NORTH LINCOLNSHIRE
GREEN
ENERGY PARK

Planning Act 2008

Infrastructure Planning (Applications Prescribed Forms and Procedure) Regulations 2009

North Lincolnshire Green Energy Park

9.38 Updated Archaeological Impact Assessment

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Acronyms and Abbreviations

Name	Description
AGI	*Above Ground Installation*
BGS	*British Geological Society*
CBMF	*Concrete Block Manufacturing Facility*
CCUS	*Carbon Capture Utilisation and Storage Facility*
CDM	*Construction Design and Management*
CIfA	*Chartered Institute for Archaeologists*
CoCP	*Code of Construction Practice*
CSM	*Conceptual Site Model*
DCLG	*Department for Communities and Local Government*
DCO	*Development Consent Order*
DHN	*District Heat Network*
DHPWN	*District Heat and Private Wire Network*
EIA	*Environmental Impact Assessment*
ERF	*Energy Recovery Facility*
ERM	*Environmental Resources Management*
ES	*Environmental Statement*
EV	*Electric Vehicle*
HE	*Historic England*
HER	*Historic Environment Record*
LPA	*Local Planning Authority*
NHLE	*National Heritage List for England*
NLC	*North Lincolnshire Council*
NLGEP	*North Lincolnshire Green Energy Park*
NPPF	*National Planning Policy Framework*

Name	Description
NPS	*National Policy Statement*
NSIP	*Nationally Significant Infrastructure Project*
PEIR	*Preliminary Environmental Information Report*
PINS	*Planning Inspectorate*
PRF	*Plastic Recycling Facility*
PWN	*Private Wire Network*
RHTF	*Residue Handling and Treatment Facility*

1. INTRODUCTION

1.1 Summary

1.1.1.1 This report provides an update of the cultural heritage impact assessment presented in ES Chapter 12 (document ref 6.2.12; examination ref APP 060) for the North Lincolnshire Green Energy Park (NLGEP) following the completion of archaeological surveys.

1.1.1.2 An overview is provided of all the archaeological research undertaken since 2021, including the geophysical, geoarchaeological and trial trench surveys that have been completed post-submission of the ES Chapter. All three reports are included here as appendices (Appendix B-D).

1.1.1.3 An updated cultural heritage gazetteer is also presented that includes seven new assets identified in the trial trench evaluation.

1.1.1.4 An updated impact assessment and summary tables are included alongside a table of assets removed from the impact assessment.

1.2 Purpose

1.2.1.1 The purpose of this document is to update the cultural heritage impact assessment presented in the ES Chapter 12 (document ref 6.2.12; examination ref APP 060) for the North Lincolnshire Green Energy Park (NLGEP) following the completion of archaeological surveys. It is intended to supplement it, not to serve as a replacement.

1.3 Scope

1.3.1.1 This updated archaeological impact deals only with predicted physical impacts to buried archaeological remains.

1.3.1.2 It does not update any of the findings relating to indirect impacts to the settings of cultural heritage assets described within ES Chapter 12 (document ref 6.2.12; examination ref APP 060), which remain as described therein.

1.3.1.3 It does not update any of the findings relating to potential impacts to the built environment described within ES Chapter 12 (document ref 6.2.12; examination ref APP 060), which remain as described therein.

1.3.1.4 It does not update any of the findings relating to potential impacts to the historic landscape described within ES Chapter 12 (document ref 6.2.12; examination ref APP 060), which remain as described therein.

1.3.1.5 An archaeological and historical background can be found in the desk based assessment in Appendix B of ES Chapter 12 (document ref 6.2.12; examination ref APP 060).

1.4 Project Description

1.4.1.1 The North Lincolnshire Green Energy Park (NLGEP) ('the Project'), located at Flixborough, North Lincolnshire, is a NSIP with an Energy Recovery Facility (ERF) capable of converting up to 760,000 tonnes of non-recyclable waste into 95 MW of electricity at its heart. It also includes a carbon capture, utilisation and storage (CCUS) facility, which will treat the excess gasses released from the ERF to remove and store carbon dioxide (CO_2) prior to emission into the atmosphere.

1.4.1.2 The NSIP incorporates a switchyard, to ensure that the power created can be exported to the National Grid or to local businesses. It includes a water treatment facility, to take water from the mains supply or recycled process water to remove impurities and make it suitable for use in the boilers, the CCUS facility, concrete block manufacture, hydrogen production and the maintenance of the water levels in the wetland area. The main project elements are shown in Figure 2. The overarching aim of the Project is to support the UK's transition to a low carbon economy as outlined in the Sixth Carbon Budget (December 2020), the national Ten Point Plan for a Green Industrial Revolution (November 2020) and the North Lincolnshire prospectus for a Green Future. It will do this by enabling circular resource strategies and low-carbon infrastructure to be deployed as an integral part of the design (for example by reprocessing ash, wastewater and carbon dioxide to manufacture concrete blocks and capturing and utilising waste-heat to supply local homes and businesses with heat via a district heating network).

1.4.1.3 The Project will include the following Associated Development to support the operation of the NSIP:

- a bottom ash and flue gas residue handling and treatment facility (RHTF)
- a concrete block manufacturing facility (CBMF)
- a plastic recycling facility (PRF)
- a hydrogen production and storage facility
- an electric vehicle (EV) and hydrogen (H2) refuelling station
- battery storage
- a hydrogen and natural gas above ground installations (AGI)
- a new access road and parking
- a gatehouse and visitor centre with elevated walkway
- railway reinstatement works including, sidings at Dragonby, reinstatement and safety improvements to the 6km private railway spur, and the construction of a new railhead with sidings south of Flixborough Wharf
- a northern and southern district heating and private wire network (DHPWN)
- habitat creation, landscaping and ecological mitigation, including green infrastructure and 65-acre wetland area

- new public rights of way and cycle ways including footbridges
- Sustainable Drainage Systems (SuDS) and flood defence
- utility constructions and diversions.

1.5 Planning background and requirements

1.5.1.1 The Project is classed as a NSIP and therefore a Development Consent Order (DCO) is required under the Planning Act 2008. The current document and the archaeological evaluation that it describes is part of the DCO Process.

1.6 Standards and Guidance

1.6.1.1 This document conforms to the following UK standards, guidance and policy:

- Chartered Institute for Archaeologists. 2019. *Code of Conduct*.
- Chartered Institute for Archaeologists. 2021. *Code of Conduct*: *professional ethics in archaeology.*
- Chartered Institute for Archaeologists. 2019. *Standard and guidance for archaeological advice by historic environment services*.
- Chartered Institute for Archaeologists. 2020. *Standards and guidance for archaeological excavation*.
- Chartered Institute for Archaeologists. 2020. *Standard and guidance for archaeological field evaluation*.
- Chartered Institute for Archaeologists. 2020. *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*.
- Chartered Institute for Archaeologists. 2020. *Standards and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*.
- Chartered Institute for Archaeologists. 2020. *Standards and guidance for the collection, documentation, conservation and research of archaeological materials*.
- Chartered Institute for Archaeologists. 2017. Updated guidelines to the standards for recording human remains.
- Historic England [formerly English Heritage]. 2004. Human Bones from Archaeological Sites: Guidelines for Producing Assessment Documents and Analytical Reports.
- Historic England. 2011. Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-Excavation (Second Edition).
- Historic England. 2015. Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record.

- Historic England. 2015. Management of Research Projects in the Historic Environment. Archaeological Excavation (PPN3).
- Historic England. 2020. Deposit Modelling and Archaeology.
- United Kingdom Institute for Conservation. 1983. *Packaging and storage of freshly excavated artefacts from archaeological sites*.

1.7 Planning & Policy

- National Policy Statements EN-1 and EN-3.
- Ancient Monuments and Archaeological Areas Act 1979 (amended by the National Heritage Act 1983 and 2003.
- Planning (Listed Buildings and Conservation Areas) Act 1990 (amended by the Enterprise and Regulatory Reform Act 2013).
- National Planning Policy Framework Section 16 (MHCLG, 2021).
- North Lincolnshire Core Strategy (North Lincolnshire Council (NLC, 2011).
- Planning for Renewable Energy Development Supplementary Planning Document (2011) - Policy 4 Heritage Assets.
- North Lincolnshire Local Plan (NLC, 2003) (Saved Policies, 2007).

2. ARCHAEOLOGICAL SURVEYS AT THE PROPOSED NLGEP

2.1 Overview of surveys

2.1.1.1 This section aims to provide an overview of the surveys conducted and their key findings. Further details can be found in the detailed reports appended to this document (Appendix B-D).

2.1.1.2 Following guidance outlined in Section 1.5, a phased approach to archaeological resource baseline gathering and assessment was taken at the proposed NLGEP. This included a Desk Based Assessment (ERM 2021), geoarchaeological investigation (AOC 2021), electrical resistivity tomography (ERT) (Wessex Archaeology 2023a), deposit modelling (AOC 2023), and geophysical survey (Wessex Archaeology 2023a).

2.1.1.3 The size and complexity of the Proposed Development, together with the relatively unknown nature of the archaeological potential of the area, meant that the fieldwork and report writing has been undertaken over a two year period and much of it undertaken after DCO submission in May 2022 (table 1).

2.1.1.4 A programme of further trial trench evaluation will be undertaken in the second half of 2023 and early 2024, followed by a programme of mitigation that includes controlled excavations and palaeoenvironmental analysis. This planned work is described in the Overarching Archaeological Mitigation Strategy (OAMS).

Table 1 Archaeological surveys at the proposed NLGEP 2019-2023

Date	Survey	References
April 2019-October 2021	Site visits and desk-based assessment	ERM 2021
November 2021	Geotechnical watching brief and preliminary deposit model	AOC 2021
October 2021-February 2022	Geophysical survey I	Wessex Archaeology 2022
April 2022-June 2022	Geoarchaeological survey I	AOC 2022a (WSI) AOC 2022b (Interim)
May 2022-April 2023	Geophysical survey II & ERT survey	Wessex Archaeology 2023a
September 2022-April 2023	Geoarchaeological survey II & radiocarbon dating	AOC 2023
December 2022-April 2023	Trial trench evaluation I	Wessex Archaeology 2023b

2.1.2 Geophysical survey

2.1.2.1 The geophysical survey consisted of magnetic surveys and ground penetrating radar.

2.1.2.2 Two types of magnetic survey were undertaken, including detailed gradiometer survey over 29.5 ha of agricultural land (Areas 3, 4 and 6) and caesium vapour magnetometry survey across 3.5 ha within Area 3. Key findings of these surveys were the identification of possible Romano-British or Iron Age square-sided enclosures within Area 4 and a possible Bronze Age circular enclosure within Area 6. Ridge and furrow, post medieval boundaries and possible extraction and refuse pits were also identified.

2.1.2.3 Ground Penetrating Radar (GPR) survey of the historic inland port area at Flixborough Staithe (Area 1) identified a regular arrangement of possible buried structural remains that closely match building and road layouts shown on historical maps. Using timeslice data, these results also demonstrate that some of these remains lie close to the surface, <0.5m below ground level (bgl). Most significantly, in terms of assessing the archaeological potential of the area, the results indicate multiple building alignments over several phases.

2.1.2.4 An electrical resistivity tomography (ERT) was also undertaken and reported within the geophysical survey report in Appendix B (Wessex Archaeology 2023a). This survey was, however, designed as part of the geoarchaeological investigation, so discussion of the results can also be found in Appendix C (AOC 2023) and are summarized in the following section.

2.1.3 Geoarchaeological survey

2.1.3.1 The initial phase of geoarchaeological investigation at the proposed NLGEP site, consisted of a watching brief of ground investigations (coring), and the development of a deposit model using historic data (AOC 2021). This investigation enabled a series of geoarchaeologically distinct zones to be recognised within the Application Land, which were used to inform both the design of further surveys and the impact assessment presented in ES Chapter 12 (document ref 6.2.12; examination ref APP 060).

2.1.3.2 The more recent geoarchaeological investigation, the full combined report of which is appended to this document as Appendix C (AOC 2023), was itself carried out over two phases in the spring and autumn of 2022. It consisted of three new core transects, two in Area 2 across the floodplain and its margins, and one in Area 4 on the high ground to the east of Flixborough Industrial estate. Single boreholes were also located within Area 1 and the southern part of Area 3.

2.1.3.3 A single borehole in Area 1 in the Area of Flixborough Staithe confirmed the findings from the preliminary deposit model, locating a thick peat deposit under more than 5m of alluvium, and extending to 11m bgl.

2.1.3.4 The two transects in the northern and southern part of Area 2 consisting of twelve new boreholes confirmed the model as described in the preliminary investigation but importantly also provided significantly higher resolution depth and thickness plots that have been crucial for assessing its archaeological potential and designing further survey .

2.1.3.5 Supplemented by two nearby ERT transects, the results confirmed that Area 2 lies almost entirely lies within Archaeological Zone 1, which is characterised by alluvial silt/warp deposit that has no recognisable horizons and measuring 2-6m thick over most of A2, under which is a thick organic/peat layer which also reaches depths of >2m over most of A2.

2.1.3.6 The investigations found that there remains some potential for prehistoric archaeology to be buried within the organic remains known to extend across A1 and A2 (archaeological zone 1), though this type of evidence (wooden trackways, boats, lithic scatters and hearths) is more likely to be concentrated on the edges of known wetland towards the southern edge of A2 and into A3 and to the east of A2.

2.1.3.7 Rangefinder radiocarbon dates of the peat deposits in Area 1 and Area 2 have now shown this peat deposit to date from the late Mesolithic to the Iron Age, which correlates to dates obtained by previous research.

2.1.3.8 The transect through Area 4 demonstrated that the Holocene windblown sands thought to possibly extend here and seal archaeological deposits were likely to be very shallow if present at all. The cores also identified natural Pleistocene gravel deposits at significantly shallower depths than anticipated.

2.1.3.9 Two optically stimulated luminescence (OSL) samples from the likely-Pleistocene age Sutton Sands, remain with the specialist laboratory. The final geoarchaeological report, included here as Appendix C will be updated and circulated to all interested parties, including NLC and Historic England, as soon as these dates are available.

2.1.3.1 Four ERT transects were recorded, one on the higher lying ground in Area 4 in the east of the Application Land (archaeological zone 3) and three within Area 2 and the northern part of Area 3, through the floodplain adjacent to the River Trent (archaeological zone 1) and the floodplain margin (archaeological zone 2). All transects were positioned perpendicular to the river. Transect 3 was split into 3 parts to avoid large drainage ditches. The results are presented in a series of profile plots (Appendix B: Figures 40-44), which at a broad level match the deposit model predictions and the results of the trial trench evaluation. Detailed interpretations can be found in Appendix B, but key findings for assessing the archaeological potential of the Application Land, are as follows:

- Transect 1 broadly matched the findings of the geoarchaeological investigation in Area 4, importantly confirming that the thick Holocene aeolian sand deposits were not present in the western half of the transect where the Gas AGI and sub-station are located.
- Transect 2 identified the thick body of alluvium and peat that characterises the wetland deposits of archaeological zone 1, and identifying a clear step in the bedrock likely to represent the former extent of the River Trent.
- Transect 3, split into 3a, 3b, and 3c is the longest transect positioned from the apex of the bend in the river, across the centre of Area 2 to the eastern edge of the Application Land in Area 6, and provides the most complete picture across the floodplain. It clearly shows the Holocene alluvium and peat becoming thinner and the underlying sands rising up towards the east, away from the river. The eastern part of transect 3 (3c) matches closely the findings from the trial trench evaluation, where sand deposits are intermittently found very close to the surface within Area 3.
- Transect 4 also supports and provides more complete understanding of the undulating sand deposits mapped by the core samples, and also confirms the observations from trial trenching that the sand deposits dip sharply under the Holocene peat and alluvium.

2.1.4 Trial trench evaluation

2.1.4.1 One hundred and sixty-eight trenches were excavated, 101 of which were aimed at assessing the archaeological potential of possible features identified through geophysical survey. Two trenches were excavated to evaluate locations identified by historical sources and two to evaluate areas adjacent to known crop marks. A further 63 trenches were excavated to evaluate areas without previously identified features.

2.1.4.2 Informed by the interim geoarchaeological reports (AOC 2022b, 2022c), and following consultation with NLC's archaeological advisor, a number of trial that were now shown to be located in areas with >2m of undifferentiated alluvium/warp silts, were scoped out of the evaluation.

2.1.4.3 The detailed deposit model provided valuable depth and thickness data which allowed trenches to target the edge of the former wetland where alluvium/warp deposit is thinner on the southern edge of Area 2. Here, trial trenches had more likelihood of reaching the surface of the peat and underlying sands and where, as noted above, there is thought to be greater archaeological potential, at the margins of the wetlands.

2.1.4.4 Nearly all the possible structural remains revealed by GPR survey lie directly beneath the current riverfront road that connects Stather Road to First Avenue and were thus considered practically unsuitable for trial trench evaluation.

2.1.4.5 Trenches were also originally positioned to sample the rest of Area 1, located throughout the industrial estate between First Avenue and Stather Road and immediately to the south of Stather Road. Subsequent discussions between interested parties including the HMS Port managers indicated that it would not be possible to undertake these trenches at this time for access reasons. Further evaluation investigations are, however, now planned in this location in the summer of 2023 (ERM 2023).

2.1.4.6 The peat deposits of high palaeoenvironmental potential are found at depths unsuitable for trial trench evaluation in Area 1 and in the northern part of Area 2. Their extent and depth is, however, well understood from a large number of borehole observations in this area.

2.1.4.7 In general, the trial trench evaluation found a poor corelation between sub-surface archaeology and that predicted by the geophysical survey. Both the large square-sided features identified as likely Romano-British or Iron Age enclosures and the penannular anomaly thought to be a possibly Bronze Age ring ditch, turned out to be natural magnetic variation.

2.1.4.8 Seventeen of the evaluation trenches were, however, found to contain archaeological features.

2.1.4.9 A number of archaeological features have not been issued asset numbers and are not considered further in the assessment as they are part of the modern or post-medieval agricultural landscape. This includes:

- a linear ditch likely to be a modern agricultural feature in the southern part of Area 2 (Trench 209);
- a furrow likely to be associated with post-medieval agricultural practices in the southern part of Area 3 (Trench 155);
- a linear hedgerow feature in the southern part of Area 3 associated with the post-medieval or modern landscape (Trench 155);

- a linear ditch likely to be a modern agricultural feature in the northern part of Area 4 (Trench 7);
- two parallel linear features in the northern part of Area 4 likely to be associated with post-medieval agricultural practices (Trench 11);
- an isolated gulley feature in the north eastern part of Area 4 (Trench 7); and
- a pit containing an animal burial that likely dates to the modern period in the south eastern part of Area 4 (Trench 37).

2.1.4.1 Potential for further investigation was identified in seven locations, six of which were newly identified and have been issued asset new numbers in the gazetteer (Table 2). This includes:

- a posthole alignment and a curvilinear ditch in the north east of Area 3 (**site 139**);
- one linear ditch feature found in the vicinity of known crop mark sites in the northern part of Area 3 (**site 140**);
- a linear ditch that corresponds to a known crop mark and may be part of a sub-rectangular enclosure in the northern part of Area 3 (**site 13);**
- a linear ditch that is sealed by a peat deposit in the middle of Area 3 (**site 141**)
- a pit and a possible enclosure in the south of Area 3 (**site 142**);
- two post-medieval refuse pits in the north east of Area 4 (**site 143**); and
- a pit and curvilinear gulley that is sealed by the peat deposit in Area 6 (**site 144**).

2.1.4.2 One trench targeting a known crop mark site (**site 13**) confirmed that it corresponded to a buried linear ditch feature.

2.1.4.3 In general, the trial trench evaluation confirmed the geoarchaeological results and the broad characterisation of zones of archaeological potential.

3. UPDATED GAZETEER

3.1.1.1 The cultural heritage gazetteer as presented in Appendix B of the ES Chapter 12 (document ref 6.2.12; examination ref APP 060) has been updated and is presented below in table 2. Ten new entries, sites 135-144, have been added, including the six new assets identified in the trial trench evaluation and four other omissions that have come to light during the examination process and ongoing consultation with NLC’s archaeological advisor, including a single and a group of Grade II listed buildings and two findspots of single lithic artefacts retrieved from ploughed fields in Area 2.

Table 2 Additional gazetteer entries

Asset Number	Asset Name	HER/NHLE No	Designation & Grade	NGR	Period	Description
135	Angel War Memorial	NHLE 1391399; MLS20272	Grade II listed building	489096E 411781N	Modern	First World War memorial. 1923 by stone mason A E Walters. White marble. Angel with spread wings, head bowed, pointing to the sky with right hand and holding a laurel wreath in the left. Stands on square pedestal inscribed in black lettering on all sides.
136	45 and 47, Old Crosby	NHLE 1083615; MLS5851	Grade II listed buildings	489236E 412169N	Post-medieval	Late C18 - early C19 two-storey house, divided into 2 dwellings c1900. Local red brick with pantiled roof.
137	Flint flake, east of Neap House	MLS19347	N/A	486260E 413300N	Early Neolithic to Early Bronze Age - 4000 BC to 1501 BC	An incomplete secondary flake of till B flint with some post-depositional damage.
138	Flint flake, north of Park Ings Store	MLS19348	N/A	486420E 413980N	Early Neolithic to Early Bronze Age - 4000 BC to 1501 BC	An incomplete tertiary flake of till A flint, with some post-depositional damage.
139	Line of postholes and curvilinear ditch, west of Skippingdale Roundabout	N/A	N/A	487384E 412933N	Late prehistoric to modern	Four sub-rectangular post-holes in a single linear arrangement and a narrow curvilinear ditch/gulley found in adjacent evaluation trenches. Three crop mark sites, sites 11b and 12 are located close to site 139, suggesting the latter may be associated with these possible settlement sites. A modern origin for this site cannot however be ruled out at this stage.
140	Linear ditch north of the Phoenix Parkway/Ferry Road West junction	N/A	N/A	486841E 412752N	Late prehistoric to modern	Wide (1.90m) but shallow (0.35m) ditch. Unknown age. Three crop mark sites, sites 11a, 11b and 13, are known in the vicinity of site 140 suggesting the latter may be associated with these possible settlement sites.

Asset Number	Asset Name	HER/NHLE No	Designation & Grade	NGR	Period	Description
141	Linear ditch in the third field south of Phoenix Parkway/Ferry Road West junction	N/A	N/A	486375E 411725N	Late prehistoric to medieval	Deep linear feature, sealed by a peat deposit. Unknown age but unlikely to be a modern feature.
142	Pit and enclosure, west of Nuddock Wood Lakes	N/A	N/A	485827E 409464N	Late prehistoric to modern	A small, bowl-shaped pit and a nearby gulley found in adjacent evaluation trenches. The gulley feature turns sharply at an almost right angle and may be part of an enclosure. Unknown age.
143	Two post medieval refuse pits, on high ground to the north east of Flixborough Industrial Estate	N/A	N/A	486598E 415026N	Post-medieval	Two large features thought to be refuse pits with post-medieval clay pipes and pottery.
144	Circular pit and curvilinear gulley, north west of Skippingdale Industrial Park	N/A	N/A	487132E 414098N	Late prehistoric to medieval	Very shallow circular pit and a wide and very shallow curvilinear gulley. Both features are sealed by a peat deposit. Unknown age but unlikely to be a modern feature.
11a[1]	Linear cropmarks and possible enclosure	MLS21377	N/A	486895E 413001N	Late prehistoric to medieval	Two parallel, north-south linear cropmarks of unknown date. At the northernmost point of these cropmarks are three sides of a possible enclosure, with small and irregular internal features. Other minor cropmarks are also visible at the southern end of the ditches.

[1] This site has been renumbered since the production of the DBA and submission of the ES. The former site 11, now known as site 11b is a crop mark that was first identified by ERM during DBA research and had not previously been recorded in the HER for North Lincolnshire. Subsequently this site was mistakenly conflated with a crop mark site in the adjacent field to the west, previously recorded in the HER as MLS21377, which has now been issued the site number 11a.

4. FURTHER INVESTIGATIONS AND MITIGATION

4.1.1.1 A programme of further evaluation and mitigation has been discussed with NLC's archaeological advisor. A summary note on these further archaeological works is included in table 6 and is outlined in detail in the Overarching Archaeological Mitigation Strategy (OAMS) (ERM 2023).

5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

5.1.1.1 The methodology set out below is taken from ES Chapter 12 (document ref 6.2.12; examination ref APP 060), and can be summarised as follows:

- identify baseline heritage assets defined as a result of data collection, collation and analysis;
- assess the value/significance of baseline heritage assets and the contribution made by their settings to their value/significance;
- identify and define the magnitude of impact and the significance of the effects resulting from construction and operation of the Project; and
- if possible, identify the spatial extent and techniques to be employed for mitigation measures to reduce the significance of the effects.

5.2 Assessment of Value

5.2.1.1 Baseline heritage assets will be assigned a level of heritage value in accordance with a four-point scale presented in Table 3. This table provides guidance on the elements that contribute to heritage significance (or value). Professional judgement will be applied in all cases regarding the appropriate level of significance to be assigned to individual heritage assets and justified in the text.

5.2.1.2 The nature and character of Conservation Areas varies greatly; from urban areas to houses set in country parks. The special character of these areas is derived from the quality of their buildings and elements that contribute significance and character to the wider landscape. In consideration of this variation, Conservation Areas feature in both the High and Moderate value categories. Professional judgement will be applied to determine the appropriate value category for each Conservation Area.

Table 3 Criteria to assess the value of heritage assets

Value	Criteria
High	■ World Heritage Sites ■ Grade I and Grade II* Listed Buildings ■ Grade I and Grade II* Registered Parks and Gardens ■ Scheduled Monuments ■ Registered Battlefields ■ Conservation Areas (as appropriate)

	■ Non-designated heritage assets (archaeological sites, buildings, monuments, parks, gardens or landscapes) that can be shown to have demonstrable national, international or universal importance (value) ■ Burial Grounds and Cemeteries ■ Well preserved historic landscape character areas, exhibiting considerable coherence, time-depth or other critical factor(s)
Moderate	■ Grade II listed Buildings ■ Conservation Areas (as appropriate) ■ Grade II Registered Parks and Gardens ■ Locally listed buildings as recorded on a local authority list ■ Non-designated heritage assets (archaeological sites, buildings, monuments, parks, gardens or landscapes) that can be shown to be of regional importance (value) ■ Historic Townscapes with historic integrity in that the assets that constitute their make-up are clearly legible ■ Averagely well-preserved historic landscape character areas with reasonable coherence, time-depth or other critical factor(s)
1. Low	■ Non-designated heritage assets (archaeological sites, buildings, monuments, parks, gardens or landscapes) that can be shown to be of limited or of local interest only (value) ■ Assets whose values are compromised by poor preservation or survival or of contextual associations to justify inclusion into a higher grade ■ Historic landscape character areas whose value is limited by poor preservation and/or poor survival of contextual associations
2. Not Significant	■ Assets identified as being of no historic, evidential, aesthetic or communal interest ■ Assets whose values are compromised by poor preservation or survival or of contextual associations to justify inclusion into a higher grade ■ Landscape with no or little significant historical interest

5.2.2 Setting

5.2.2.1 Assessments of impact on the setting of heritage assets has been carried out in accordance with GPA3, Historic England's guidance on the Setting of Heritage Assets (Historic England 2017b).

5.2.2.2 The setting of a heritage asset is defined as:

> '*The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral'* (NPPF Annex 2, Glossary).

5.2.2.3 Setting can contribute to the significance of a heritage asset. It is acknowledged that setting may be affected by other factors, including noise. Where relevant, the contribution of the existing sound environment to the significance of the heritage asset will be identified and the potential change to this will be considered as part of the assessment process.

5.3 Magnitude of Impact

5.3.1.1 Impacts can be direct or indirect, and can be characterised in terms of temporal scope, scale, duration, reversibility and the likelihood of the impact occurring. Table 4 below presents factors influencing assessment of magnitude of impact on the basis of five ratings.

Table 4 Factors influencing assessment of magnitude of impact

Impact rating	Description of impact
High	■ Change such that the significance of the asset is totally altered or destroyed. Comprehensive change to setting affecting significance, resulting in changes in our ability to understand and appreciate the resource and its historical context and setting
Medium	■ Change such that the significance of the asset is affected. Changes such that the setting of the asset is noticeably different, affecting significance resulting in changes in our ability to understand and appreciate the resource and its historical context and setting
Low	■ Change such that the significance of the asset is slightly affected ■ Changes to the setting that have a slight impact on significance resulting in changes in our ability to understand and appreciate the resource and its historical context and setting
1. Minimal	■ Changes to the asset that hardly affect significance. Changes to the setting of an asset that have little effect on significance and no real change in our ability to understand and appreciate the resource and its historical context and setting
2. No change	■ The Project does not affect the significance of the asset. ■ Changes to the setting that do not affect the significance of the asset or our appreciation of it

5.4 Significance of effect

5.4.1.1 Assessment of the significance of effects will consider embedded mitigation associated with the Project. Embedded mitigation is presented in section **Error! Reference source not found.**.

5.4.1.2 Assessment of the level of overall significance of the effect is determined by cross-referencing the value of the heritage asset and the magnitude of impact upon it as shown in Table 5.

5.4.1.3 Major and moderate levels of effect are considered significant effects. Effects can be either adverse, neutral or beneficial.

Table 5 Matrix for establishing significance of effect

	Magnitude of impact				
Value	**High**	**Medium**	**Low**	**Minimal**	**No change**
High	Major	Major	Moderate	Minor	Neutral
Moderate	Major	Moderate	Minor	Minor	Neutral
1. Low	Moderate	Minor	Minor/negligible	Negligible	Neutral

	Magnitude of impact				
Value	High	Medium	Low	Minimal	No change
2. Not significant	Negligible	Negligible	Negligible	Negligible	Neutral

6. UPDATED IMPACT ASSESSMENT

6.1.1.1 The following impact assessment is presented for each Development Area[2] in turn. An impact assessment is provided for each new asset identified, and each asset where there has been a change in impact assessment, following the post-submission surveys. A summary impact assessment table can be found in Table 6, which includes all sites where an impact is predicted, including those where the impact assessment has remained the same. The trial trench evaluation has also demonstrated that a number of assets will not be impacted by the Proposed Development (Table 7).

6.2 Area 1

6.2.1.1 The impact assessment for assets within Area 1 remains as is detailed in ES Chapter 12 (document ref 6.2.12; examination ref APP 060).

6.3 Area 2

6.3.1.1 The impact assessment for assets within Area 2 remains as is detailed in ES Chapter 12 (document ref 6.2.12; examination ref APP 060).

6.4 Area 3

6.4.1.1 The following section describes the archaeological assets within Area 3 from east to west and then north to south along the route of the DHPWN.

6.4.2 Site 139

6.4.2.1 **Site 139** is a new asset number assigned to a linear alignment of four sub-rectangular postholes and curvilinear ditch, west of Skippingdale Roundabout, identified in two adjacent evaluation trenches (Trenches 115 and 116) in the north eastern part of Area 3 to the north of Phoenix Parkway (east-west portion of the DHPWN corridor) (Appendix D: Figure 13).

6.4.2.2 Three crop mark sites, **sites 11b and 12** are located close to **site 139**, suggesting the latter may be associated with these possible settlement sites. A modern origin for this site cannot however be ruled out at this stage.

[2] Following discussion with North Lincolnshire's archaeological advisor, it was decided to employ the term Development Area in place of Impact Area, as previously used. The geographical extent of the Impact Areas matches exactly the Development Areas used here.

6.4.2.3 Noting that we do not know the full extent, age and character of the asset, yet employing a precautionary approach, the value of such remains is considered to be **low to moderate**, the magnitude of impact is considered to be **low to medium**. The overall effect therefore is considered to be **minor to moderate** (a not significant to significant effect).

6.4.3 Site 140

6.4.3.1 **Site 140** is a new asset number assigned to a linear ditch feature identified in evaluation trenches 102 and 103 in the northern part of Area 3 to the north of Phoenix Parkway (east-west portion of the DHPWN corridor) (Appendix D: Figure 12).

6.4.3.2 Three crop mark sites, sites 11a, 11b and 13 are known in the vicinity of **site 140** suggesting the latter may be associated with these possible settlement sites.

6.4.3.3 Noting that we do not know the full extent, age and character of the asset, yet employing a precautionary approach, the value of such remains is considered to be **low to moderate**, the magnitude of impact is considered to be **low to medium**. The overall effect therefore is considered to be **minor to moderate** (a not significant to significant effect).

6.4.4 Site 13

6.4.4.1 **Site 13** is an existing asset number documented in the HER database as a sub-rectangular crop mark site (MLS20572). The likely enclosure feature is situated in the northern part of Area 3 (north-south portion of the DHPWN corridor) (Appendix D: Figures 12 & 28), on slightly elevated ground at the junction of the B1216 and A1077, where a raised sand deposit is visible on satellite and Lidar imagery. The recent trial trench evaluation (Trench 101) confirmed the archaeological nature of this asset, demonstrating that it corresponds to a buried ditch feature and that this feature extends into the DHPWN works corridor.

6.4.4.2 Although no artefactual evidence was recovered, the remains of charred 'free-threshing' bread wheat found within its fill indicating the feature, which was previously thought to be late prehistoric in origin, is in fact likely to date from the early medieval to post-medieval period.

6.4.4.3 The new results confirm the predicted construction impact assessment as reported in the ES chapter (document ref 6.2.12; examination ref APP 060), which is as follows*: the value of such remains is considered to be **moderate**, the magnitude of impact **low** as and the overall effect therefore **minor** (not a significant effect)*. Note that the magnitude of impact is considered to remain as low because only a maximum of 25% of the extent of this feature would be within the DHPWN corridor.

6.4.5 Site 141

6.4.5.1 **Site 141** is a new asset number assigned to a linear ditch feature identified in evaluation trench 124 in the middle part of Area 3 (north-south portion of the DHPWN corridor) (Appendix D: Figure 14).

6.4.5.2 Though the evaluation did not produce any dating evidence, **site 141** was sealed by a thin peat deposit and, pending further radiocarbon dating, is therefore, likely to pre-date the post-medieval drainage of this area.

6.4.5.3 Noting that we do not know the full extent, age and character of the asset, yet employing a precautionary approach, the value of such remains is considered to be **low to moderate**, the magnitude of impact is considered to be **low to medium**. The overall effect therefore is considered to be **minor to moderate** (a not significant to significant effect).

6.4.6 Site 142

6.4.6.1 Site 142 is a new asset number assigned to a gulley feature and circular pit feature identified in evaluation trench 155 and 154 respectively. The asset is located in the southern part of Area 3 (north-south portion of the DHPWN), adjacent to Nuddock Wood Lakes (Appendix D: Figures 16, 18.2 & 29).

6.4.6.2 The shape of the gulley feature in plan is indicative of an enclosure feature and therefore likely to be associated to a settlement site rather than serving a drainage or field boundary function.

6.4.6.3 Noting that we do not know the full extent, age and character of the asset, yet employing a precautionary approach, the value of such remains is considered to be **low to moderate**, the magnitude of impact is considered to be **low to medium**. The overall effect therefore is considered to be **minor to moderate** (a not significant to significant effect).

6.5 Area 4

6.5.1 Site 143

6.5.1.1 Site 144 is a new asset number assigned to two post medieval pits identified by trial trench evaluation (Trench 24) situated on the high ground in the north east of Area 4 (future mitigation/landscaping) (Appendix D: Figure 9 & 18.1).

6.5.1.2 Based on the presence of ceramic building material and clay pipe and two iron objects within the pit fills, the site has been interpreted as a post-medieval refuse location. One sherd of late medieval pottery was also recovered.

6.5.1.3 The value of such remains is considered to be **low**, but the magnitude of impact **medium due to the potential for tree roots to disturb the pit features. The** overall effect is therefore **Minor** (not a significant effect).

6.6 Area 6

6.6.1 Site 144

6.6.1.1 **Site 144** is a new asset number assigned to a circular pit and a curvilinear gulley identified by trial trench evaluation (Trench 58) in the north of Area 6 (flood bund around chicken farm), to the north west of Skippingdale Industrial Park (Appendix D: Figure 11). The presence of an electricity pylon and overhead cable meant that Trench 58 was repositioned to the west, along the edge of flood bund footprint. And it not yet known whether **site 144** extends into the works area but because of its proximity this is assumed to be the case.

6.6.1.2 Though the evaluation did not produce any dating evidence, the archaeological features that make up **site 144** were shown to be sealed by a thin peat deposit and are therefore, pending further radiocarbon dating, likely to pre-date the post-medieval drainage of this area. The full extent and character of the features present is not yet known yet their shallow depth and form in plan and section indicates that they are unlikely to have served an agricultural function.

6.6.1.3 Two crop mark sites, **sites 8 and 9** are located within 100m of **site 143**, suggesting the latter may be associated with these likely multi-phased settlement sites.

6.6.1.4 The value of such remains is considered to be **moderate**, and noting that we do not know the full extent of the asset, or whether it will be impacted by the construction works, yet employing a precautionary approach, the magnitude of impact is considered to be **medium**. The overall effect therefore is considered to be **moderate** (a significant effect).

6.7 Residual impacts

6.7.1.1 The mitigation measures consist of archaeological excavation and recording. Whilst entirely necessary to prevent the loss of information, archaeological excavation does not have an effect on the residual impact of a project. The loss of the resource during groundworks that physically remove a resource remains the same.

7. CONCLUSIONS

7.1.1.1 This section summarises the conclusions of the impact assessment for the NLGEP project as a whole including the key findings from the original impact assessment presented in ES chapter 12 (document ref 6.2.12; examination ref APP 060).

7.2 Impact Assessment

7.2.1.1 Significant physical effects have been identified on the following three known heritage assets:

- deep sequences of organic deposits of probable prehistoric date (with potential to contain associated archaeology) within the footprint of the ERF and infrastructure, as well as the footprints of the concrete block, visitor centre and plastic recycling facilties (**site 134**);
- buried structural remains at Flixborough Staithe associated with medieval and post-medieval river port (**site 7**); and
- buried archaeological features located to the north west of Skippingdale Industrial Park on the site of the proposed flood bund (**site 144**).

7.2.1.2 Trial trench evaluation has also identified potential significant physical effects on the following four heritage assets, which require further investigation before the effects can be appropriately assessed:

- buried archaeological features to the west of Skippingdale Roundabout on the site of the proposed DHPWN (site 139);
- buried archaeological features to the north of the Ferry Road West/A1077 junction on the site of the proposed DHPWN (site 140);
- buried archaeological features to the north of the Frodingham Grange Roundabout on the site of the proposed DHPWN (site 141); and
- buried archaeological features to the west of Nuddock Wood Lakes inside the DHPWN corridor (site 142).

7.2.1.3 In addition, the construction of the ERF will have a significant effect on the setting of the 'Flixborough Nunnery' (medieval settlement of North Conesby) scheduled monument (**site 78**).

7.2.1.4 There will also be a significant adverse effect on the Axholme Fens HLCA.

7.2.1.5 The trial trench evaluation has demonstrated that there will be no adverse effects on the following two heritage assets:

- archaeological features identified by desk-based analysis and geophysical survey (**site 133**) on the site of the proposed Gas AGI/substation site to the east of Flixborough Industrial Estate; and
- the site of a World War 2 searchlight near Neap House (**site 10**).

7.2.1.6 There remains potential for significant physical effects on as yet unidentified heritage assets, both in Area 1 which has not yet been investigated with trial trenches, and in areas where the trial trench evaluation highlighted archaeological/palaeoenvironmental potential such as the wetland margins in southern Area 2/northern Area 3.

7.3 Enhancement

7.3.1.1 These enhancement proposals are put forward in the context of the significant impacts on the setting of the scheduled site of Flixborough Nunnery and on the historic landscape. While there are no clear options for direct mitigation of such impacts, engagement with local communities and other interested stakeholders provides a way of enhancing knowledge, appreciation and access to the cultural heritage of the area.

7.3.1.2 The site of the former excavation and medieval settlement of North Conesby is currently overgrown and has no signage or information. It is therefore recommended that the Project should work with local organisations (e.g. Scunthorpe Museum/local heritage groups) to improve management and information sharing for the public relating to the site.

Table 6. Predicted Construction Impacts

Asset number	Area	Asset name/ description	Revised/ new asset	Value	Description of impact	Magnitude of impact	Significance of effect	Mitigation	Residual effects
7	A1	Flixborough Staithe	No revision	Moderate	Likely to be substantial impacts on the remains of the medieval and post-medieval settlement associated with the river port	Medium	Moderate	Record by controlled archaeological excavation.	Moderate
13	A3	Enclosure, south of Ferry Road West	Revised description of impact	Moderate	Partial disturbance of buried remains of settlement	Low	Minor	Record by controlled archaeological excavation.	Minor
78	A1	Flixborough Saxon nunnery & site of All Saints burial ground.	No revision	High	The addition of the ERF and its 120m high stack does mark a substantial additional industrialisation of what remains a largely rural landscape today.	Low	Moderate	No suitable mitigation.	Moderate
119	A4	Lime kilns (site of), east of Flixborough	Mitigation revised	Low	Potential removal or partial removal of buried remains	Low	Minor	Close archaeological supervision of landscaping works.	Minor
124	A2	Brick Kiln, Flixborough Staither	No revision	Low	Potential removal or partial removal of buried industrial remains	Medium	Minor	If deemed appropriate following results of further evaluation, recommended mitigation would take the form of controlled excavation.	Minor
132	A1	Flixborough Ferry jetty	No revision	Low	Indirect effects on setting	Low	Minor	Record at low water to form a permanent record of their form and current condition.	Minor

Asset number	Area	Asset name/ description	Revised/ new asset	Value	Description of impact	Magnitude of impact	Significance of effect	Mitigation	Residual effects
134	A1 & A2	Deep sequence of peat deposits between 4.70-6.70m to 11.70-12.30m bgl	Revised mitigation	Moderate	Likely to be substantial impacts on buried alluvial organic deposits	Medium	Moderate	Target Bunker Hall for archaeologically supervised machine stripping in controlled spits. Supported by additional palaeoenvironmental and geoarchaeological sampling and analysis and interpretation of existing core samples across A1 & A2.	Moderate
139	A3	Line of postholes and curvilinear ditch, west of Skippingdale Roundabout	New asset	Low to moderate	Potential removal or partial removal of buried remains of settlement	Low to medium	Minor to moderate	If deemed appropriate following results of further evaluation, recommended mitigation would take the form of controlled excavation.	Minor to moderate
140	A3	Linear ditch north of the Phoenix Parkway/Ferry Road West junction	New asset	Low to moderate	Potential removal of buried post medieval or modern agricultural or boundary feature	Low to medium	Minor to moderate	Record by controlled archaeological excavation.	Minor to moderate
141	A3	Linear ditch in the third field south of Phoenix Parkway/Ferry Road West junction	New asset	Low to moderate	Potential removal of buried late prehistoric to medieval agricultural or boundary feature	Low to medium	Minor to moderate	Record by controlled archaeological excavation.	Minor to moderate
142	A3	Pit and enclosure, west of Nuddock Wood Lakes	New asset	Low to moderate	Potential removal or partial removal of buried remains of settlement	Low to medium	Minor to moderate	Record by controlled archaeological excavation.	Minor to moderate

Asset number	Area	Asset name/ description	Revised/ new asset	Value	Description of impact	Magnitude of impact	Significance of effect	Mitigation	Residual effects
143	A4	Two post medieval refuse pits, on high ground to the north east of Flixborough Industrial Estate	New asset	Low	Potential removal or partial removal of buried remains of settlement	Medium	Minor	Close archaeological supervision of landscaping works.	Minor
144	A6	Circular pit and curvilinear gulley, north west of Skippingdale Industrial Park.	New asset	Moderate	Potential removal or partial removal of buried remains of settlement	Medium	Moderate	If deemed appropriate following results of further evaluation, recommended mitigation would take the form of controlled excavation.	Moderate

Table 7. Archaeological assets removed from the impact assessment

Asset number	Asset name	Previous assessment				Reason removed from impact assessment
		Value	Magnitude of impact	Significance of effect	Residual effects	
9	Cropmarks, Atkinsons Warren	Moderate	Low	Minor	Minor	Trial trench evaluation demonstrated that the crop marks do not extend into the footprint of ground disturbing activities associated with the construction of the flood bund adjacent to this asset. There will therefore be no disturbance of buried remains of settlement as previously predicted.
10	Neap House WWII searchlight battery	Low	High	Moderate	Moderate	Trial trench evaluation did not identify any physical remains associated with the WWII searchlight battery. There will therefore be no disturbance of buried remains of settlement as previously predicted.
11	Linear cropmarks and possible enclosure	Moderate	Low	Low	Minor	Trial trench evaluation demonstrated that the crop marks do not extend into the footprint of ground disturbing activities associated with the construction of the flood bund adjacent to this asset. There will therefore be no disturbance of buried remains of settlement as previously predicted.

Asset number	Asset name	Previous assessment				Reason removed from impact assessment
		Value	Magnitude of impact	Significance of effect	Residual effects	
12	Enclosure, west of Holyrood Drive	Moderate	Low	Minor	Minor	Trial trench evaluation demonstrated that the crop marks do not extend into the footprint of ground disturbing activities associated with the construction of the flood bund adjacent to this asset. There will therefore be no disturbance of buried remains of settlement as previously predicted.
123	Site of limekiln quarry	Low	Low	Minor	Minor	Trial trench evaluation did not identify any physical remains associated with the lime kiln site. There will therefore be no disturbance of buried remains as previously predicted.
133	Land east of Flixborough Industrial Estate	Moderate	High	Moderate	Moderate	Trial trench evaluation demonstrated that the geophysical anomalies that were interpreted as possible archaeological features were not archaeological. There will therefore be no disturbance of buried remains of settlement as previously predicted.

7.3.1.3 A programme of public engagement to communicate the results of archaeological field investigation will enhance public understanding and appreciation of the historic environment. In particular the history of Flixborough Staithe – from its origins as a medieval river port to the disaster of 1974 – should be documented and shared with the public, using appropriate media including information displays at the proposed visitor centre. This should again be done in collaboration with local organisation/heritage groups.

7.3.1.4 Aside from the mitigation excavations and sampling of peats in the proposed Bunker Hall area, there are no clear options for an appropriate mitigation strategy for most of the deep sequences of Holocene organic deposits that are found across the vast majority of Application land. It is therefore recommended that the Project should work with local communities and interested academics in the broader Humber region to develop information displays about the palaeoenvironmental potential of this asset, with a focus on reconstructing the landscape through time.

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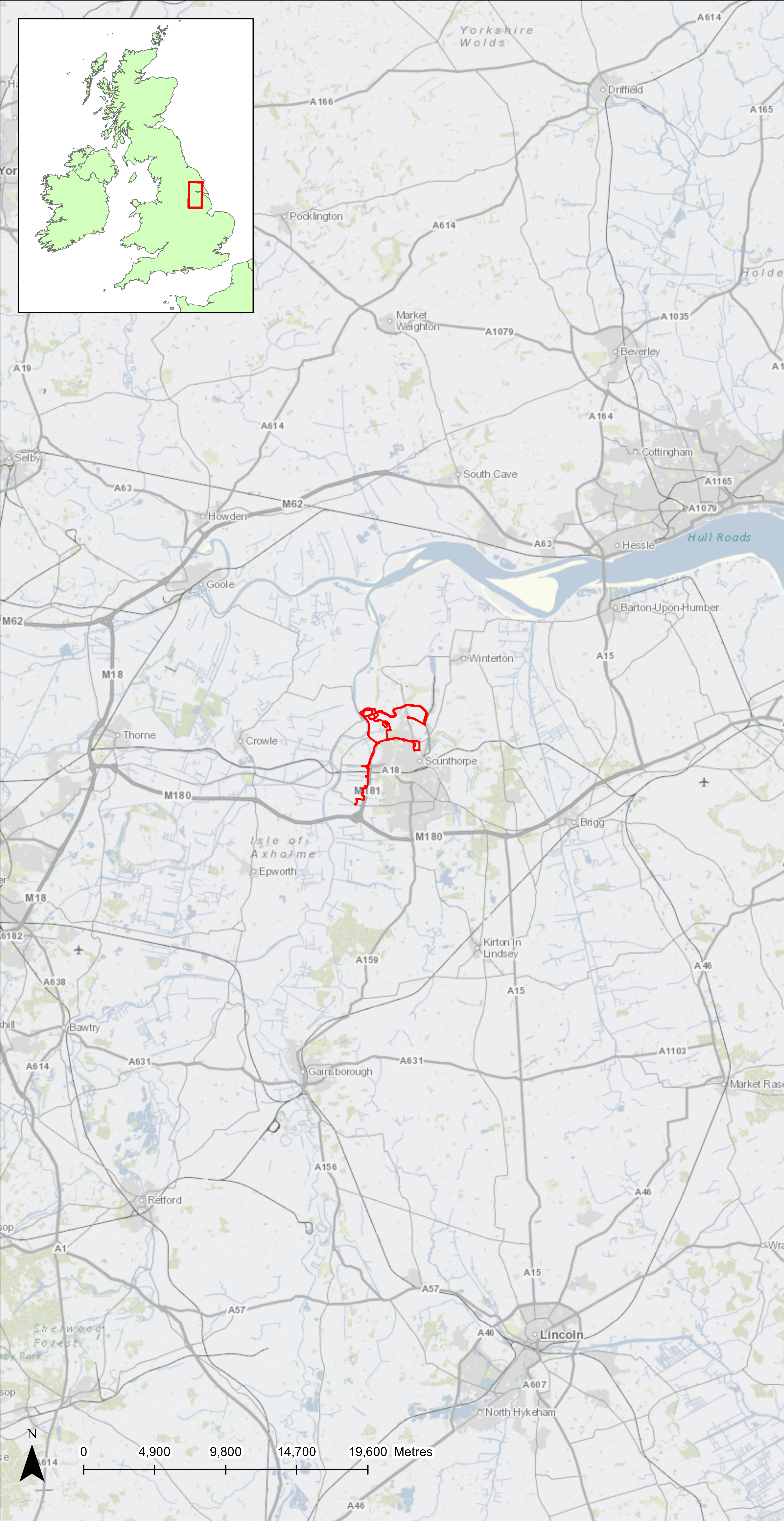
APPENDIX A FIGURES



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title	Figure 1 NLGEP Project Location

Client Information

Client	North Lincolnshire Green Energy Park Ltd
PINS Proj No	010116
Date	09/05/2023
Drawn by	MTC
Checked by	NW
Version	P0

Map Information

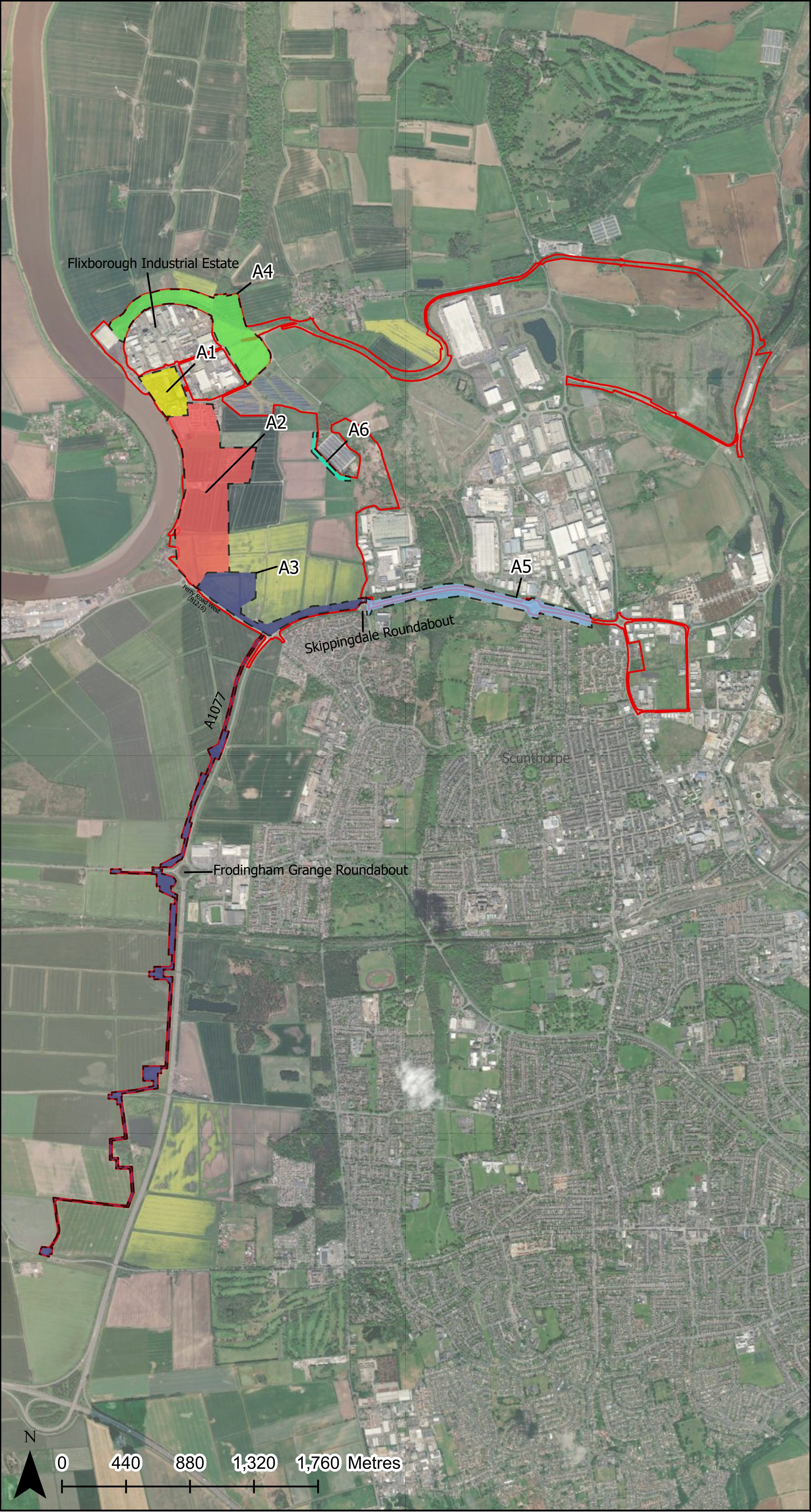
CRS EPSG	27700
CRS Name	British National Grid
Scale	250,007
ArcMap File	HER_ES_SiteLocation_A01

Legend

Order Limits

Layer Source Information

DO NOT SCALE THIS DRAWING



NORTH LINCOLNSHIRE GREEN ENERGY PARK

ERM

North Lincolnshire Green Energy Park

Title The NLGEP Project area, Order Limits and Development Areas

Figure 2

Client Information

Client	North Lincolnshire Green Energy Park Ltd.
PINS Proj No	EN010116
Date	05/05/2023
Drawn by	MW
Checked by	CA
Version	P0

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	1:35,000

ArcMap File

D:\ERM\solar\6. GIS\mw\IA_18022022_mw.aprx

Legend

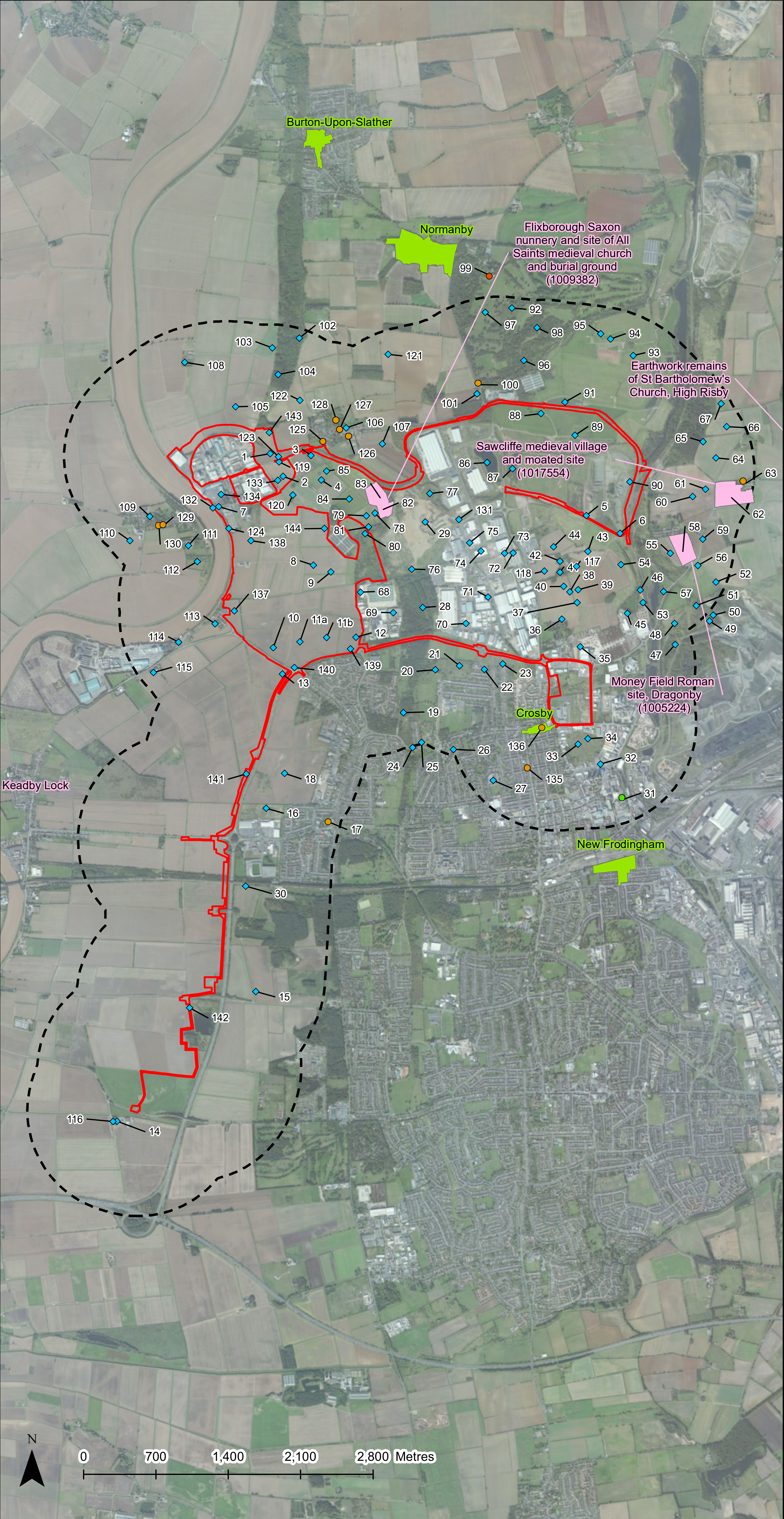
Areas

- 1
- 2
- 3
- 4
- 5
- 6
- Order Limits

Layer Source Information

World Imagery: Maxar, Microsoft
World Street Map: Esri UK, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS© Crown copyright and database rights 2021 OS Licence 100035409 Reproduced with the permission of the National Library of Scotland

DO NOT SCALE THIS DRAWING



North Lincolnshire Green Energy Park

Title	Figure 3 The NLGEP Project Area Showing Designated and Undesignated Sites

Client Information

Client	North Lincolnshire Green Energy Park Ltd.
PINS Proj No	EN010116
Date	09/05/2023
Drawn by	MTC
Checked by	CLQ
Version	P1

Map Information

CRS EPSG	27700
CRS Name	British National Grid
Scale	35,001
ArcMap File	

HER_ES_ProjectArea_Designated_NonDesignatedAssets_A01

Legend

- Order Limits
- Non-Designated Assets

Listed Buildings

- Grade I Listed Building
- Grade II Listed Building
- Grade II* Listed Building
- Scheduled Monuments
- Conservation Area
- 1km Buffer

Layer Source Information

Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

DO NOT SCALE THIS DRAWING

APPENDIX B GEOPHYSICAL SURVEY REPORT

North Lincolnshire Green Energy Park, Scunthorpe, North Lincolnshire

Detailed Gradiometer, Caesium Vapour, ERT and Ground-Penetrating Radar Survey Report

Report Ref.:
254050.03 May 2023

wessexarchaeology

Portway House
Old Sarum Park
Salisbury
Wiltshire
SP4 6EB

[redacted]

Document Information

Document title	North Lincolnshire Green Energy Park, Scunthorpe, North Lincolnshire
Document subtitle	Detailed Gradiometer, Caesium Vapour, ERT and Ground-Penetrating Radar Survey Report
Document reference	254050.03
Client name	ERM
Address	2nd Floor Exchequer Court 33 St Mary Axe London EC3A 8AA
Site location	Scunthorpe
County	North Lincolnshire
National grid reference	Area 3 485700 408450 (SE 85700 08450) to 489050 412845 (SE 89050 12845) Area 4 486650 414600 (SE 86650 14600) Area 6 487200 413900 (SE 87200 13900)
Statutory designations	None
WA project name	North Lincolnshire Green Energy Park
WA project code	254050
Dates of fieldwork	27/10/2021 – 28/10/2021 02/11/2021 – 04/10/2021 22/12/2021 14/01/2022 03/02/2022 – 04/02/2022 02/11/2022 – 03/11/2022 27/02/2023 – 02/03/2023
Fieldwork directed by	Amy Dunn, Cameron Ray, Filippo Carozzo
Project management by	Chris Breeden
Document compiled by	Alexander Schmidt
Contributions from	Tom Richardson, Brett Howard, Rok Plesnicar
Graphics by	Rok Plesnicar & Brett Howard

Quality Assurance

Issue	Date	Author	A[redacted]	
1	23/11/2021	AJS	[redacted]	TR
2	31/01/2022	AJS / BH / RP	[redacted]	CB
3	11/03/2022	AJS / BH / RP	[redacted]	TR
4	13/05/2022	AJS / BH / RP	[redacted]	TR
5	14/12/2022	AJS / BH / RP	[redacted]	PE
6	10/03/2023	AJS / BH / RP / NLC	[redacted]	NLC
7	10/05/2023	AJS / BH / RP / NLC	[redacted]	NLC

Contents

List of Figures

Summary

A series of geophysical surveys were conducted over land outlined for the development of the North Lincolnshire Green Energy Park, Scunthorpe, North Lincolnshire (Area 3 between NGR 485700 408450 and 489050 412845; Area 4 centred on 486650 414600; Inland Port centred on 486090 414316). This comprises a detailed fluxgate gradiometer survey together with more targeted caesium vapour gradiometer, Ground Penetrating Radar (GPR), and Electrical Resistivity Tomography (ERT) surveys. The project was commissioned by ERM with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application.

The magnetic survey comprises 18 arable fields and consists of a detailed gradiometer survey over 29.5 ha of land (Areas 3, 4, 5 and 6) and caesium vapour magnetometry survey across 3.5 ha (Area 3). These surveys were undertaken between the 27 and 28 October, 2 and 4 November 2021, 14 January, 3 – 4 February and 2 and 3 November 2022 and have demonstrated the presence of several anomalies of potential archaeological interest. For example, possible Bronze Age funerary activity has been noted in the form of a ring ditch in Area 6, although this is in an area of increased magnetic response, making the interpretation tentative. In addition, a substantial number of anomalies associated with ridge and furrow cultivation has been revealed by the surveys. In addition, two large enclosures have been identified in the south-eastern portion of Area 4. Elsewhere in Area 4, numerous linear and curvilinear anomalies have been identified spanning almost the entire survey area, which could evidence settlement activity.

Numerous weakly positive discrete anomalies are interpreted as evidence of possible extraction or refuse pits in the gradiometer survey. However, this interpretation is not confident as these anomalies could equally be natural in origin. Several further anomalies thought to indicate natural variation in the underlying geological deposits have been identified throughout Area 3 and 4. This comprises localised variation in the magnetic susceptibility of the underlying superficial deposits such as the Warp deposits contained in Area 4 and E5. In addition, other variations in bedrock geology and natural fissures have also been widely identified in the form of weakly positive interconnected sinuous anomalies. The remaining anomalies are interpreted as modern in origin and predominantly associated with recent agricultural activity. Further, highly ferrous anomalies associated with an underlying service as well as extant pylons have also been identified in Area 4 and 5 respectively.

The GPR survey was undertaken at the Inland Port area on 22 December 2021 covering approximately 0.16 hectares of area. This survey revealed a series of high amplitude linear and rectilinear features that are potentially the remains of former buildings on the site and the line of a former road.

The ERT survey comprised four transects surveyed between 25 April and 4 May 2022, and 27 February to 2 March 2023. This has identified palaeochannel deposits potentially associated with a former course of the River Trent in Transects 2 and 3. Transect 1 has confirmed glacial geology identified with the magnetic survey and Transect 3c and 4 has also likely identified upstanding blown sand landforms within the floodplain, which were previously identified as cropmarks.

Acknowledgements

Wessex Archaeology would like to thank ERM for commissioning the geophysical survey. The assistance of Charles Le Quesne is gratefully acknowledged in this regard.

The fieldwork was undertaken by Amy Dunn, Cameron Ray, Andres Perez Arana, Jo Instone-Brewer Filippo Carrozzo and Rok Plesnicar. Alexander Schmidt and Rok Plesnicar processed and interpreted the geophysical data. Alexander Schmidt, Brett Howard, Rok Plesnicar and Nicholas Crabb wrote the report. The geophysical work was quality controlled by Tom Richardson. Illustrations were prepared by Rok Plesnicar and Brett Howard. The project was managed on behalf of Wessex Archaeology by Chris Breeden.

North Lincolnshire Green Energy Park, Scunthorpe, North Lincolnshire

Detailed Gradiometer, Caesium Vapour, ERT and Ground-Penetrating Radar Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by ERM to carry out a geophysical survey to support the North Lincolnshire Green Energy Park Scheme. This is separated into several areas. Area 3 is located between NGR 485700 408450 and 489050 412845 to the west of Scunthorpe, Area 4 is centred on NGR 486650 414600 to the east of the Flixborough Industrial Estate and Area 6 is centred on NGR 487200 413900 (**Figures 1** – **10**).

1.1.2 The proposed development comprises a new Green Energy Park located at Flixborough Industrial Estate.

1.2 Scope of document

1.2.1 This report presents a brief description of the methodology followed by the detailed survey results and the archaeological interpretation of the geophysical data.

1.3 The site

Area 3

1.3.1 Area 3 is located west of the town of Scunthorpe, North Lincolnshire and covers the land between NGR 485710 408440 and 489050 412845. This comprises 26.6 ha of agricultural land. On the eastern side, the area is bounded by the M181 and A1077 and extends between Burringham Road to the south and Ferry Road to the north.

1.3.2 This area is located on relatively flat land, located between 2 m – 3 m above Ordnance Datum (aOD).

1.3.3 The solid geology comprises sedimentary bedrock of Mercia Mudstone Group with overlying superficial geological deposits of Warp (clay and silt), and Alluvial (clay, silt, sand, and gravel) deposits to the north of Ferry Road (BGS 2021).

1.3.4 The soils underlying the site are likely to consist of gleyic brown calcareous earths of the 532b (Romney) association (SSEW SE Sheet 1 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Area 4

1.3.5 Area 4 is located at the eastern edge of the Flixborough Industrial Estate, centred on NGR 486650 414600. This comprises 3.5 ha of agricultural land. The area is bounded by Flixborough Industrial Estate to the west, Stather Road to the south and First Avenue to the north. To the east, the area extends as further agricultural land.

1.3.6 The area is on a slight incline sloping from 11 m aOD at the northern edge to 7 m aOD at the southern edge.

1.3.7 The solid geology comprises Mudstone of the Penarth Group at the western part of the area and Mudstone and Limestone of the Scunthorpe Mudstone Formation in the eastern part of the area. Overlying superficial geological deposits comprise clay and silt of Hemingbrough Glaciolacustrine Formation (BGS 2021).

1.3.8 The soils underlying the site are likely to consist of typical brown sands of the 551d (Newport 1) association (SSEW SE Sheet 1 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey

Area 6

1.3.9 Area 6 is located to the north of the town on Scunthorpe and 1 km south of the village of Flixborough, centred on NGR 487200 413900.

1.3.10 The area comprises 1.4 ha of arable land spread across two land parcels. The north-eastern area is bounded by a field boundary, to the east, south and west it extends as further agricultural land.

1.3.11 The area is situated in flat land at 4 m aOD.

1.3.12 The solid geology comprises Mudstone, Siltstone, and Sandstone of Triassic Rocks in the western part and Mudstone, Siltstone, Limestone, and Sandstone of the Lias Group in the eastern part of the area. Overlying superficial geological deposits comprise Alluvial clay, silt, and sand in the western part and Blown Sand deposits to the east (BGS 2021).

1.3.13 The soils underlying the site are likely to consist of gleyic brown calcareous earths of the 532a (Blacktoft) association (SSEW SE Sheet 1 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Inland Port

1.3.14 The inland port area consists of 0.39 hectares of industrial works centred on NGR 486090 414316.

1.3.15 The site forms part of RMS Ports Flixborough Wharf and is located at its southern entrance. Ground conditions consisted of a tarmac entrance and roadway along with loose material storage areas and buildings.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a prior DBA (ERM 2021), which considered the recorded historical environment resource within a 1 km study area of the proposed development. The DBA used information from the North Lincolnshire Historic Environmental Record (NLHER) and the National Heritage List for England (NHLE). Additional sources of information are referenced, as appropriate. The DBA relates to the entire scheme and presents a detailed account of the archaeological and historical environment. This summary of the historic assets will be comprised of elements considered relevant to the geophysical survey.

2.2 Archaeological and historical context

2.2.1 There is one scheduled monument within the 1 km study area. Flixborough Saxon nunnery and the site of All Saints medieval church and burial ground (NHLE 1009382) are located 1 km to the east of Area 4.

2.2.2 There are six Grade II listed buildings within the study area. The Smithy (NHLE 1161486), Dovecote (NHLE 1103757), the Church of All Saints (NHLE 1103756), and Liliac Cottage

(NHLE 1161472) are located in the village of Flixborough. The Berkley Hotel (NHLE 1426932) and Angel of War memorial (NHLE 1391399) are located in Scunthorpe.

2.2.3 Several microliths, cores, flakes, scrapers, and two ‘leaf-shaped’ arrowheads and Bronze Age pottery were found 300 m to the north of Area 3, at the site of Skippingdale Retail Park.

2.2.4 Prehistoric flint flakes were found within Area 4. Furthermore, a scraper and seven flakes were found 200 m north of Area 4.

2.2.5 Several features were excavated 250 m to the north-east of Area 4. Finds included a Neolithic pit containing pottery sherds, a Middle Bronze Age cinerary urn, a poorly preserved Iron Age crouched inhumation with grave goods, an Iron age storage jar, and a Roman pit containing burnt bone, pottery, and nails.

2.2.6 A Bronze Age ring ditch was identified 400 m to the east of Area 3, during a geophysical survey on Brumby Common West, in 2014-15. It was interpreted as the remains of a potential Bronze Age round barrow.

2.2.7 A ‘heart-shaped’ enclosure, visible as a crop mark on an aerial photograph taken in 1989, is located immediately west of Holyrood Drive, 100 m to the north of Area 3. The described and depicted form of the feature suggests an Iron Age feature.

2.2.8 A fragmentary sub-rectangular enclosure is visible as a crop mark on aerial photographs taken in 1989. The enclosure is located on a discrete area of sand immediately south of Ferry Road West located within Area 3. It measures 44 m x 50 m and appears to have a conjoined section of ditch on its western side. At least one internal pit is visible in the southern half of the enclosure. Recent Environment Agency Lidar survey information indicates that this enclosure is located on a raised area 1 m above the surrounding land.

2.2.9 A field walking survey was undertaken in advance of a proposed residential development, about 200 m east of Area 3, which recovered 16 pieces of flint, as well as post-medieval and modern material. The finds comprised two early Neolithic blades, a Neolithic or early Bronze Age end scraper, two primary flakes, a tertiary flake, two retouched flakes, and eight pieces of unworked flint.

2.2.10 Two ditches, one containing Iron Age pottery, were recorded during an archaeological evaluation in 2015 located 500 m to the east of Area 3.

2.2.11 At least four Roman coins were recovered in Bridge Field during metal detecting in 2000, 200 m to the north-east of Area 4.

2.2.12 Parallel linear cropmarks with a possible enclosure at the northern end are visible on aerial photographs, taken in 1995. They suggest an Iron Age or Roman stock or settlement enclosure within its immediate farming landscape. This is situated 120 m to the north of the western part of Area 3.

2.2.13 A findspot of a bronze coin of Victorinus was found on the allotments 400 m to the south of the eastern extent of Area 3. However, this was the site of former ironstone mining, and the topsoil has been replaced. Another roman coin from the 3rd century was found 350 m to the east of Area 3.

2.2.14 A post-medieval linear crop mark, visible on an aerial photograph is located 370 m to the north of Area 4.

2.2.15 Post-medieval cropmark remains of a series of parallel linear ditches, probably defining trackways, are located 150 m to the west of Area 3, by the train line. These ditches are on the same orientation as a major post-medieval warping drain complex to the north and may be related and contemporary.

2.2.16 Post-medieval Old Park Farm was located on Park Farm Road. The site is beneath the Foxhills Industrial Estate 500 m to the north of Area 3.

2.2.17 Several post-medieval grange farmhouses are located within the buffer area; however, they are not listed. None the less they indicate to rural nature of the area in the post-medieval period.

2.2.18 Post-medieval cropmarks of warping drains and field boundaries were identified during a geophysical survey in 2005 and a desk-based assessment in 2006. They were identified 250 m to the east of Area 3.

2.2.19 A Second World War heavy anti-aircraft battery was located to the east of Neap House Farm between Areas 3 and 5 and was removed in later 20th century.

2.2.20 The site of Area 235 Number 13 searchlight battery at Frodingham is located 250 m east of Area 3. The battery was established during the Second World War in 1940 by Number 30 Searchlight Regiment and it was manned by 316 Searchlight Battalion. It was equipped with one 150 cm projector with a sound locator and five normal 90 cm projectors. It was demolished during the 20th century.

2.2.21 Within the Inland Port area lies the site of the Flixborough Staithe historic port. This port had medieval origins and was the site of the eastern landing of the ferry crossing across the River Trent. The ferry crossing and associated buildings can be identified on early historic mapping such as the Snape 1778 survey and the 1885 1st Edition Ordnance Survey. The 1885 map specifically identifies Ferry Boat Inn as being located within this area.

3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical surveys were undertaken by Wessex Archaeology's in-house geophysics team in multiple phases between October 2021 and March 2023.

3.1.2 The gradiometer survey was undertaken between the 27 and 28 October, 2, 4 November 2021, 14 January 2022, 4 February 2022 and the 2 and 3 November 2022. Field conditions were adequate throughout the period of survey. An overall coverage of 29.5 ha has been achieved (Area 3 totalling 10.2 ha gradiometer survey and 3.5 ha caesium vapour magnetometry; Area 4 totalling 13.74 ha; Area 6 totalling 1.5 ha).

3.1.3 The Ground-Penetrating Radar survey (GPR) was undertaken on the 22 December 2021. Due to the survey site being a working port with multiple obstructions, including buildings and material storage, 0.16 of the proposed 0.39 hectares was successfully surveyed.

3.1.4 The Electric Resistance Tomography (ERT) survey was undertaken over four transects between the 25 April and 4 May 2022, and 27 February to 2 March 2023. Field conditions at the time of the survey were favourable throughout the period of survey. Transect 3 was split into three sections (A, B, and C) due to the presence of field ditches and there were slight reductions to Transect 2 due to spreading and spraying in the survey area partway through the survey.

3.1.5 The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation (WSI) (Wessex archaeology 2021), as well as to current best practice, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014) and European Archaeologiae Consilium (Schmidt *et al.* 2015).

3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices; and

  To inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

3.2.2 In order to achieve the above aims, the objectives of the geophysical survey are:

- To conduct a geophysical survey covering as much of the specified area as possible, allowing for on-site obstructions;
- To clarify the presence/absence of anomalies of archaeological potential; and
- Where possible, to determine the general nature of any anomalies of archaeological potential.

3.3 Fieldwork methodology

Gradiometer survey

3.3.1 The cart-based gradiometer system used a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems. Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

3.3.2 The detailed gradiometer survey was undertaken using four Bartington Grad-01-1000L gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart. Data were collected with an effective sensitivity of 0.03 nT at a rate of 10 Hz, producing intervals of 0.15 m along transects spaced 4 m apart.

3.3.3 The detailed gradiometer survey was also undertaken using four SenSys FGM650/3 magnetic gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart. Data were collected with an effective sensitivity of ±8 µT over ±1000 nT range at a rate of 100 Hz, producing intervals of 0.02 m along transects spaced 4 m apart.

Caesium Vapour survey

3.3.4 The caesium vapour magnetometer surveys were conducted using two Geometrics G-864 sensors mounted 1 m apart on a non-ferrous cart. Data was collected at intervals no greater than 0.25 m along transects spaced 1 m apart with an effective sensitivity of 0.02 nT, in accordance with EAC guidelines. A Geometrics G-857 base station was also used to correct for diurnal magnetic drift when processing the data.

GPR survey

3.3.5 The GPR survey was conducted using an Impulse Radar Raptor 45 array. This multi-channel GPR system uses separate shielded transmitter and receiver antennae placed in an arrangement that allows it to be manually pushed across the area. The Raptor system contains eight separate transmitter and receiver antennae with a central frequency of 450 MHz. The data were recorded every 2.5 cm with a horizontal profile spacing of 8 cm within a time window of 100 ns.

3.3.6 The GPR system provides real-time positioning enabling full site coverage without the need to set up individual grid nodes across the survey areas. However, in order to ensure survey accuracy, the boundaries of the survey extent were established using a real-time kinematic

(RTK) Global Navigation Satellite System (GNSS) instrument. This allows positions to be determined with sub-decimetre accuracy and therefore exceeds EAC recommendations.

ERT Survey

3.3.7 The ERT data was collected using an IRIS Syscal Pro with up to 72 electrodes arranged with a spacing of 1 or 2 m between electrodes (dependent on proposed transect length). These were positioned along a series of linear transects distributed across the accessible parts of the site.

3.3.8 ERT works by injecting electrical current into the ground between a pair of electrodes and measuring the voltage between another pair. By repeating these measurements along an array of probes on the surface, and using a number of different electrode separations, it is possible to determine changes in resistivity (Ω·m) with increasing depth. Different subsurface materials respond differently to this applied electrical current and generally, areas with high clay content are characterised by lower resistivity values, and those with low clay content, such as sands and gravel or bedrock, will be displayed as higher resistivity. However, the specific resistivity values for any material are dependent on lithology, ground-water content, and porosity.

3.3.9 Prior to the recording of ERT data points a resistance measurement (Rs check) is taken of the whole dipoles in order to check that all the electrodes are correctly connected and that there is good ground contact. If this indicated that the line was open (electrode not correctly connected), improvements were made to the contact resistances at the ground surface, thus reducing the collection of 'bad' data points.

3.3.10 A Leica RTK GNSS GPS instrument, which is precise to approximately 0.02 m, was used to record the position of each electrode. This GPS data was used to correct the ERT profiles for topographic changes.

3.4 Data processing

Gradiometer and Caesium vapour processing

3.4.1 Magnetic data from the survey were subjected to minimal correction processes using in-house software. These comprise a 'destripe' function (±5 nT thresholds), applied to correct for any variation between the sensors, and an interpolation used to grid the data and discard overlaps where transects have been collected too close together.

GPR processing

3.4.2 Data from the survey were subjected to minimal correction processes. These comprise a background removal median function with an effective window of 60 m, applied to correct for any variation between the sensors, a discard overlaps function where transects have been collected too close together and an interpolation used to grid the data.

3.4.3 GPR data from the survey were subjected to common radar signal correction processes. These include amplitude and wobble correction of the radar profile to correct for variance in temperature and soil moisture content, and background and bandpass filtering to remove noise in the data from the surrounding area. Further details of the geophysical and survey equipment, methods and processing are described in Appendix 1.

3.4.4 The approximate depth conversion for the 450 MHz antenna is shown in Table 1. These have been calculated on the assumption that the GPR pulse through the ground is 0.066 m/ns for the 450 MHz antenna. It is possible to determine more precisely the average velocity of the GPR pulse through the ground is excavated features at a known depth can be identified in the data. Radargrams were analysed for suitable hyperbolic reflections, which can be used to determine the velocity of the GPR pulse through the subsurface deposits.

Table 1 Relative velocity to depth conversion based on a dielectric constant of 20.51 for the 450 MHz antenna

Time Slice	Time (ns)	Depth (m)	Time Slice	Time (ns)	Depth (m)
1	0-4.49	0–0.15	**11**	45.02-49.52	1.49-1.64
2	4.5-8.99	0.15-0.3	**12**	49.53-54.02	1.64-1.79
3	9.0-13.50	0.3-0.45	**13**	54.03-58.52	1.79-1.94
4	13.51-18.00	0.45-0.6	**14**	58.53-63.02	1.94-2.09
5	18.01-22.50	0.6-0.75	**15**	63.03-67.53	2.09-2.24
6	22.51-27.00	0.75-0.89	**16**	67.54-72.03	2.24-2.39
7	27.01-31.51	0.89-1.04	**17**	72.04-76.53	2.39-2.53
8	31.52-36.01	1.04-1.19	**18**	76.54-81.03	2.54-2.68
9	36.02-40.51	1.19-1.34	**19**	81.04-85.54	2.68-2.83
10	40.52-45.01	1.34-1.49			

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

ERT processing

3.4.6 Data from the ERT survey were processed using the commercially available RES2DINV software to produce topographically corrected pseudo-sections.

3.4.7 An inversion process was undertaken to convert the apparent resistivity values into pseudo-sections of estimated subsurface resistivity. The inversion routine used by the RES2DINV program is an iterative process based on the smoothness-constrained least-squares method. The results of this are then plotted against the depth for each midpoint in the electrode configuration. The main advantage of this method is that the damping factor and roughness filters can be adjusted to suit different types of data.

3.4.8 Where necessary, 'bad' data points were exterminated to remove erroneously high or low data values before the calculation of an inverted model. Such values do not represent true resistivity measurements and are usually caused by systematic or random noise due to poor ground contact.

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

4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

4.1 Introduction

Gradiometer and Caesium Vapour

4.1.1 The geophysical survey has identified magnetic anomalies across the scheme. Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:2000 (**Figures 11** to **36**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale images.

4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous responses, burnt or fired objects, and magnetic trends (**Figures 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

4.1.5 Gradiometer and Caesium Vapour survey may not detect all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

GPR

4.1.6 The 450 MHz GPR antenna used in this survey has the potential of detecting features to a depth of 2 – 4 m in optimal conditions, however the total depth reached varies depending on the specific conditions of each area.

4.1.7 For ease of interpretation, the most representative timeslices have been selected for presentation with the interpretation image detailing the salient results from each relevant depth of the two areas. For this report, it was decided that **Timeslice 2**, **3**, **4**, and **5** would be chosen as these best represent the data. For reference, the depth from surface for the timeslices are detailed in Table 1.

4.1.8 The GPR survey has identified several planar returns and linear responses, as well as anomalous areas of low amplitude response across the survey area. Results are presented as a series of greyscale timeslices, and archaeological interpretations at a scale of 1:800 (**Figures 37** - **39**).

4.1.9 All features are described in terms of their geophysical character. It is important to stipulate that all the depths referred to in this report are approximate levels below the current ground surface. The interpretation of the GPR data highlights the presence of possible archaeological features and high/low amplitude responses representing planar and linear reflections.

4.1.10 It should be noted that small features and waterlogged features may produce responses that are below the detection threshold of the GPR antenna. Excessive disturbance can also impede the ability of geophysical techniques to detect archaeology. It may therefore be the case that more archaeological features are present than have been identified through the geophysical survey.

ERT

4.1.11 The ERT survey results are presented as a series of colour-scale pseudo-sections with annotative interpretations (**Figures 40** – **44**). Transects 1-4 are presented at approximately the same vertical and horizontal scale, with a vertical exaggeration of 2, but as the maximum depth of survey was lower in Transects 3c and 4, a vertical exaggeration of 4 was applied to maximise the identification of variability in the near-surface.

4.1.12 A logarithmic colour scale is used to enhance resistivity contrasts within each Transect. As transects 1 and 4 exhibited greater variations in resistivity a colour scale ranging from 0 to 300 Ω·m was applied (**Figures 40, 44**). However, to enhance the more subtle resistivity contrasts in pseudo-sections for transects 2 and 3(a-c), an alternative scale from 0-120 Ω·m was used (**Figures 41 to 43**). In both cases, these values were selected to enhance the visibility of subsurface features and deposits, as well as facilitate comparison across the entire dataset, where low resistivity values are displayed as blue and high resistivity as yellow/red.

4.1.13 The interpretation of the datasets highlights the presence of archaeologically relevant topographic features and provides information on the identifiable stratigraphic units across the site. This is currently based on the results of the ERT survey, available nearby borehole data, and BGS geological data.

4.1.14 All of the depths referred to in this report are approximate levels below the current ground surface. As the ERT profile data is topographically corrected, these values are given relative to metres above Ordnance Survey Datum (m OD).

4.1.15 It should be noted that the specific resistivity response of the ERT survey depends on moisture contrasts in the soil and that these fluctuate depending on the time of year, weather, vegetation, etc. Excessive disturbance can also impede the ability of geophysical techniques to detect subsurface features. It may therefore be the case that more features are present than it has been possible to identify through the geophysical survey.

4.2 Detailed gradiometer survey results and interpretation

Area 3

4.2.1 A weakly positive fragmented linear anomaly at **3000** has been identified to the south of Brumby Common Lane, in the southern part of Area 3 (**Figure 16**). It is up to 2 m wide and runs on the east to west orientation for 80 m. After 17 m it branches towards SSW for additional 35 m where it exits the survey area. This ditch-like feature likely indicates an old field boundary that predates available historical mapping.

4.2.2 In the northern portion of Area 3, to the north of A 1077, a weak positive oval fragmented anomaly at **3001** (**Figure 24**) has been identified. The anomaly is up to 2.5 m wide and covers a space of 17 m by 8 m on an ENE – WSW orientation. It indicates a ditch-like feature of a possibly archaeological origin. Its broad magnetic response and non-distinct boundaries, however, suggest a natural origin. Further investigation would be required to confirm this.

4.2.3 To the east of **3001**, is a weak positive curvilinear anomaly at **3002** (**Figure 24**). It is up to 2 m wide and runs on a north-east to south-west orientation for 14 m before it turns south-east for an additional 18 m. It indicates a ditch-like feature of an unknown origin; however, its weak magnetic response and poorly defined edges suggest a natural origin.

4.2.4 Two weak positive linear anomalies at **3003** and **3004** have been identified further to the east of **3002** (**Figures 24, 26**). They are 2 m wide and 100 m long on a WNW – ESE orientation and 27 m long on a north – south orientation respectively. These anomalies indicate ditch-like features and show former field boundaries or land drains that are absent on available historical mapping.

4.2.5 A broad, weakly positive linear anomaly is noted at **3005** in the north-eastren part of Area 3 (**Figure 26**). The anomaly extends to the north for 30 m and is 2.5 m wide. This could indicate an unrecorded boundary. However, the anomaly could also be earlier in origin indicating a disassociated ditch feature.

4.2.6 Numerous positive, discrete anomalies have been identified across the northern part of Area 3. Examples of these anomalies are noted at **3006** (**Figure 26**). These anomalies indicate pit-like features and could evidence wider settlement activity such as localised extraction or refuse pits. However, it is equally possible these anomalies are natural, pertaining to localised variation in the magnetic susceptibility of the topsoil, or underlying geological deposits.

4.2.7 Broadly spaced (4 m), weakly positive and negative linear anomalies are noted in near **3006**, at **3007** (**Figure 26**). The anomalies are on a north-west to south-east alignment. These anomalies indicate ridge and furrow based on the spacing between the anomalies. This type of feature date from the medieval to post-medieval period.

4.2.8 An area of increased magnetic response **3008** has been identified in the southern portion of Area 3 (**Figure 12**). It extends for 70 m east – west and covers the width of the survey area. This anomaly indicates made ground and is considered to be modern.

4.2.9 An area of variable positive and negative responses has been identified at the southern end of Area 3, at **3009** (**Figures 12, 14**). It covers the entire surveyed area for 250 m but has little discernible pattern or coherence to it. This is indicative of the natural alluvial sediments recorded in the area.

4.2.10 To the north of the area of alluvial deposits is an area of increased magnetic response at **3010** (**Figure 14**). It covers the entire width of the survey area and is 60 m long from south-west to north-east. This is indicative of made ground and could relate to the construction of the adjacent M181.

4.2.11 An irregular area of increased magnetic response at **3011** has been identified 220 m to the south of **3000** (**Figure 16**). It is 82 m long and 22 m wide and extends beyond the eastern survey boundary. It is considered to be a surface spread of magnetically enhanced material. Another area of increased magnetic response at **3012** has been identified 166 m to the north of **3011** (**Figure 16**). It has an oval shape and indicates pit-like features, backfilled with magnetically enhanced material. This kind of anomaly is usually associated with backfilled extraction pits, however, there is no evidence to support this at this location.

4.2.12 A weakly negative, broad anomaly is located in the central portion of Area 3 at **3013** (**Figure 18**). It is 20 m wide, 90 m long, and extends beyond the survey area, continuing to the north of Doncaster Road **3014** (**Figure 18**). This subtle feature is visible in aerial photography and relates to a major warping drain.

4.2.13 An area of increased magnetic response is noted in the central portion of the surveyed area at **3015** (**Figure 18**). This anomaly extends 30 m north – south and covers the breadth of the survey area. This is thought to be modern in origin and likely associated with the construction of the adjacent highway.

4.2.14 Several weakly positive, discrete anomalies have been identified in the central portion of Area 3. Examples of these anomalies are noted at **3016** (**Figure 20**). These anomalies indicate pit-like features and could evidence wider settlement activity, such as localised extraction or refuse pits. However, it is equally possible these anomalies are natural, pertaining to localised variation in the magnetic susceptibility of the topsoil or geological deposits.

4.2.15 The majority of the area presents with broad areas of weakly positive response, such as at **3017** (**Figure 20**). This is likely to be evidence of localised variation in the magnetic susceptibility of the geological deposits and is therefore interpreted as natural in origin.

4.2.16 A strong linear dipolar anomaly at **3018** has been identified in the northern portion of Area 3 (**Figure 22**). It is up to 4 m wide and traverses the survey area on a WNW – ESE orientation and indicates a ditch-like feature that was backfilled with magnetically enhanced material. Located 185 m to the north is another dipolar linear anomaly at **3019** on a similar alignment (**Figure 22**). It is up to 3 m wide and traverses and is indicating a ditch-like feature. Both features were identified as old field boundaries, as they appear on 1908, 2nd edition OS mapping.

4.2.17 Several weakly positive discrete anomalies have been identified in the northern portion of Area 3, to the north of B1216 Ferry Road West, at **3020** (**Figure 24**). They are up to 2 m in diameter and indicate pit-like features. These pits could indicate archaeological activity; however, it is more likely that they are a consequence of natural pitting and undulations in the superficial deposits.

4.2.18 About 20 m to the south of **3020** are two areas of increased magnetic response at **3021** and **3022** that relate to made ground at the entrance to the field (**Figure 24**).

4.2.19 Two areas of increased magnetic response have been identified to the east of **3004** at **2023** and **3024** (**Figure 26**). The anomaly at **3023** appears to curve broadly parallel to the south-western corner of the field. The anomaly at **3024** measures 31 m east – west and has not been fully realised at its northern extent due to the limit of the survey area. The anomalies are most likely modern and associated with recent agricultural activity.

4.2.20 A highly magnetic response has been identified in the central portion of the surveyed area at **3025** (**Figure 26**). This corresponds to two extant pylons along the bisecting field boundary.

Area 4

4.2.21 Two large enclosures are noted to south-east of Area 4 (**Figure 30**). The first is at **4000** and covers 62 m x 37 m. The second is at **4001** and covers 62 m x 39 m. The relative similarity in the size of these enclosures as well as their shared alignment to the ridge and furrow anomalies suggests their potential as evidence of earlier enclosure features. Such features are likely to be medieval in origin.

4.2.22 A fragmented positive linear anomaly has been identified in the far south-east of the area at **4002** (**Figure 30**). The anomaly is 40 m long on a north-east to south-west alignment and could evidence a further ditch feature. This shares an alignment with the enclosures at **4000** and **4001** but due to its fragmented nature, cannot be more confidently interpreted.

4.2.23 In the south-east of the area, a weakly positive rectilinear anomaly is noted at **4003** (**Figure 30**). This anomaly extends from the southern boundary of the survey area for 22 m before turning to the west-south-west for a further 18 m. The anomaly is 1 m wide and parallel to anomalies interpreted as ridge and furrow in the area. The anomaly may also indicate a contemporary boundary feature that is not recorded on the available historical mapping. However, an earlier origin cannot be ruled out.

4.2.24 The majority of the field surrounding the anomalies interpreted as archaeological in the south-east of Area 4 (**4000** – **4003**) presents with a highly variable magnetic background (**Figure 30**). The majority of this is interpreted as evidence of natural variation in the underlying superficial deposits. However, ditch- and pit-like features have been identified throughout that an anthropogenic origin cannot be ruled out. However, due to the variable magnetic background and density of these anomalies, a confident interpretation cannot be ascribed. Several curvilinear anomalies are noted which could indicate earlier boundary features or even evidence of settlement activity (**4004**). However, further investigation would be required to confirm this. The anomalies are largely fragmented, likely as a result of the ridge and furrow recorded in this area. This suggests a potential prehistoric origin. However, the anomalies could equally be natural.

4.2.25 In the north of the area, a weakly positive recti-linear anomaly has been identified at **4005** (**Figure 34**). The anomaly measures 13 m north – south and 15 m east – west. To the east, two parallel linear anomalies are noted at **4006** and **4007**. These anomalies are on the same alignment and spaced 13 m apart. These anomalies indicate ditch features and may relate to a series of small enclosures or earlier boundary features. However, the anomalies are weak and could evidence modern agricultural activity.

4.2.26 Two broader parallel linear anomalies are noted on an north – south alignment in the north of the area at **4008** and **4009** (**Figure 34**). The anomalies are up to 2 m wide, spaced 93 m apart and span the breadth of the surveyed area for 40 m. These anomalies indicate ditch features and could evidence former boundary features. However, due to their weak magnitude, a more confident interpretation is not possible.

4.2.27 Further to the east at **4010**, a weakly positive linear anomaly has been identified (**Figures 32, 34**). This anomaly is 1 m wide and spans the breadth of the surveyed area on a north-west to south-east alignment for 90 m. The anomaly could evidence an earlier boundary ditch. However, the anomaly is broadly on a similar alignment to anomalies interpreted as land drains to the east (**4020**) and as such, could be associated with drainage.

4.2.28 In the east of the area at **4011**, a positive, curvilinear anomaly has been identified (**Figure 32**). This is 1 m wide and 23 m long. This evidences a ditch and could be anthropogenic. However, the anomaly is isolated, and a more confident interpretation is not clear from the results of the geophysical survey alone.

4.2.29 Towards the south-east of the area, a weakly positive linear anomaly has been identified at **4012** (**Figure 30, 32**). This is 148 m long and up to 1.5 m wide. This type of anomaly indicates a ditch and is most likely associated with a boundary feature of unknown date.

4.2.30 Numerous weakly positive, discrete anomalies have been identified across Area 4. Examples of these anomalies are noted at **4013** (**Figure 30**). These anomalies indicate pit-like features and could evidence wider settlement activity, such as localised extraction or refuse pits. However, it is equally possible these anomalies are natural, pertaining to localised variation in the magnetic susceptibility of the topsoil, or underlying geological deposits.

4.2.31 Broadly spaced (5 – 6.5 m), weakly positive and negative linear anomalies are noted in the eastern portion of the area at **4014** (**Figure 30**). The anomalies are on a west-north-west to east-south-east alignment. These anomalies indicate historical cultivation and are interpreted as evidence of ridge and furrow based on the spacing between the anomalies. This type of feature date to the medieval or post-medieval period.

4.2.32 In the east of the area, weakly positive, sprawling sinuous anomalies have been identified at **4015** (**Figure 32**). The lack of any regular shape or pattern suggests this area of anomalies is natural in origin. It is indicative of cracking or fissures in the bedrock, backfilled with natural material.

4.2.33 A broader area of positive magnetic variation is noted traversing the eastern portion of the area on a north – south alignment at **4016** (**Figure 32**). Similar variations are noted continuing throughout the area to the south-east at **4017** and **4018** (**Figure 30**). These anomalies are evidence of natural variation in the magnetic susceptibility of the underlying geological deposits.

4.2.34 Broadly spaced, weakly dipolar linear anomalies have been identified in the western portion of the area at **4019** (**Figure 34**). The anomalies are noted in both a parallel linear and a ‘herringbone’ array. These anomalies indicate material that has been burnt or fired, such as ceramic. Similarly spaced, positive linear anomalies are noted in the south-east of the area at **4020**. These are interpreted as drains.

4.2.35 Closely spaced, parallel linear anomalies have been identified throughout the eastern portion of Area 4 at **4021** (**Figure 30**). These anomalies are interpreted as evidence of the modern ploughing regime.

4.2.36 Across the southern boundary of the north-western portion of Area 4, an alignment of increased magnetic response is noted at **4022** (**Figure 32**). This is adjacent to a trackway and considered to be modern in origin.

4.2.37 A highly magnetic dipolar linear anomaly is noted traversing the western boundary of the east of Area 4 at **4023** (**Figure 30**), continuing to the south at **4024** (**Figure 30**). This indicates a modern service, such as a pipe or cable.

Area 6

4.2.38 A positive, fragmented, annular anomaly at **6000** is located in the northern part of Area 6 (**Figure 28**). It has a diameter of 18 m, and it is up to 1.5 m wide indicating a ditch-like feature. It likely relates to a ring-ditch feature, such as a Romano-British/Iron Age roundhouse or round barrow of possible Bronze age date. Several small finds and a location of a possible round barrow dated to the Bronze age have been identified in the wider landscape. The location of this ring-ditch within an area of increased magnetic response (**6004**) prevents a more confident interpretation.

4.2.39 A positive broad oval anomaly at **6001** has been identified in the southern part of Area 6 (**Figure 28**). It is 13 m long by 12 m wide and indicates a large pit-like feature. This feature could be related to material extraction; however, it is more likely that is a result of natural undulations in the alluvial deposits.

4.2.40 To the south of **6001** is a weak positive linear anomaly at **6002** that has an east – west alignment (**Figure 28**). It is up to 1.5 m wide by 92 m long and traverses the survey area. It relates to a former field boundary that is visible on the 1908 OS mapping.

4.2.41 Two large dipolar amorphous anomalies at **6003** and **6004** have been identified in the southern and northern portions of the site (**Figure 28**). They indicate spreads of enhanced magnetic material, likely related to modern agricultural practices.

4.2.42 Numerous positive and dipolar linear anomalies were identified throughout the site. They are associated with ploughing and land drains.

4.3 Caesium vapour magnetometer survey results and interpretation

Area 3

4.3.1 The caesium vapour survey has identified several anomalies that are interpreted as possible archaeology (**3100**) (**Figure 36**). These pertain to pit-like anomalies similar to those identified throughout the detailed gradiometer survey results. These anomalies are positive, 1 – 2 m in breadth and could evidence wider settlement activity such as refuse or extraction pits. However, the anomalies could equally be natural in origin, pertaining to localised variation in the magnetic susceptibility of the topsoil or underlying geological deposits.

4.3.2 Large areas of weakly increased magnetic response are noted throughout the dataset (**3101**) (**Figure 36**). These anomalies correspond to features visible throughout the landscape in aerial imagery as cropmarks and indicate localised natural variation in the alluvial deposits.

4.3.3 A large area of increased magnetic response has been identified, dominating the eastern and central portion of the surveyed area at **3102** (**Figure 36**). This type of response indicates a greater variation in the magnetic susceptibility of the underlying deposits. As such these anomalies are likely to be natural in origin, consisting of different deposits to the surrounding variation. It is also possible these anomalies are associated with more recent agricultural activity, such as surface spreading of green-waste, or other material.

4.4 Ground-Penetrating Radar (GPR) results and interpretation

Inland Port – Area 1

4.4.1 The geophysical survey has identified several features that are likely to be associated with archaeological remains. These features are predominantly located in the centre of the GPR survey area and are associated with amorphous planar reflectors and linear features potentially relating to former structures.

4.4.2 Multiple high amplitude planar reflectors, present at depths starting from 0.15 m through to 0.75 m below the ground surface, are visible across the GPR survey area (**1000** – **1006; Figure 38**). Responses marked **1000**, **1003**, **1004**, **1005**, and **1006**, present as collections of broadly rectilinear forms and cover an area of approximately 26 m by 26 m. These responses are most likely foundation remains of former structures, as seen on historic mapping.

4.4.3 Further high amplitude responses (**1001** and **1002; Figure 38**) are present at 4 m and 22 m, respectively, north-east of the main collection of responses. These are amorphous, high amplitude responses at a depth range of between 0.15 m – 0.45 m (**Timeslice 2** and **3**); **1001** covers an area of 8 m by 3 m, whereas **1002** covers an area of 8 m by 5 m. The characteristics of the responses, both in amplitude and dimension, suggest the presence of further structure foundation material relating to former buildings in the area.

4.4.4 A high amplitude linear response (**1007**; **Figure 38**) is present 5 m south of **1003**, and measures approximately 28 m in length and 1 m wide, on an east-west orientation. This response is indicative of the edge of the former road route, opposite the former buildings.

4.4.5 There are a series of areas of low amplitude response across the survey area (**1008**, **1009**, **1010**). At 7 m by 4 m, **1008** presents as a well-defined rectangular area indicative of groundworks to replace, or remodel, the floor. Further, an amorphous low amplitude area at **1009**, 23 m east of **1008**, is suggestive of further groundworks, or road repair. Both **1008** and **1009** are present from the surface timeslices, inferring modern activity. However, **1010**, immediately east of **1004** and **1006**, is most visible in Timeslice 4 (**Figure 38**) at a depth of 0.45 m to 0.6 m from the surface. At 20 m by 8 m, **1010** is broadly rectangular and is suggestive of former surfacing works, most likely related to the former structures on the site.

4.4.6 Existing surface features have been indicated on the drawing, as has evidence of services.

4.5 Electric Resistivity Tomography (ERT) results and interpretation

4.5.1 A total of four ERT transects were recorded across the accessible parts of the site (**Figure 10**). All were positioned on a WSW-ENE alignment, which is perpendicular to the orientation of the Hemingborough Glaciolacustrine Formation and the River Trent.

4.5.2 The ERT survey has been successful in identifying different subsurface materials that may be associated with geo-archaeologically relevant topographic features. In the following section, the results for each pseudo-section are discussed in terms of their geophysical character and associated palaeoenvironmental potential. In general, lower resistivity values are principally associated with finer-grained (silt/clay) deposits and higher resistivity values relate to coarse (sand/gravel) material. However, it should be noted that groundwater levels at the time of the survey may affect the specific resistivity values recorded by each transect. In addition, it may not also be possible between more subtle distinctions within these classes, and a division between different types of Holocene alluvium (lower/upper) and peat, which are often impossible to discern in terms of their geophysical character.

Transect 1

4.5.3 Transect 1 (**Figure 40**) is located towards the north of the site, within Area 4, and is 216 m long. The ground surface slopes upward at a constant gradient towards the east. Two areas of high resistivity (>200 Ω·m) are present near the surface, to a depth of 0 m (aOD). Approximate distance values for these are 10 – 100 m, and 170 – 216 m along the transects, with a thickness between 5 and 10 m. BGS geology data indicate that these high resistivity areas correspond with superficial deposits of the Hemingborough Glaciolacustrine Formation, which are associated with a Pleistocene land surface.

4.5.4 Between approximately 100 m and 170 m along Transect 1, there is an area of different superficial deposits, visible as relatively moderate resistivity values (60 – 150 Ω·m), but less resistive than the Hemingborough Glaciolacustrine Formation. This deposit layer is approximately 10 m thick and terminates at 0 m (aOD) and likely corresponds with Blown sand deposits identified in nearby boreholes (Transect A and B; AOC Archaeology Group 2022b).

4.5.5 The superficial deposits overlie a lower resistance layer, which corresponds with the mudstone bedrock known to be present at this location. The boundary between layers is continuous with an undulating character.

Transect 2

4.5.6 Approximately 800 m SW of Transect 1 is Transect 2, which measures 288 m in length and is located within flat topography (**Figure 41**). The moderate resistivity of the uppermost 2 m of the pseudo-section is indicative of dry cracked surface soils, where air-filled gaps have increased resistivity values. This is followed by a relatively consistent lower resistivity response from 0 m to approximately -10 m (aOD). This is indicative of alluvial deposits, below which a higher resistivity layer is present. The resistivity of this layer is greater than that of the mudstone bedrock within Transect 1, but due to the natural variability in the resistivity of sedimentary rocks, it has still been interpreted as such.

4.5.7 The boundary between the alluvium and bedrock layer is stepped at 100 m along the transect, a feature that is also present in the adjacent Transect 3a. This could be related to the former extent of the adjacent River Trent, where this step formed part of the previous riverbank.

Transect 3 (a-c)

4.5.8 Transect 3 was split into three parts due to large ditches impeding the original proposed 1 km long survey (**Figures 42, 43**). Transect 3a measures 216 m in length and is located within flat topography, Transect 3b is situated immediately east of Transect 3a and is 432 m long, and finally, Transect 3c is 358 m long. Each of these transects is interpreted individually, and where possible linked together with adjacent transects.

4.5.9 Close to the surface of Transect 3a and 3b, there is a moderately resistive layer present at the surface. This is due to the dry, cracked soils present during the survey, but this was not present in Transect 3c, due to wetter ground conditions.

4.5.10 Within Transects 3a and 3b, the upper part of the pseudo-sections is dominated by low resistivity values, which is associated with finer-grained (silt/clay) alluvial sediment. This is above a moderate to high resistivity response that is associated with mudstone bedrock. The boundary or interface between this, slopes gently from east to west, suggesting that the thickness of alluvial sediments is thicker towards the present course of the river in the centre of the floodplain. The westernmost extent of this interface is situated at -12.5 m (aOD), reducing to -7.5 m deep by the end of Transect 3a, and -5 m by the end of Transect 3b. This is consistent with the depths of Holocene alluvial sediments and peat deposits encountered in nearby boreholes, which are generally deeper to the west, gradually thinning to the east (AOC Archaeology Group 2022b).

4.5.11 The boundary between the alluvium and bedrock layer is stepped at 100 m along Transect 3a, a feature that is also present in the adjacent Transect 2. This could be related to the former extent of the adjacent River Trent, where this step formed part of the previous riverbank. Undulations are present in the bedrock layer at 250 m and 320 m along Transect 3b, which could indicate discontinuities or weaknesses that have been infilled with overlying alluvium. These cannot be classified with certainty, so they have not been interpreted as a separate layer.

4.5.12 Within Transect 3c, higher resistivity readings are encountered in the east between 140 m and the eastern limit of the pseudo-section. This likely relates to more resistant sandy material and indicates there is limited alluvial sediment cover in this area. This correlates with adjacent borehole records (e.g. WS5-WS6 (Transect C); AOC Archaeology Group 2022b), where the Sutton Sand surface is reached between 1-2 m BGL. This higher resistivity material is approximately 4 m thick, but part of this may also comprise gravel material underlying the Sutton sands.

4.5.13 In the western part of Transect 3c, the pseudo-section is dominated by lower resistivity values. These are predominantly associated with alluvial sediments comprising silt/clay material, which is consistent with the Holocene alluvium recorded to approximately -4 m aOD in adjacent boreholes (e.g. WS4 (Transect C); AOC Archaeology Group 2022b). This appears to be slightly shallower towards the west, potentially indicating a subsurface topographic high point or an area where alluvial sediments are more limited. However, this may also simply reflect a slight change in the sediment composition, possibly reflecting the interface between lower and upper alluvium, as denoted by other geoarchaeological investigations (AOC Archaeology Group 2022b).

4.5.14 Across the lower portion of the entire pseudo-section are further lower resistivity values, which may be associated with clayey-silt mudstone bedrock. However, it is notable that the higher resistivity band recorded below the alluvium within Transects 3a-3b is not represented here, possibly due to higher groundwater levels at the time of the survey. Despite this, slightly higher resistivity values are encountered at the base of the pseudo-section, which may relate to more coarse components contained within this.

Transect 4

4.5.15 Transect 4 is located towards the south of the site and is 430 m long. The topography of the profile is gently undulating, with several broad high points and adjacent depressions.

4.5.16 The lower portion of the Transect, between -10 m aOD and -4m aOD is dominated by lower resistivity. This is thought to be associated with Mudstone bedrock, with the low values indicating high groundwater levels.

4.5.17 In the upper part of the pseudo-section, there are three high resistivity bands in the near-surface between 0-45 m, 150-230 m. and 285-360 m along the profile. These likely relate to more coarse deposits such as sand. A further example is also potentially located at the eastern end of the Transect, but this likely continues beyond the ERT survey line. These are thought to be associated with upstanding blown sand deposits within the floodplain, which are likely covered by minimal alluvial sediment. The examples in the centre and east of the transect are located directly below the surface and are also visible as cropmarks in satellite imagery of the area. However, the example in the west is more deeply buried and potentially overlain by approximately 1.5-3 m of alluvium.

4.5.18 Between the high resistivity (blown sand) regions, are lower resistivity values that are thought to relate to Holocene alluvial sediments. The example between 32-160 m along the profile has a slightly concave profile, which is redolent of a paleochannel profile. Given that the present course of the River Trent is a similar width, this could perhaps relate to a former course of the river. However, it is difficult to confirm this based on the geophysical survey data alone, and they may simply relate to deeper deposition of lower Holocene alluvium such as that identified in adjacent boreholes (Transect D: AOC Archaeology Group 2022b).

Similarly, the other lower resistivity regions near the surface are also thought to relate to thicker deposits of finer-grained (silt/clay) alluvium.

5 DISCUSSION

5.1.1 Possible Bronze Age funerary activity has been noted in the form of a ring ditch in Area 6. While similar activity is noted in the surrounding area, the anomaly is seen in an area of increased magnetic response, making the interpretation less confident.

5.1.2 A substantial portion of evidence associated with ridge and furrow cultivation has been revealed by the surveys. These are prevalent in Area 4 and 5. Two large enclosures have been identified in the south-eastern portion of Area 4. These anomalies evidence an earlier iteration of land division comprising ditch field boundaries. They are parallel to anomalies associated with ridge and furrow and therefore may be contemporary. However, they could equally be associated with earlier activity.

5.1.3 Also in Area 4, numerous linear and curvilinear anomalies have been identified spanning almost the entire survey area. These could evidence settlement activity, although a natural origin cannot be entirely ruled out. The ridge and furrow cultivation may have impacted the preservation and detection of these features, and as such, a confident interpretation is not possible.

5.1.4 In addition, numerous weakly positive discrete anomalies are tentatively considered evidence of possible extraction or refuse pits. However, this interpretation is not confident as these anomalies could equally be natural in origin.

5.1.5 A number of further anomalies thought to indicate natural variation in the underlying geological deposits have been identified throughout Area 3 and 4. In Area 3 anomalies thought to indicate localised variation in the magnetic susceptibility of the probable superficial deposits have been identified. In Area 4, evidence of underlying natural fissures has been widely identified in the form of weakly positive interconnected sinuous anomalies.

5.1.6 The remaining anomalies are interpreted as modern in origin and predominantly associated with recent or modern agricultural activity such as ploughing or surface spreads as well as underlying land drains. Further, highly ferrous anomalies associated with an underlying service as well as extant pylons have also been identified in Area 4 and 5 respectively.

5.1.7 The GPR survey results have provided evidence for the presence of archaeological features in the Inland Port area.

5.1.8 The collections of high amplitude rectilinear features in the centre of the survey area, and the amorphous features to the east, suggest the remains of foundations of former structures as indicated on historic mapping, such as the known Ferryman Inn.

5.1.9 It is likely that the linear feature to the south is also associated with the former buildings and was the edge of the former road which led, from the extant road, west to the ferry terminal, known to have operated in this vicinity.

5.1.10 The low amplitude features in the data are indicative of groundworks, most likely resurfacing, both modern and historical.

5.1.11 ERT has identified the extent of palaeochannel deposits potential associated with a former course of the River Trent in Transects 2 and 3. Transect 1 has confirmed glacial geology identified with the magnetic survey and Transect 3c and 4 has also likely identified upstanding blown sand landforms within the floodplain, which are also visible as cropmarks.

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APPENDICES

Appendix 1: Survey Equipment and Data Processing

Survey methods and equipment

Gradiometer Survey

Bartington Array

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

The gradiometers have an effective resolution of 0.03 nT over a ±100 nT range. All of the data are then relayed to a CS35 tablet, running the MLgrad601 software, which is used to record the survey data from the array of Grad601 probes at a rate of 10 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

Sensys Array

The magnetic data for this project were acquired using a non-magnetic cart fitted with four SenSys FGM650/3 magnetic gradiometers. The instrument has four sensor assemblies fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 0.6 m separation and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of ±8 µT over ±1000 nT range. All of the data are then relayed to a CS35 tablet, running the MONMX program, which is used to record the survey data from the array of FMG650/3 probes at a rate of 20 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Captivate system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.01 m intervals along traverses spaced up to 0.25m apart.

Post-processing

The magnetic data collected during the survey is downloaded from the 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.

Typical data and image processing steps may include:

- GPS Destripe – Determines the median of each transect and then subtracts that value from each datapoint in the transect. May be used to remove the striping effect seen within a survey caused by directional effects, drift, etc.

- GPS Base Interpolation – Sets the X & Y interval of the interpolated data and the track radius (area around each datapoint that is included in the interpolated result).

- Discard Overlaps - Intended to eliminate a track(s) that have been collected too close to one another. Without this, the results of the interpolation process can be distorted as it tries to accommodate very close points with potentially differing values.

Typical displays of the data used during processing and analysis:

- Greyscale – Presents the data in plan 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

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.

Ground penetrating radar (GPR)

The ground penetrating radar (GPR) data will be collected using a cart-mounted shielded antenna with central frequency suitable for the types of targets being investigated. Lower frequency antennae are able to acquire data from deeper below the surface, whereas higher frequencies allow high resolution imaging of near-surface targets at the expense of deep penetration. The exact make and model of equipment varies.

The depth of penetration of GPR systems is determined by the central frequency of the antenna and the relative dielectric permittivity (RDP) of the material through which the GPR signal passes. In general, soils in floodplain settings may have a wide range of RDPs, although around 8 may be considered average, resulting in a maximum depth of penetration of approximately 2.5 m with the GPR signal having a velocity of approximately 0.1 m/ns.

The GPR beam is conical in shape, however, and whilst most of the energy is concentrated in the centre of the cone, the GPR signal illuminates a horizontal footprint, which becomes wider with increasing depth. At the maximum depth of the antenna, it becomes impossible to resolve any feature smaller than the horizontal footprint for the corresponding depth. The size of the footprint is dependent upon central frequency, and its size increases as the central frequency decreases.

The vertical resolution is similarly dependent upon the central frequency; for example, a 300 MHz antenna, features of the order of 0.05 m may be resolved vertically. Antennae with lower frequencies can therefore penetrate more deeply but are less resolute in both horizontal and vertical directions. Choice of antenna frequency is guided largely by the anticipated depth to the target and the required resolution.

GPR data for detailed surveys are collected along traverses of varying length separated by 0.5 m with cross lines collected running perpendicular to these traverses at wider separations. The data sampling resolution is governed by the data logger and a minimum separation of 0.05 m between traces is collected for all surveys, in accordance with European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

Post-Processing
The radar data collected during the detail survey are downloaded from the GPR system for processing and analysis using commercial software (GPR Slice). This software allows for both the data and the images to be processed to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

Typical data and image processing steps may include:

- Gain – Amplifies GPR data based upon its position in the profile, which boosts the contrast between anomalies and background. A wobble correction is also applied during this step;

- Background Filter - is used to remove banding noises that are seen across the radargrams

- Bandpass – Removes GPR data lying outside a specified range, which removes high- and low-frequency noise.

Typical displays of the data used during processing and analysis:

- Timeslice – Presents the data as a series of successive plan views of the variation of reflector energy from the surface to the deepest recorded response. The variation in amplitude is represented using a greyscale with black indicating high amplitude and white indicating low amplitude responses.

- Radargram – Presents each radar profile in a vertical view with distance along the profile expressed along the x axis and depth along the y axis. The amplitude variation is expressed using a greyscale.

Electrical resistivity tomography (ERT)

ERT data were acquired using an IRIS Syscal Pro with up to 72 electrodes arranged with a spacing of 2.5 m between electrodes. The system uses four of these electrodes at a time to measure each reading. By varying the position and separation of the four electrodes used, the position along each transect and the depth of the reading can be controlled. A series of roll-along sequences was created prior to the commencement of the survey using ElectrePro software, which was then uploaded onto the switch console. This then runs through the sequence(s), automatically switching between probes used. Readings are logged automatically on the Prosys Switch system and then downloaded to a computer for processing.

Readings are taken by passing an electrical current through the ground and measuring the resistivity within the path the current takes. The electrical resistivity of the earth is dependent partly upon the chemical and geological composition of the soils and the geometry of the electrode array used but also largely upon the soil moisture content. Wet, briny environments will typically exhibit low electrical resistivity, whereas dry sands will exhibit high resistivity. Very low resistivity values can also be obtained where a large conductive structure such as a steel pipe or a reinforced concrete structure is present.

Typical ERT surveys consist of the collection of a series of linear transects with electrodes spaced at regular intervals along the line. The type of array, the number of electrodes used and the separation between them dictates the maximum depth of investigation of the survey. The array used is determined by the application and requirements of the site. If transects are collected on a regular grid the individual 2D transects can be combined and processed to give a 3D output although it is recommended that 3D ERT data is collected from a grid of electrodes using appropriate equipment rather than collecting individual 2D transects.

A number of standard arrays are available for use in an ERT survey, including Wenner alpha, Wenner beta, Wenner gamma, dipole-dipole, Wenner-Schlumberger, pole-pole, and pole-dipole. The array selection is important as the array chosen can dictate the form of the anomaly in the data, signal strength, the depth of investigation, horizontal data coverage and the sensitivity of the array to vertical and horizontal changes in the subsurface resistivity. For full 3D surveys the use of either the pole-pole, pole-dipole or dipole-dipole arrays is recommended as other arrays have poorer data coverage near the edges of the survey grid. It should be noted that it is possible to use other arrays for 3D surveys.

The Wenner alpha array is most commonly used by Wessex Archaeology as it is a robust array that is sensitive to vertical changes in the subsurface resistivity and has the highest signal to noise ratio compared to the other main arrays. The one drawback to this array that it is less sensitive to horizontal changes and this sensitivity drops as the electrode separation is increased.

Post-Processing

The ERT data collected during the survey are downloaded from the ERT system using ImagerPro 2006, then processed and analysed using commercial software (RES2DINV). This software allows for the inversion of the collected 2D transects in isolation and the inversion of several 2D transects collected in a regular grid at the same time. The software uses the least-squares and smoothness-constrained least-squared inversion methods. The parameters of the particular inversion can be altered to suit the data being processed more closely and can also incorporate topographic data during the inversion process. The inversion process creates a model and calculates the resistivity values that would have been recorded over it from this model. By comparing the model data with the field data, an error value can be calculated, and the software goes through a number of iterations to minimise this error by altering the modelled values. A more detailed description of the different variations of the smoothness-constrained least-squares method can be found in Loke (2016).

Typical inversion parameters that may be altered include:

- Robust inversion – This option is typically used where sharp boundaries exist between subsurface bodies that would be smeared by the standard least-squares inversion method. The robust model constrain inversion method minimises the absolute changes in the resistivity values producing models with sharp interfaces;

- Smoothing of model resistivity values – This is used for particularly noisy data sets where the smoothness constraint used in the standard least-squares inversion method is not sufficient on its own.

Typical displays of the data used during processing and analysis:

- 3D Output – Outputs of 3D models generated in the Rockworks software package;

- 2D Vertical Pseudo-Section – Presents each ERT transect in a vertical view with distance along the profile expressed along the x axis and depth along the y axis. Topography data can be displayed along with the inverted data. The varying resistivity is expressed using a colour scale;

- 2D Horizontal Pseudo-Slice – Presents the data as a series of successive plan views of the variation in resistivity from the surface to the deepest inversion layer. The variation in resistivity is represented using a colour scale.

Appendix 2: Geophysical Interpretation

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

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

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.

- Possible archaeology – used for features which give a response, but which form no discernible pattern or trend.

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

- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.

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

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.

- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.

- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.

- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

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

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.

- Trend – used for low amplitude or indistinct linear anomalies.

- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative, or broad bipolar (positive and negative) anomalies.

Appendix 3: OASIS form

Project Details:

Project name	North Lincolnshire Green Energy Park, Scunthorpe, North Lincolnshire
Type of project	Field evaluation
Project description	A series of geophysical surveys were conducted over land outlined for the development of the North Lincolnshire Green Energy Park. This comprised a detailed fluxgate gradiometer survey together with more targeted caesium vapour gradiometer, Ground Penetrating Radar (GPR), and Electrical Resistivity Tomography (ERT) surveys. The detailed gradiometer survey and caesium vapour magnetometry have demonstrated the presence of several anomalies of potential archaeological interest, including possible Bronze Age funerary activity in the form of a ring ditch. In addition, a substantial number of anomalies associated with ridge and furrow cultivation and two large enclosures have been which could evidence settlement activity. The GPR survey revealed a series of high amplitude linear and rectilinear features that are potentially the remains of former buildings on the site and the line of a former road. The ERT survey comprised four transects surveyed between 25 April and 4 May 2022, and 27 February to 2 March 2023. This has identified palaeochannel deposits potentially associated with a former course of the River Trent in Transects 2 and 3. Transect 1 has confirmed glacial geology identified with the magnetic survey and Transect 3c and 4 has also likely identified upstanding blown sand landforms within the floodplain, which were previously identified as cropmarks.
Project dates	**Start:** 27-10-2021 — **End:**02-03-2023
Previous work	Yes
Future work	Not known

Project Code:	254050	**HER event no.**	N/A	**OASIS form ID:**	wessexar1-506729
		NMR no.	N/A		
		SM no.	N/A		

Planning Application Ref.	
Site Status	None
Land use	Cultivated land 3 – operations to a depth greater than 0.25 m

Project Location:

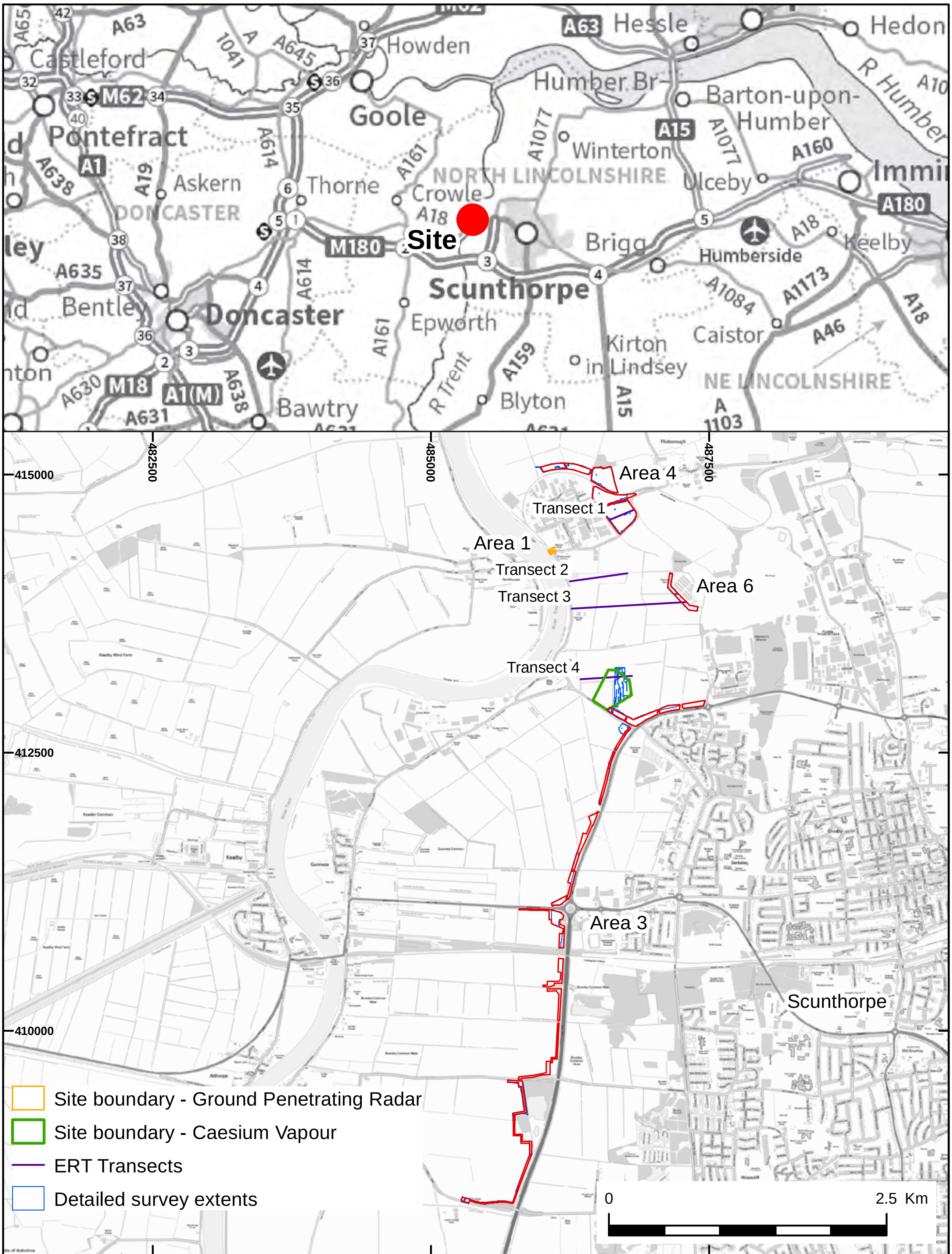
Site Address	Land west and north-west of Scunthorpe / M181 / A1077			**Postcode**	DN15 8SG
County	Lincolnshire	**District**		**Parish**	
Study Area		**Height OD**	2 – 11 m	**NGR**	485710 408440 486650 414600 486820 412745

Project Creators:

Name of Organisation	Wessex Archaeology		
Project brief originator	ERM	**Project design originator**	Wessex Archaeology
Project Manager	Chris Breeden	**Project Supervisor**	Amy Dunn
Sponsor or funding body	ERM	**Type of Sponsor**	Client

Project Archive and Bibliography:

Physical archive	N/A	**Digital Archive**	Geophysical survey and report	**Paper Archive**	N/A
Report title	North Lincolnshire Green Energy Park, Scunthorpe, North Lincolnshire Detailed Gradiometer, Caesium Vapour Survey and Ground Penetrating Radar Report			**Date**	2022
Author	Wessex Archaeology	**Description**	Unpublished report	**Report ref.**	254050.03



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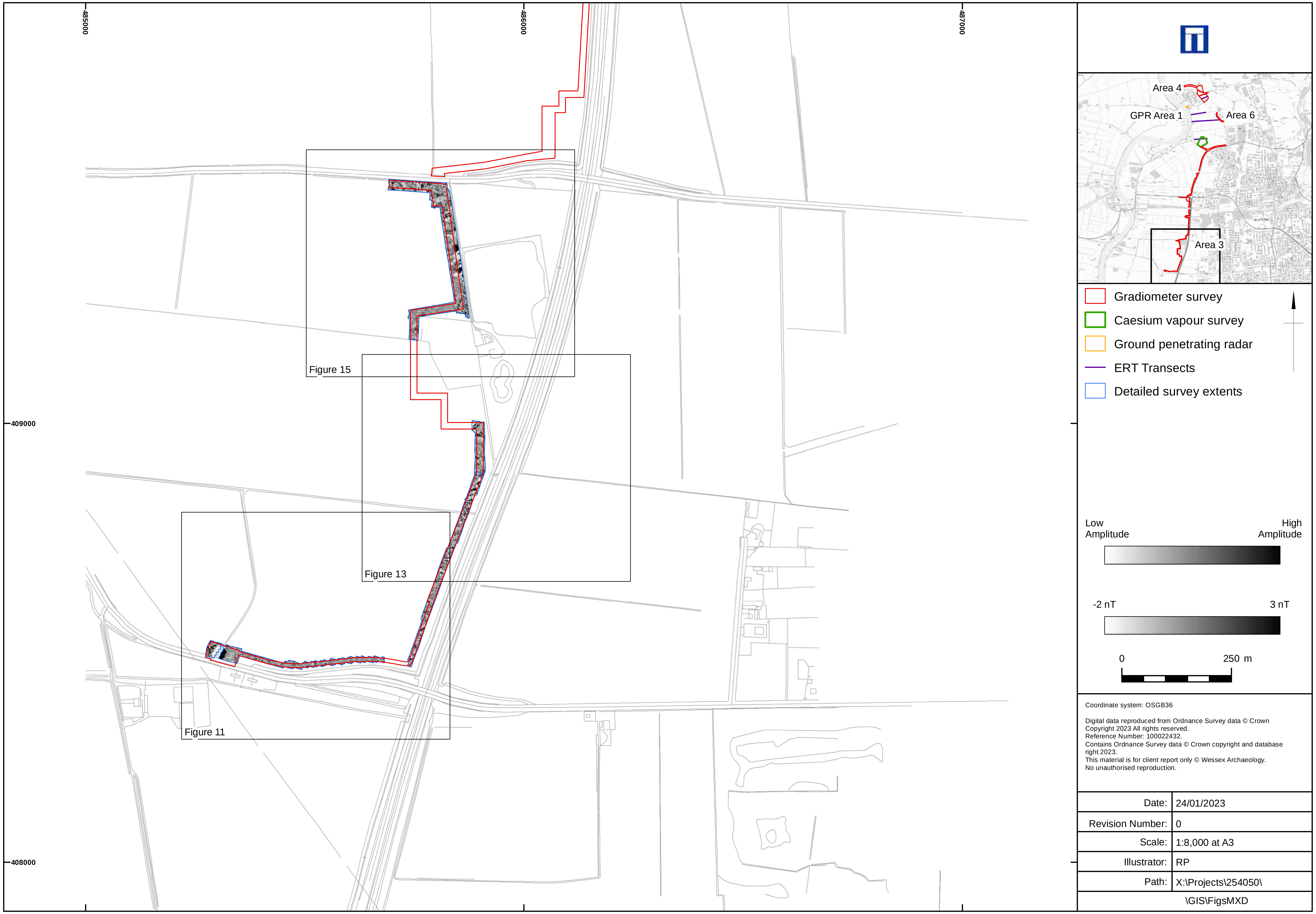
Path:	X:\Projects\254050\GIS\FigsMXD		

Site location and survey extents

Figure 1



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Revision Number:	0
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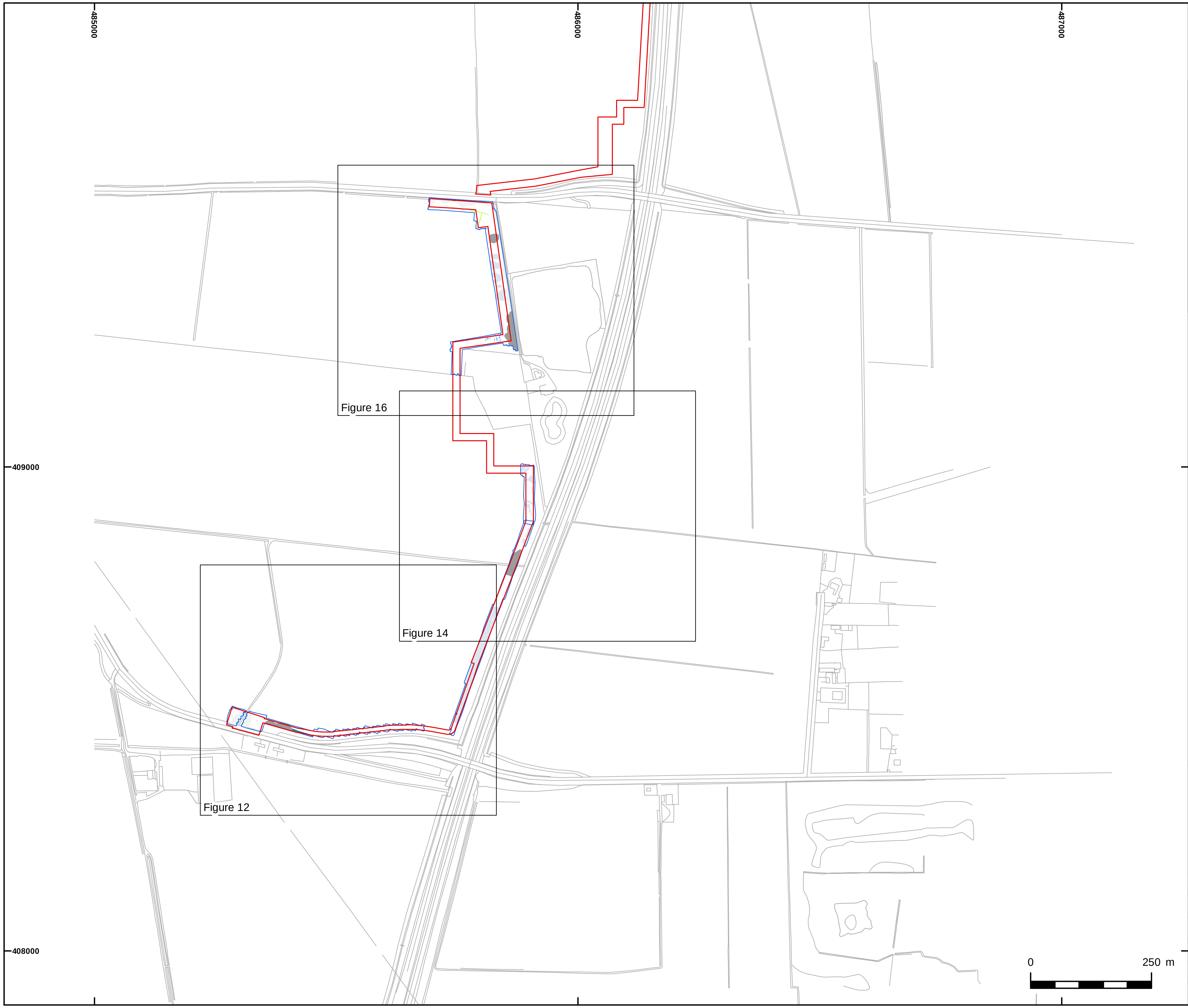
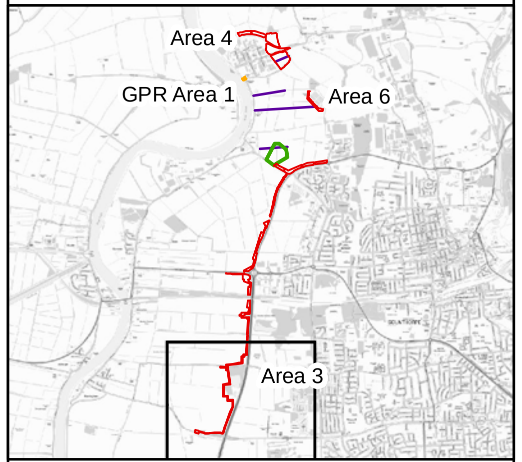
Path:	X:\Projects\254050\ \GIS\FigsMXD

Geophysical survey results: overview greyscale plot (Area 3 south)

Figure 2





- Gradiometer survey
- Caesium vapour survey
- Ground penetrating radar
- ERT Transects
- Detail survey extents
- Archaeology
- Possible archaeology
- Ridge and furrow
- Former field boundary
- Trend
- Increased magnetic response
- Ploughing
- Drainage
- Ferrous
- Superficial geology
- Modern service

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:8,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\
	\GIS\FigsMXD

Geophysical survey results: overview interpretation (Area 3 south)

Figure 3

Gradiometer survey
Caesium vapour survey
Ground penetrating radar
ERT Transects
Detailed survey extents

Low Amplitude
High Amplitude

-2 nT
3 nT

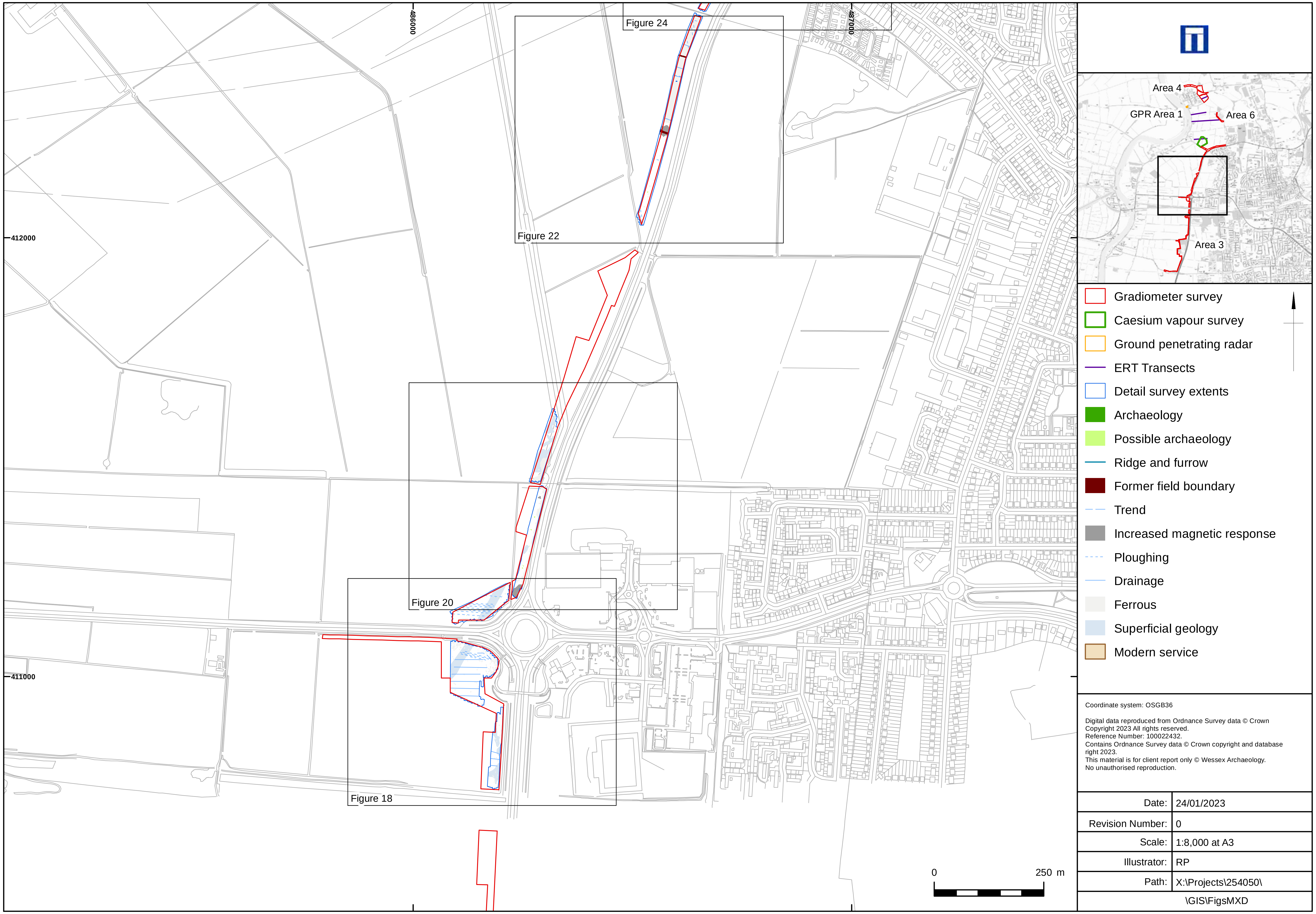
0
250 m

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:8,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Geophysical survey results: overview greyscale plot (Area 3 centre)

Figure 4

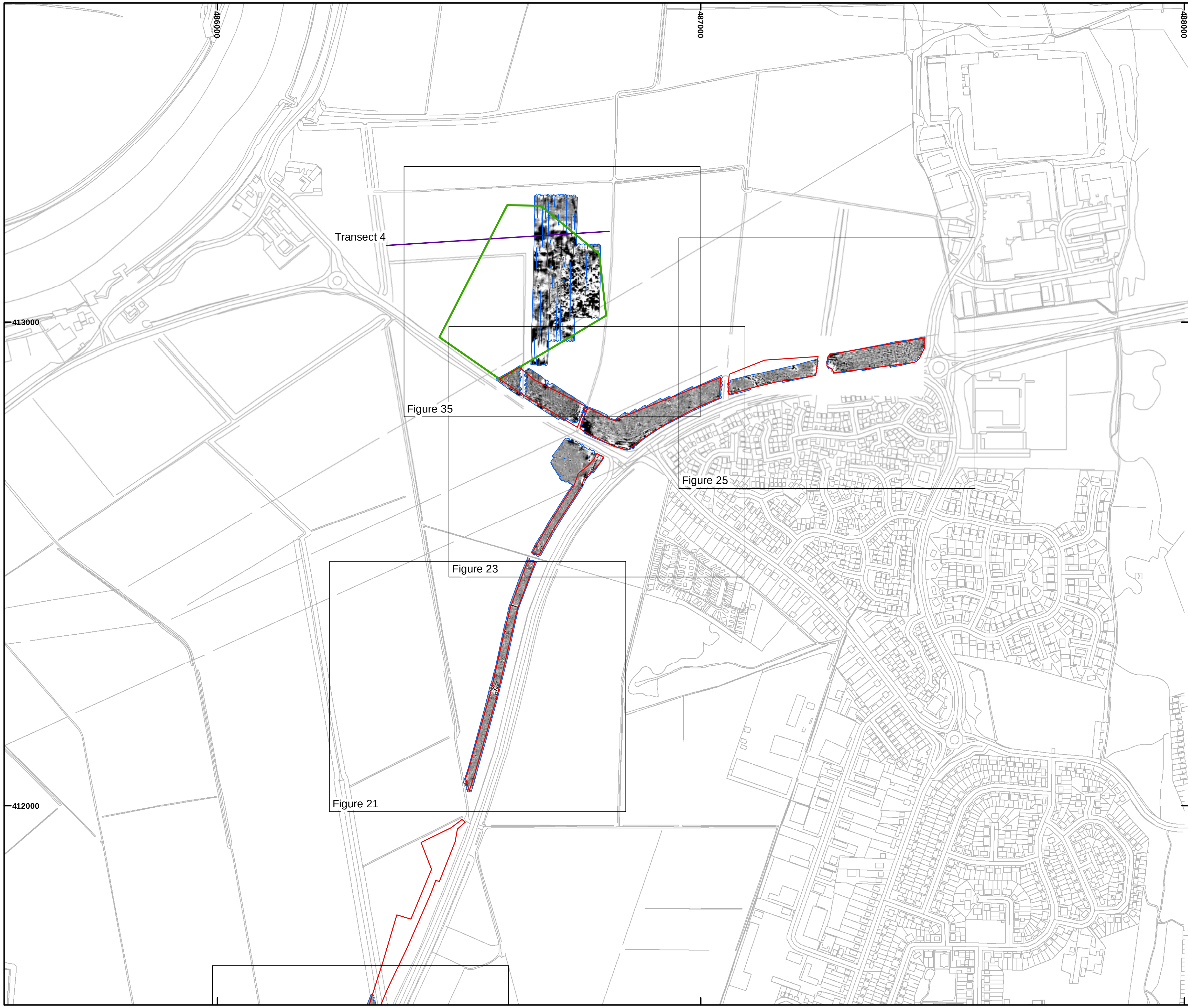


Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:8,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Geophysical survey results: overview interpretation (Area 3 centre)

Figure 5



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Revision Number:	0
Scale:	1:8,000 at A3
Illustrator:	RP
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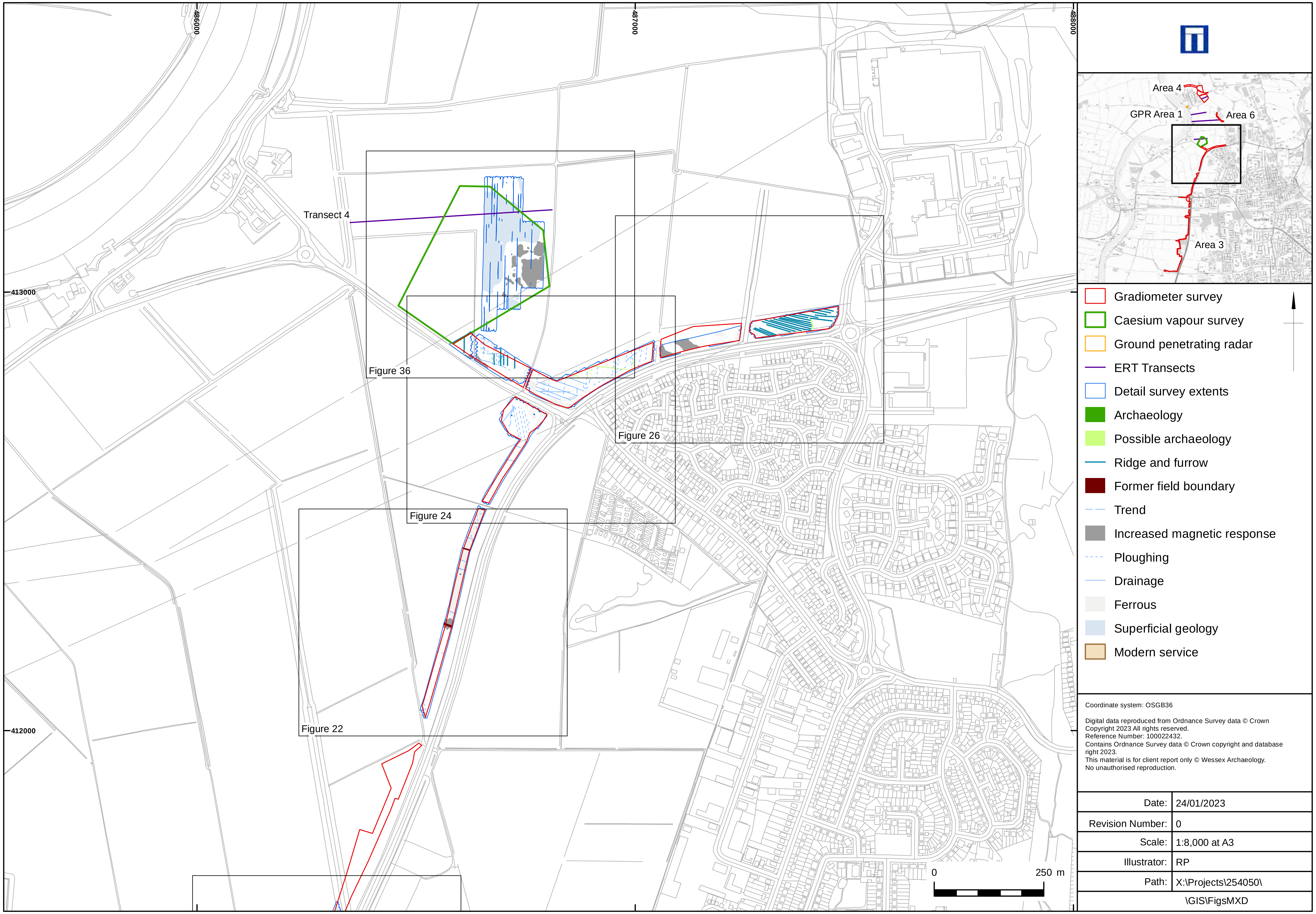
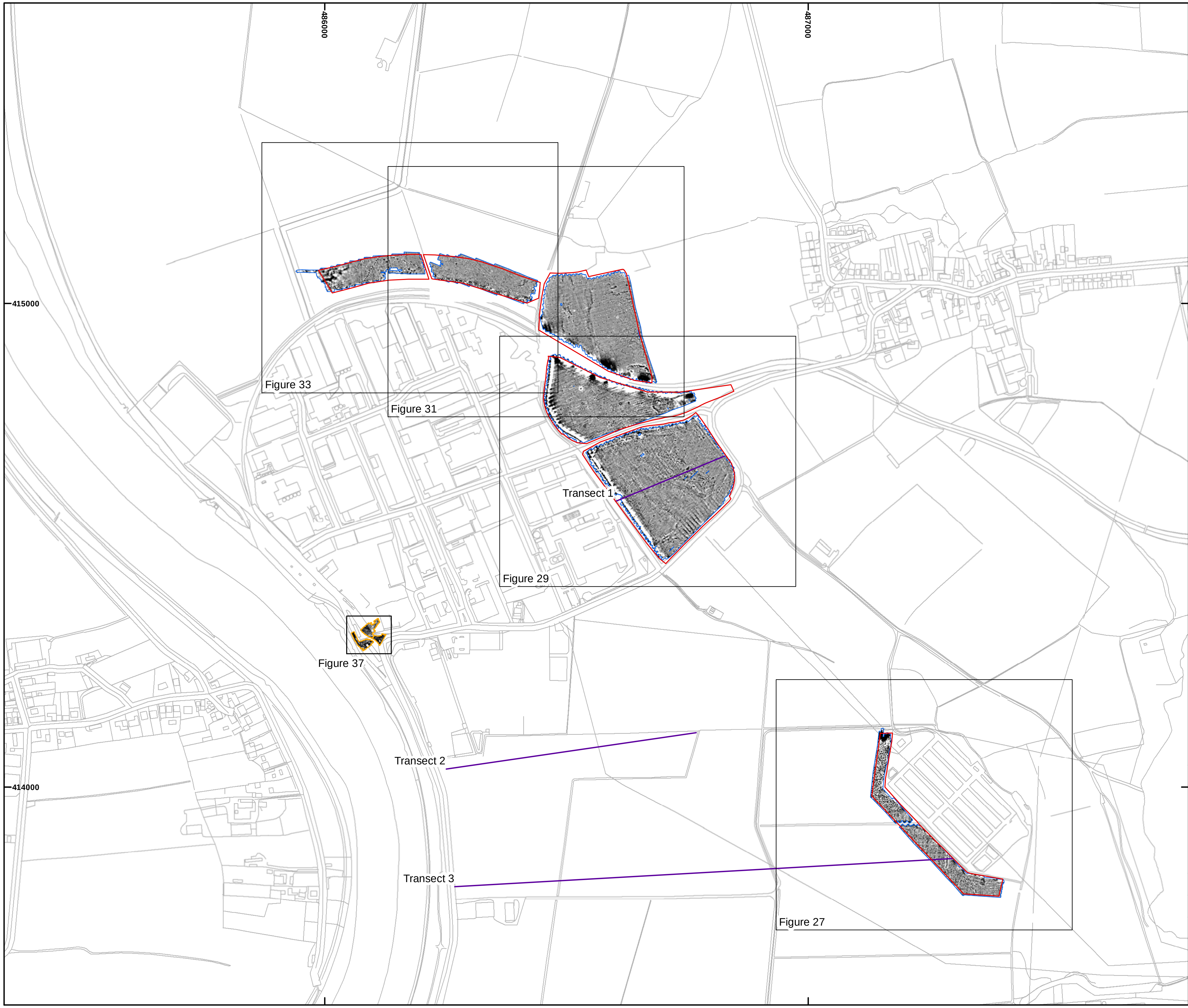
Geophysical survey results: overview greyscale plot (Area 3 north, Area 5)

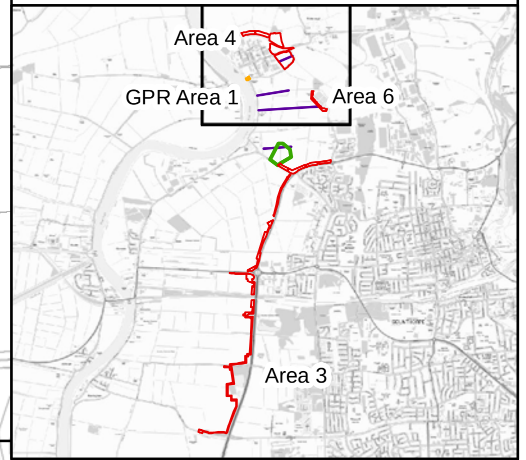
Figure 6



Geophysical survey results: overview interpretation (Area 3 north, Area 5)

Figure 7





Gradiometer survey
Caesium vapour survey
Ground penetrating radar
ERT Transects
Detailed survey extents

Low Amplitude

High Amplitude

-2 nT

3 nT

0

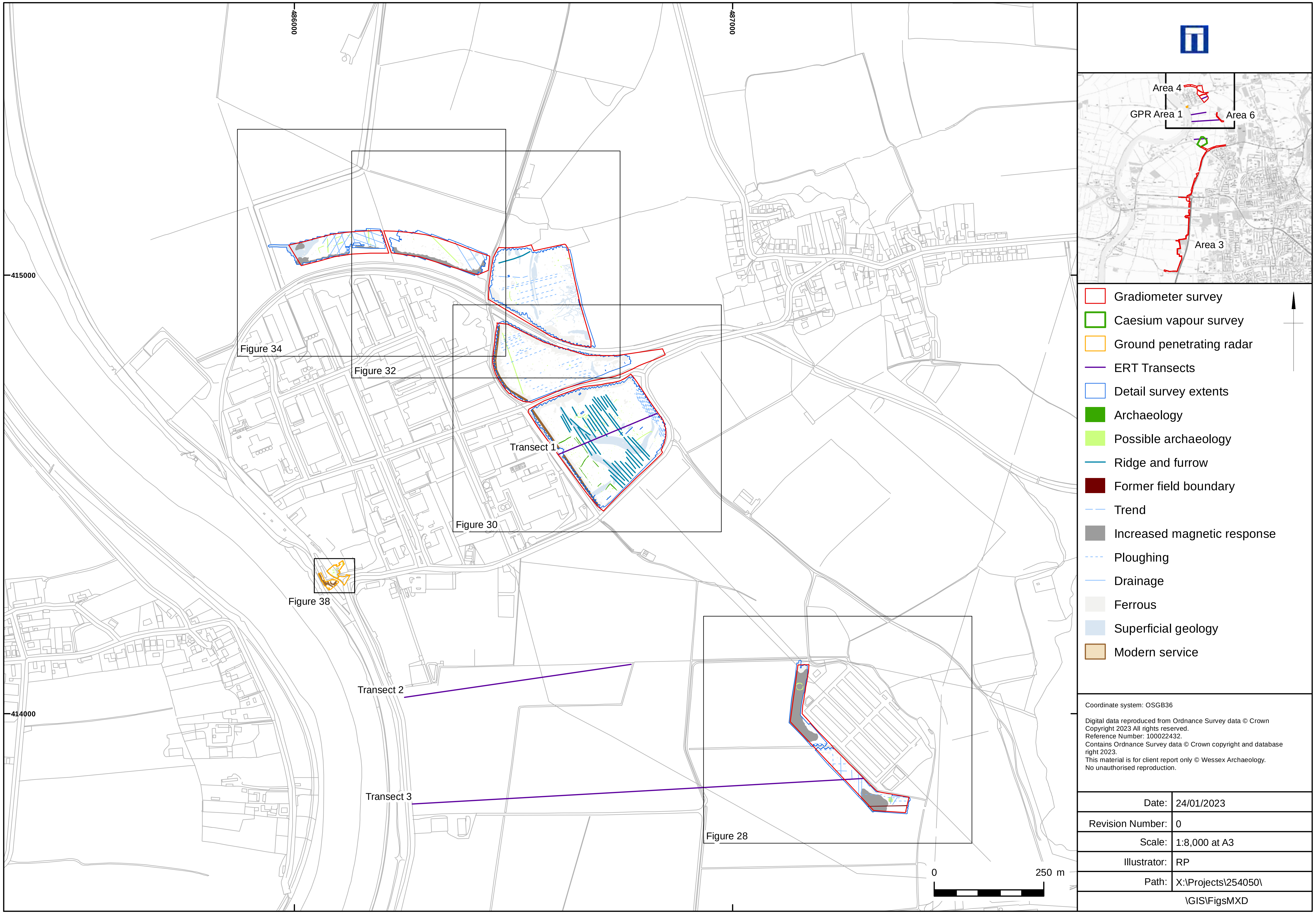
250 m

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:8,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\
	\GIS\FigsMXD

Geophysical survey results: overview greyscale plot (Area 4, Area 6, GPR Area)

Figure 8



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Revision Number:	0
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Illustrator:	RP
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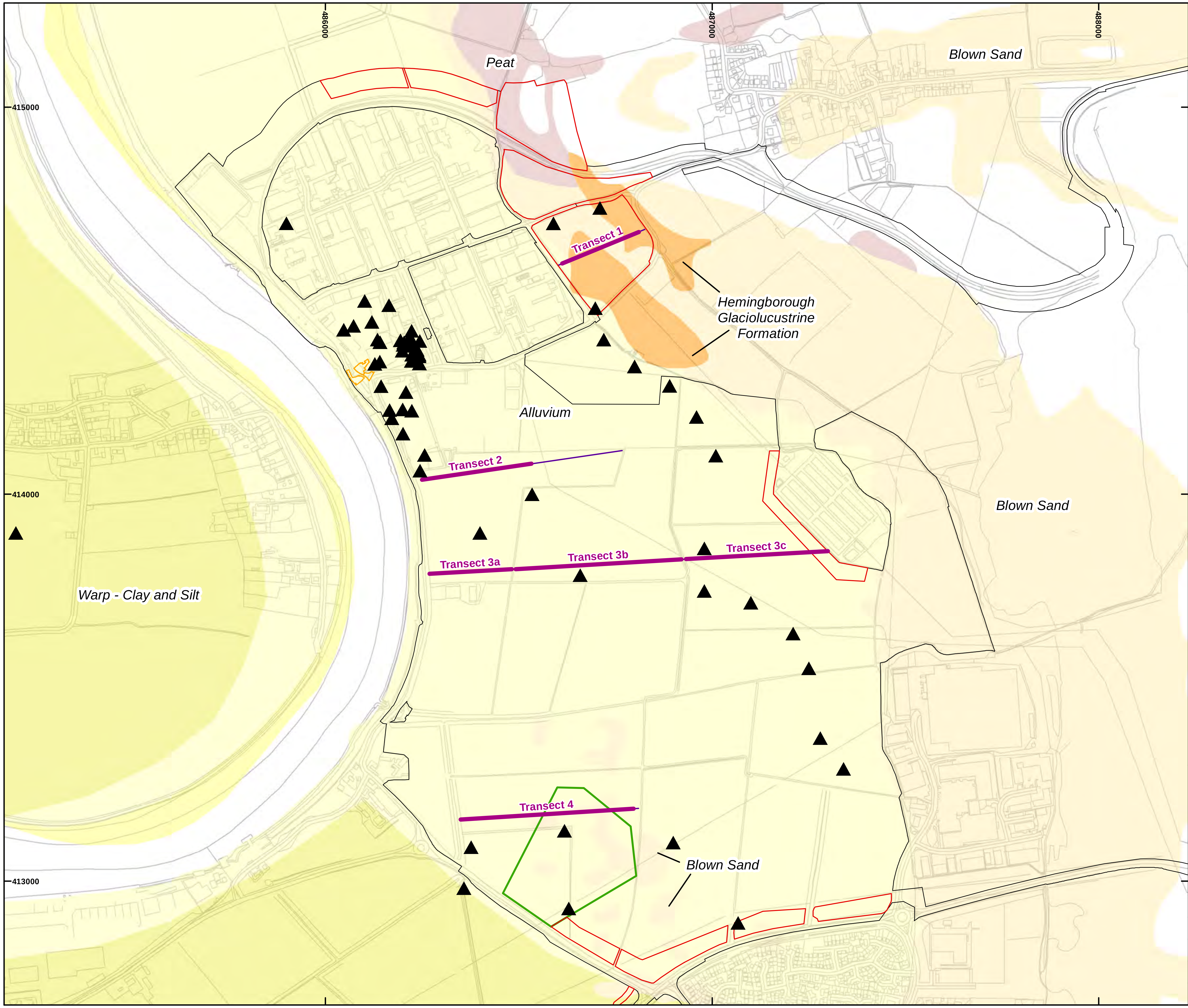
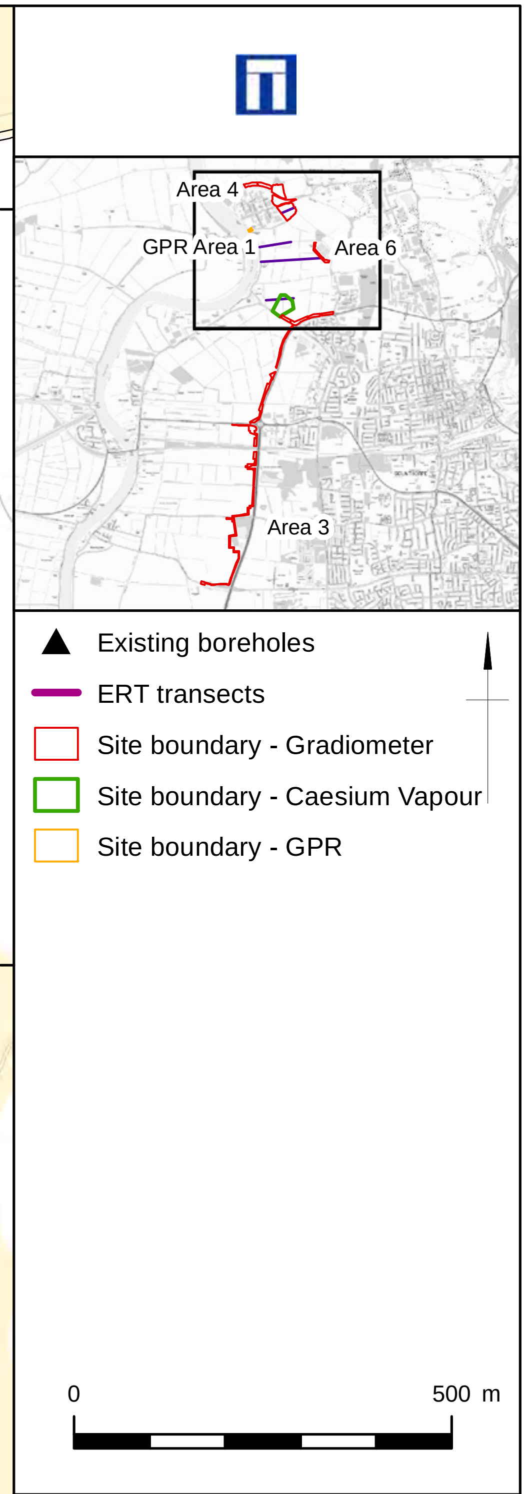
Geophysical survey results: overview interpretation (Area 4, Area 6, GPR Area)





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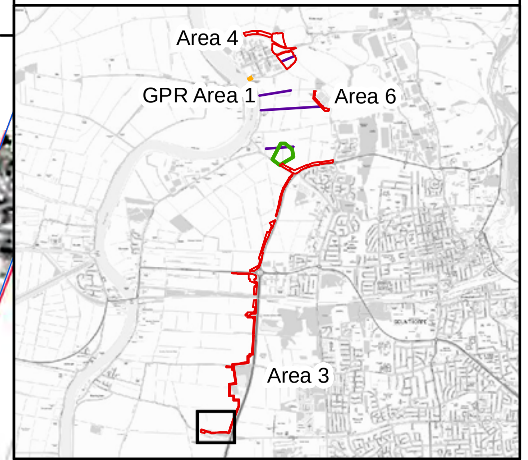
ERT transects and location of previous investigations

Figure 10



Gradiometer survey
Caesium vapour survey
Detailed survey extents

-2 nT
3 nT

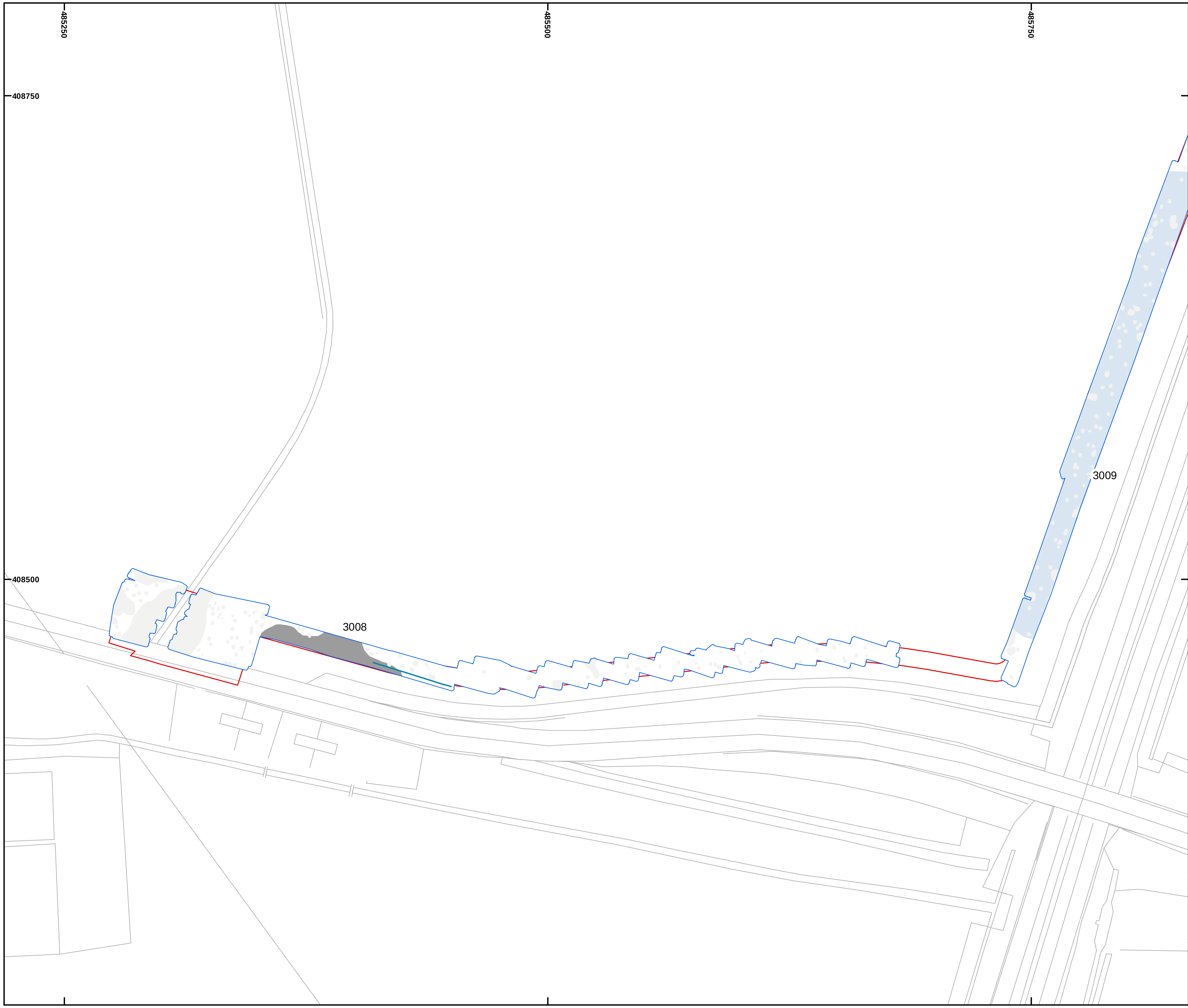
0
100 m

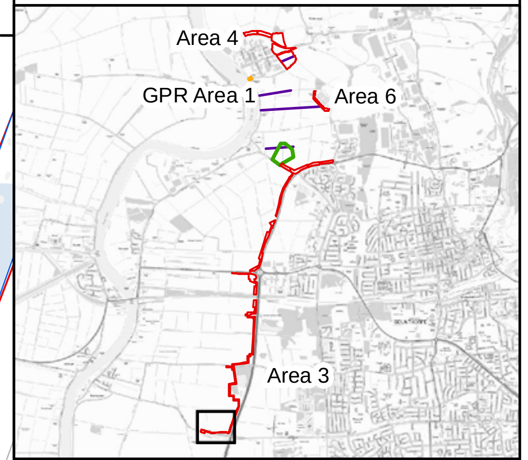
Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (Area 3 south)

Figure 11





Gradiometer survey
Caesium vapour survey
Detailed survey extents
Archaeology
Possible archaeology
Ridge and furrow
Former field boundary
Trend
Increased magnetic response
Ploughing
Drainage
Ferrous
Superficial geology
Modern service

0 100 m

Coordinate system: OSGB36

Date:	15/12/2022
Revision Number:	0
Scale:	1:2,000 at A3
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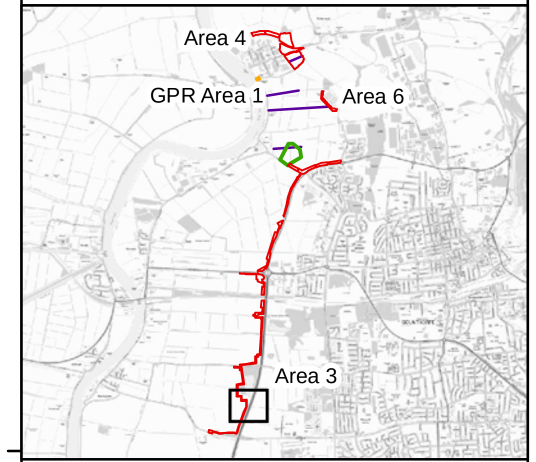
Detailed gradiometer survey results: interpretation (Area 3 south)

Figure 12



Gradiometer survey
Caesium vapour survey
Detailed survey extents

-2 nT 3 nT

0 100 m

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
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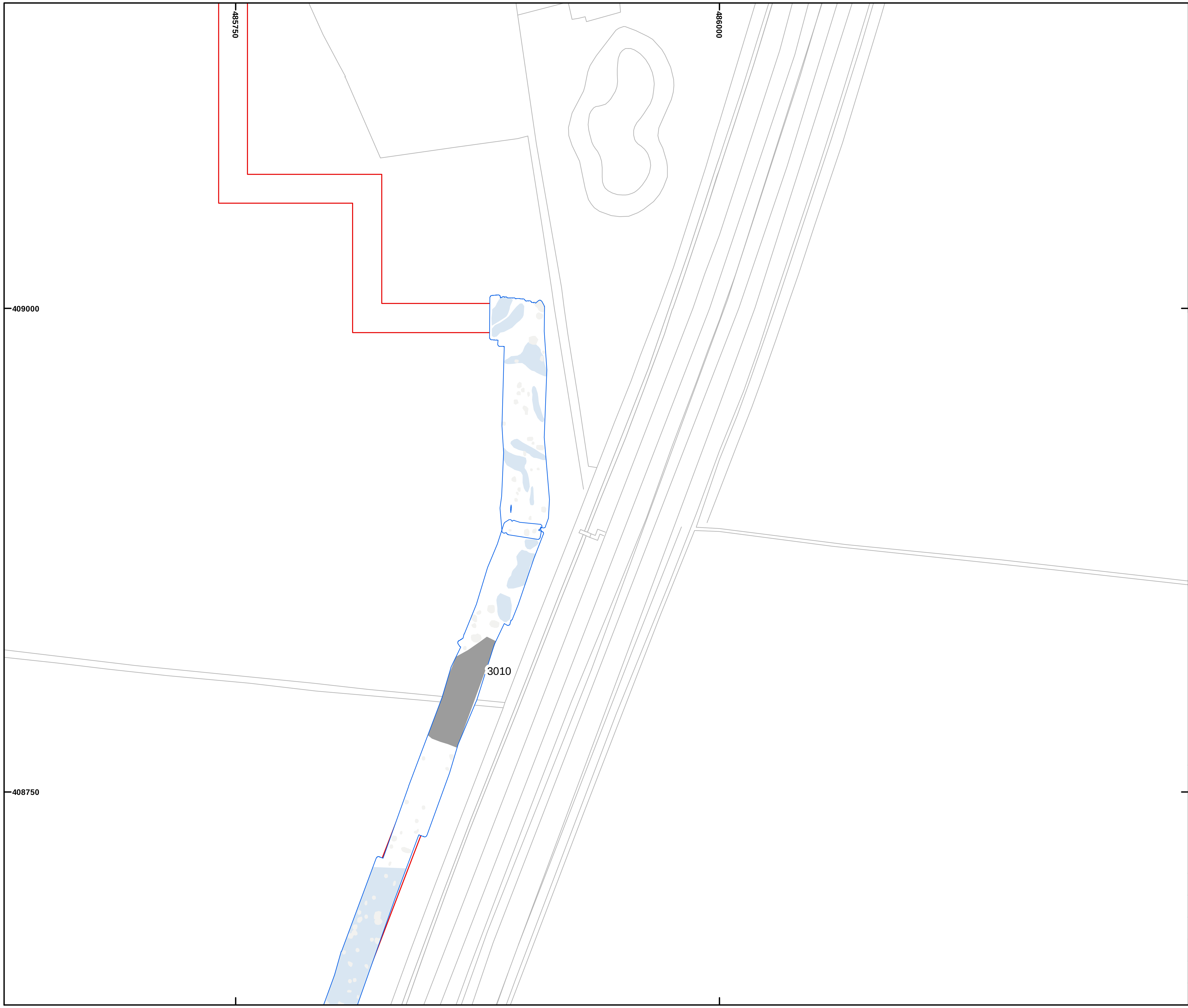
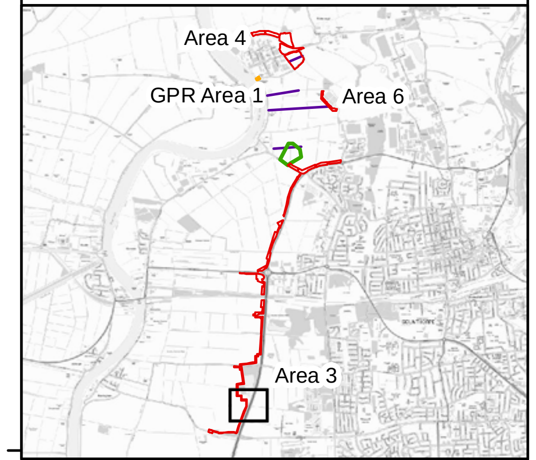
Detailed gradiometer survey results: greyscale plot (Area 3 south)

Figure 13





- Gradiometer survey
- Caesium vapour survey
- Detailed survey extents
- Archaeology
- Possible archaeology
- Ridge and furrow
- Former field boundary
- Trend
- Increased magnetic response
- Ploughing
- Drainage
- Ferrous
- Superficial geology
- Modern service

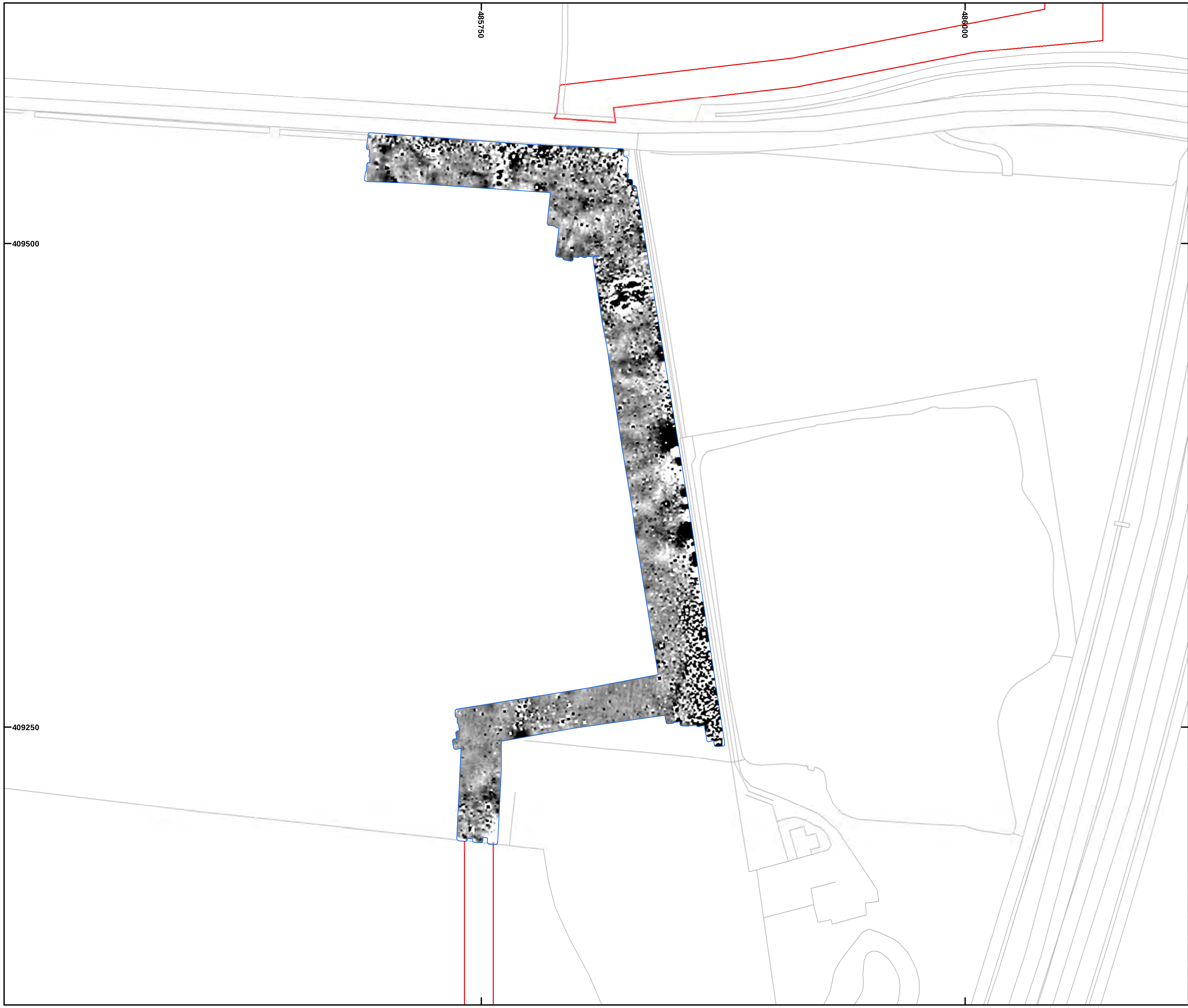
0 100 m

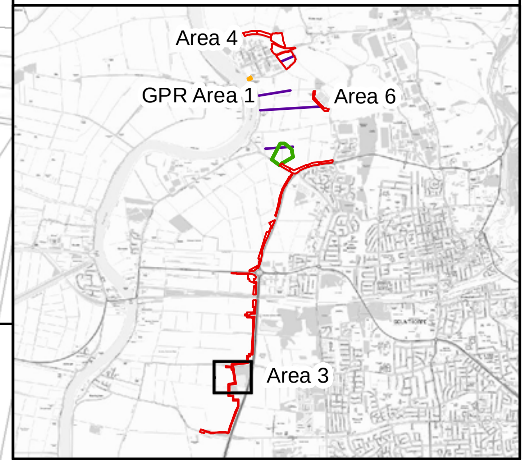
Coordinate system: OSGB36

Date:	15/12/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: interpretation (Area 3 south)

Figure 14





Gradiometer survey

Caesium vapour survey

Detailed survey extents

-2 nT 3 nT

0 100 m

Coordinate system: OSGB36

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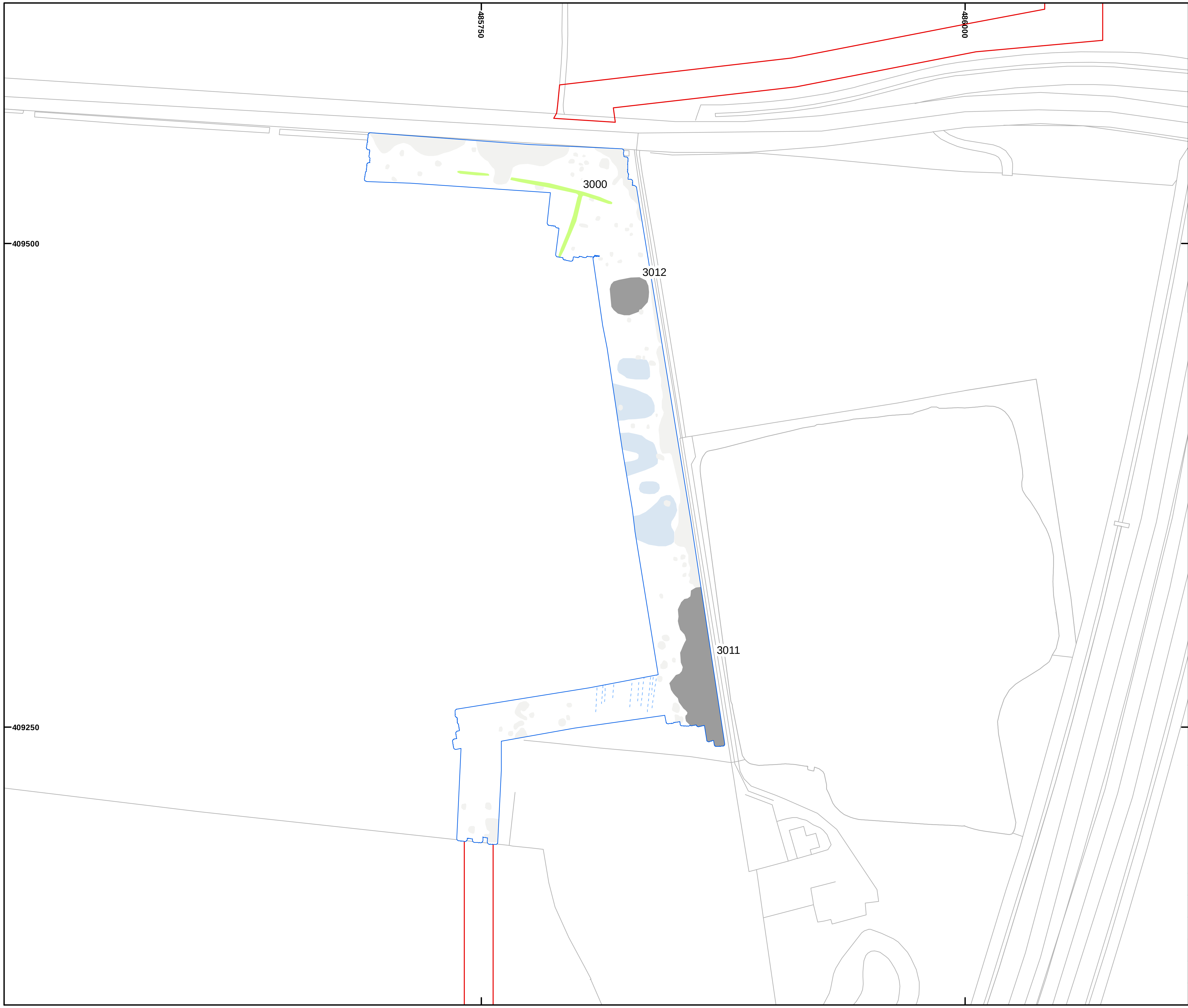
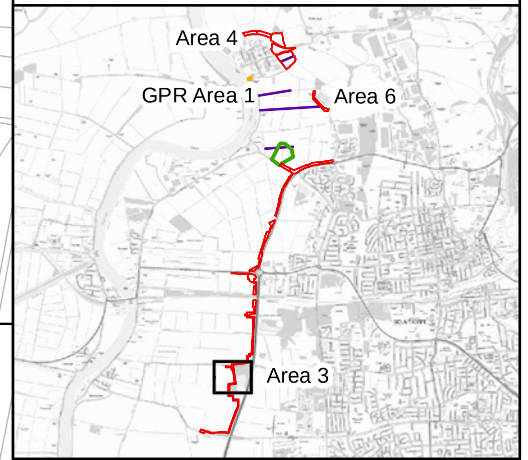
Detailed gradiometer survey results: greyscale plot (Area 3 south)

Figure 15





- Gradiometer survey
- Caesium vapour survey
- Detailed survey extents
- Archaeology
- Possible archaeology
- Ridge and furrow
- Former field boundary
- Trend
- Increased magnetic response
- Ploughing
- Drainage
- Ferrous
- Superficial geology
- Modern service

0 100 m

Coordinate system: OSGB36

Date:	15/12/2022
Revision Number:	0
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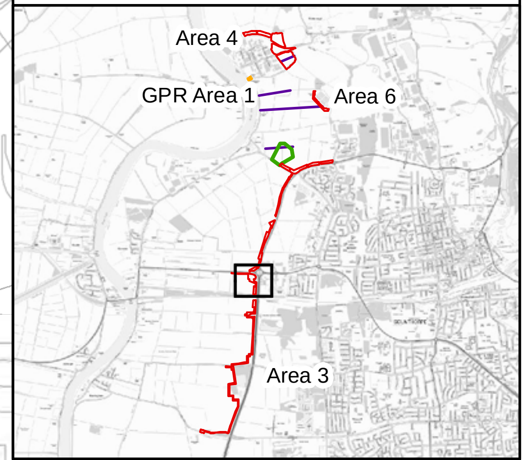
Detailed gradiometer survey results: interpretation (Area 3 south)

Figure 16



Gradiometer survey
Caesium vapour survey
Detailed survey extents

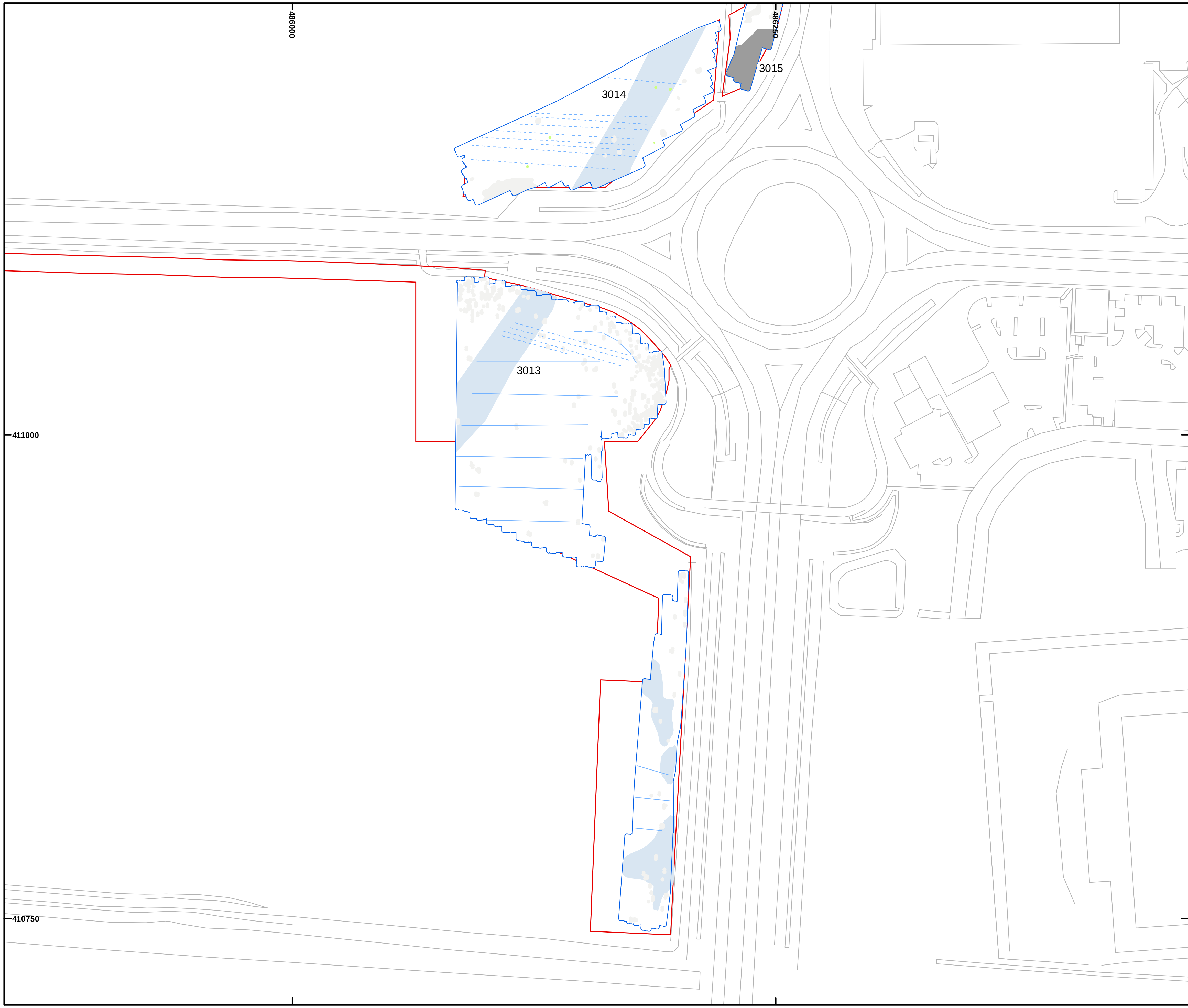
-2 nT
3 nT

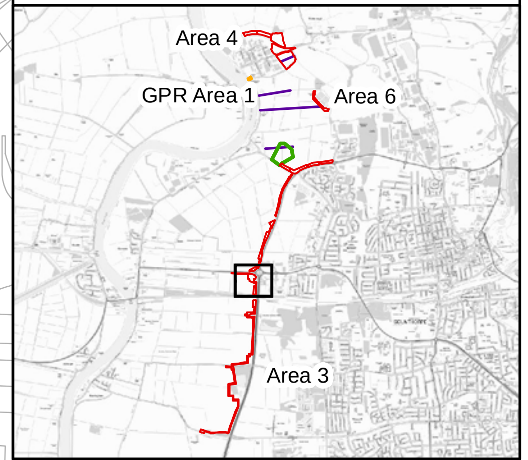
0
100 m

Date:	24/01/2023
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (Area 3 centre)

Figure 17





- Gradiometer survey
- Caesium vapour survey
- Detailed survey extents
- Archaeology
- Possible archaeology
- Ridge and furrow
- Former field boundary
- Trend
- Increased magnetic response
- Ploughing
- Drainage
- Ferrous
- Superficial geology
- Modern service

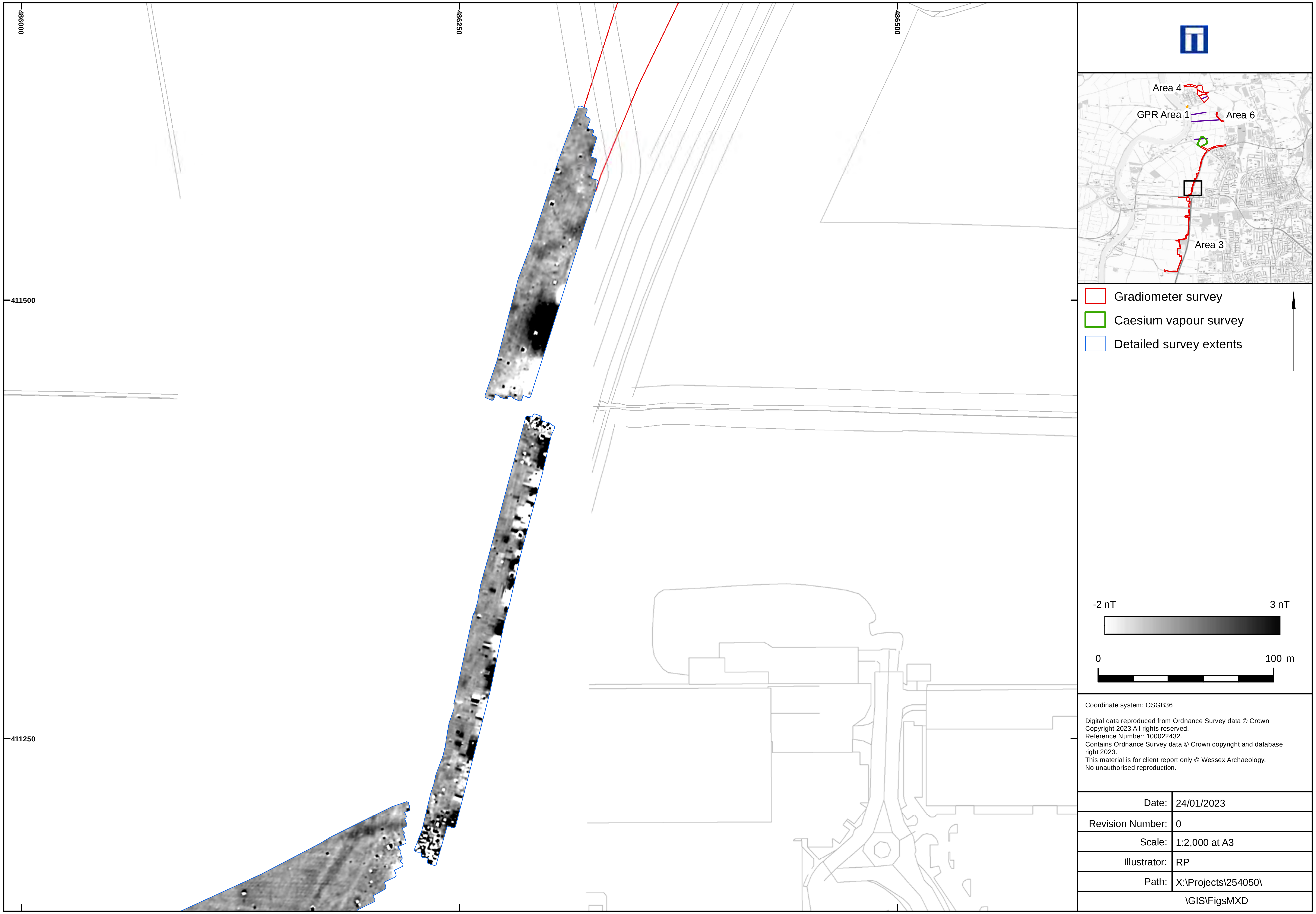
0 100 m

Coordinate system: OSGB36

Date:	15/12/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: interpretation (Area 3 centre)

Figure 18



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Revision Number:	0
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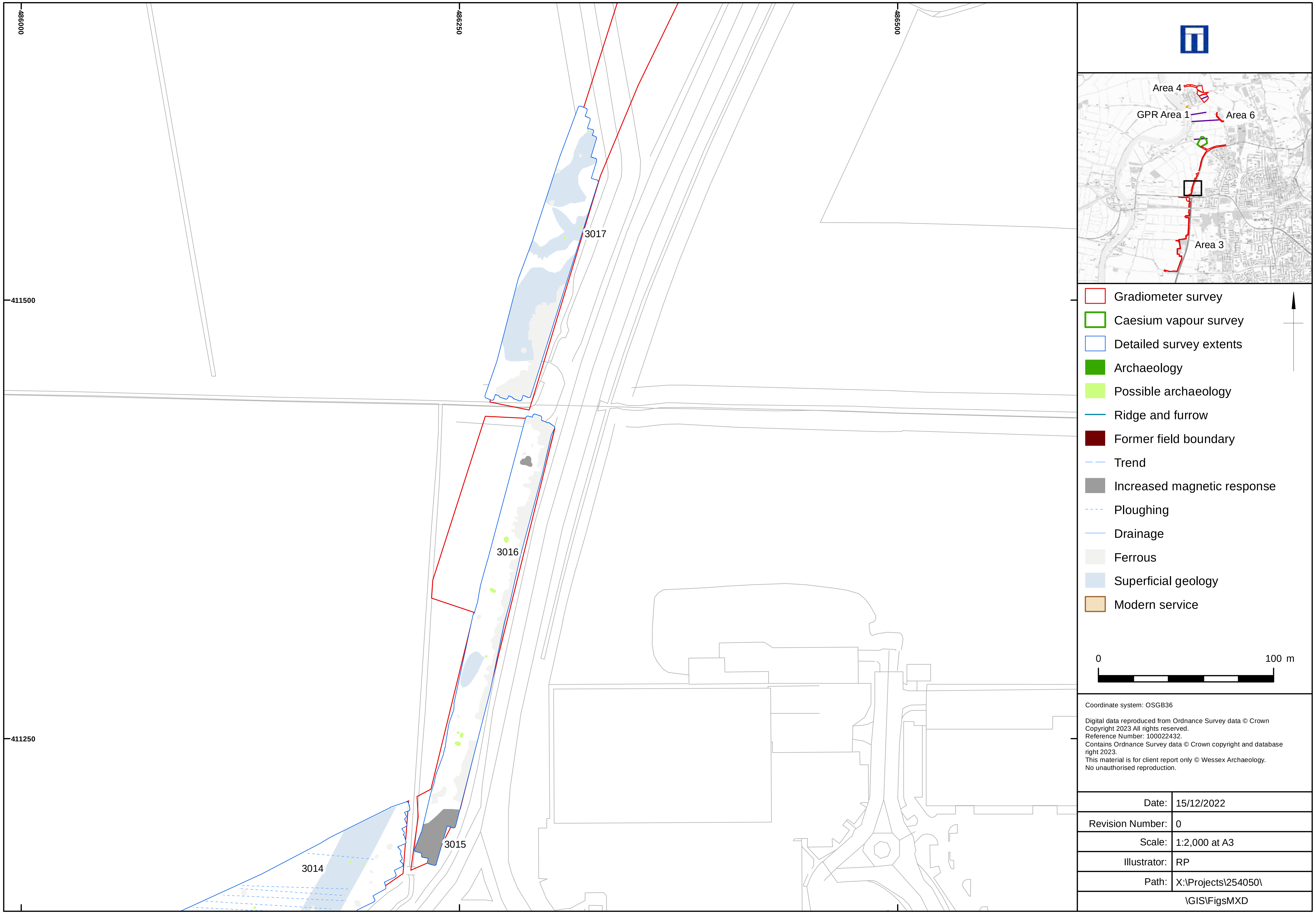
Path:	X:\Projects\254050\ \GIS\FigsMXD

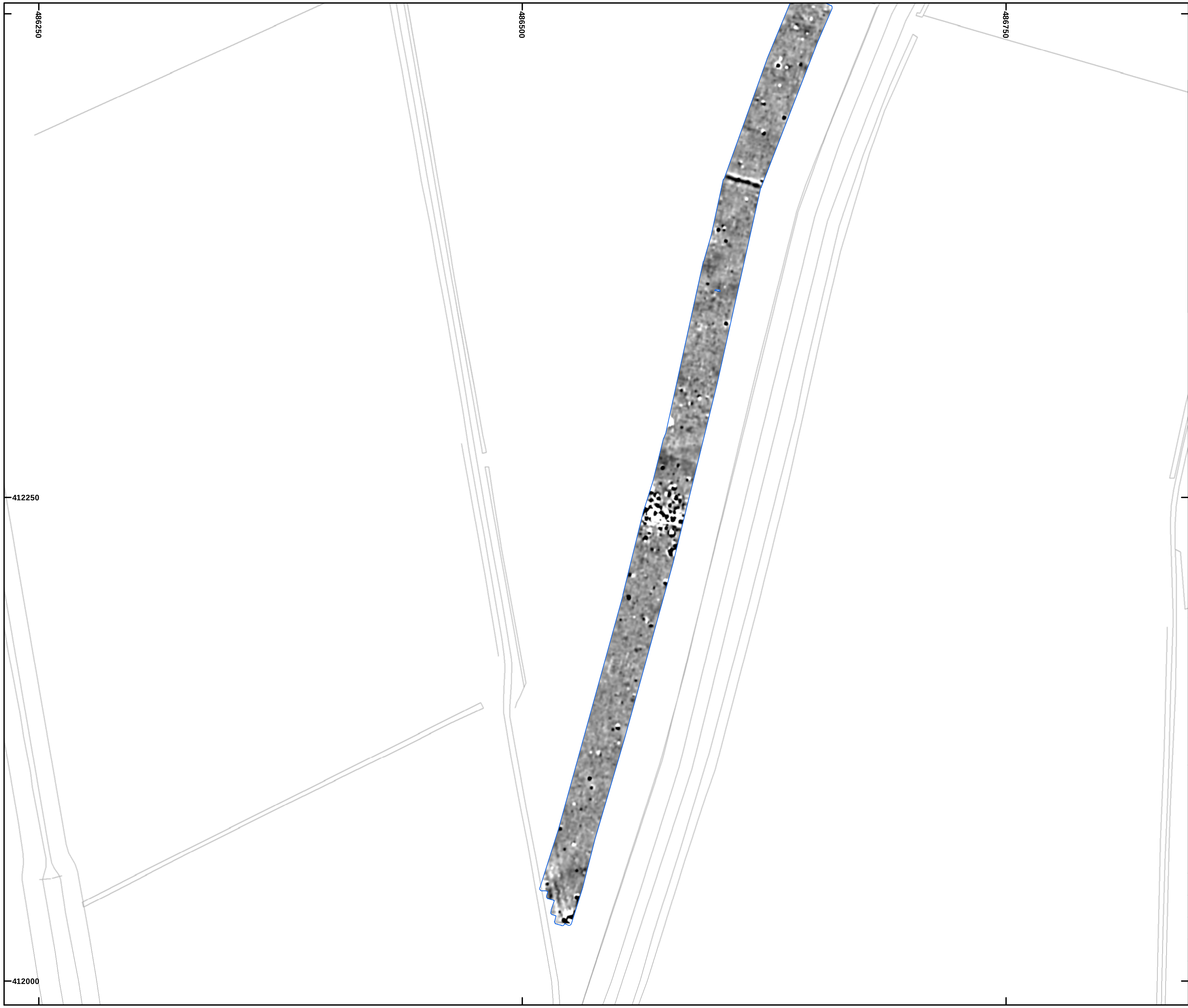
Detailed gradiometer survey results: greyscale plot (Area 3 centre)

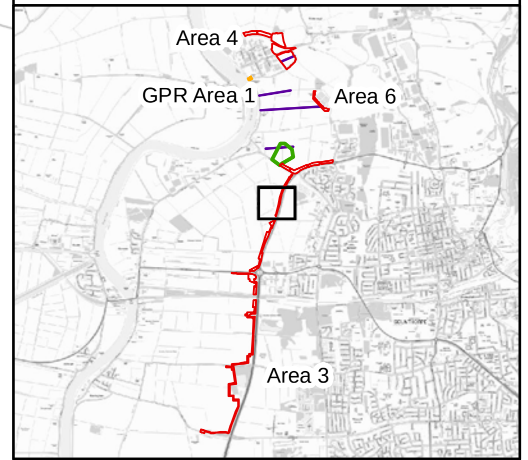
Figure 19



Detailed gradiometer survey results: interpretation (Area 3 centre)

Figure 20





Gradiometer survey

Caesium vapour survey

Detailed survey extents

-2 nT 3 nT

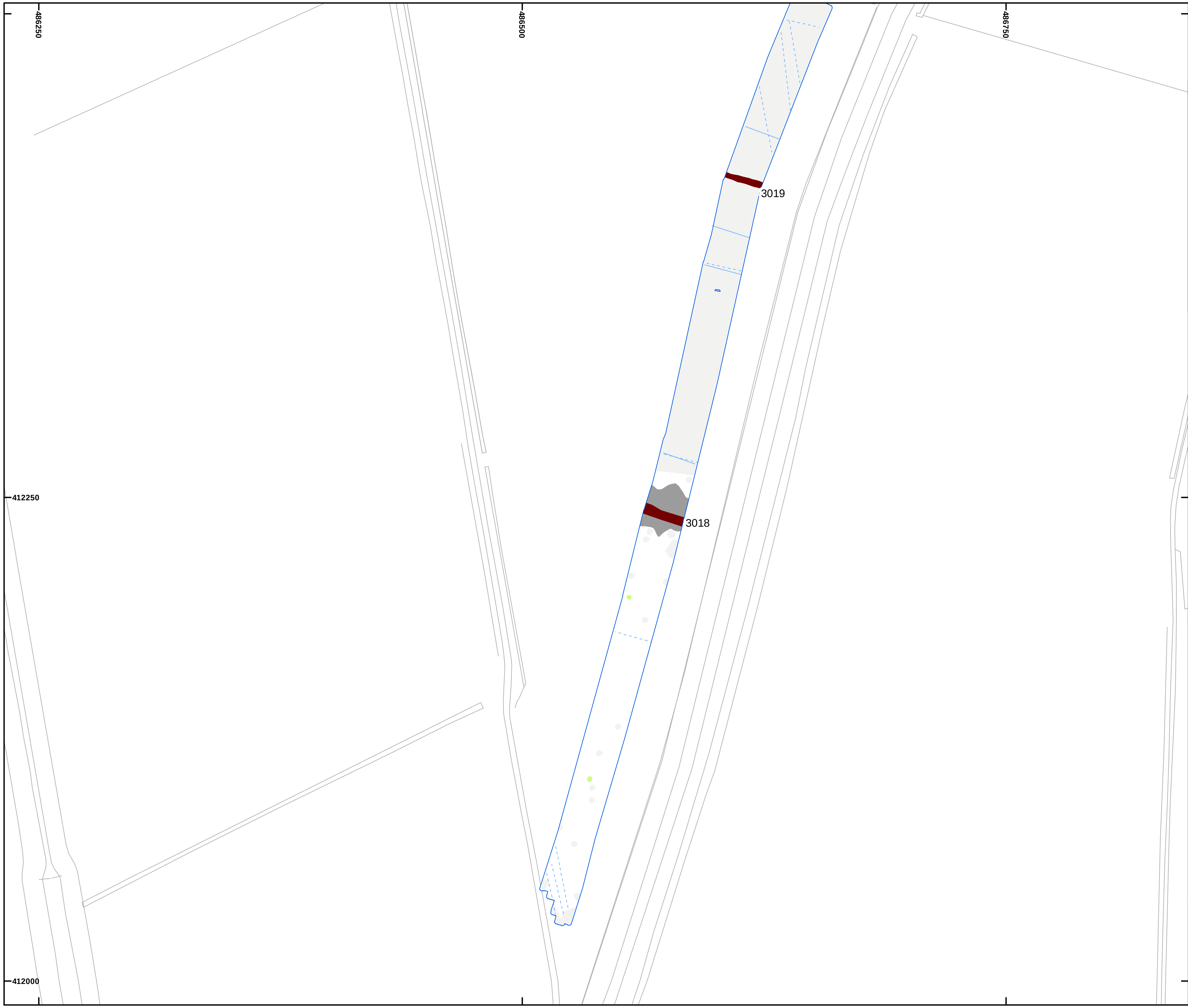
0 100 m

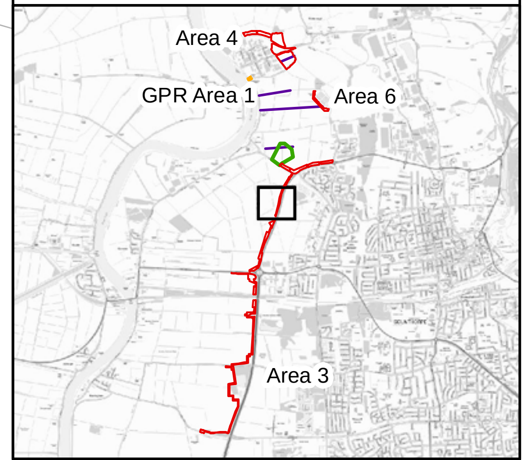
Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (Area 3 north)

Figure 21





- Gradiometer survey
- Caesium vapour survey
- Detailed survey extents
- Archaeology
- Possible archaeology
- Ridge and furrow
- Former field boundary
- Trend
- Increased magnetic response
- Ploughing
- Drainage
- Ferrous
- Superficial geology
- Modern service

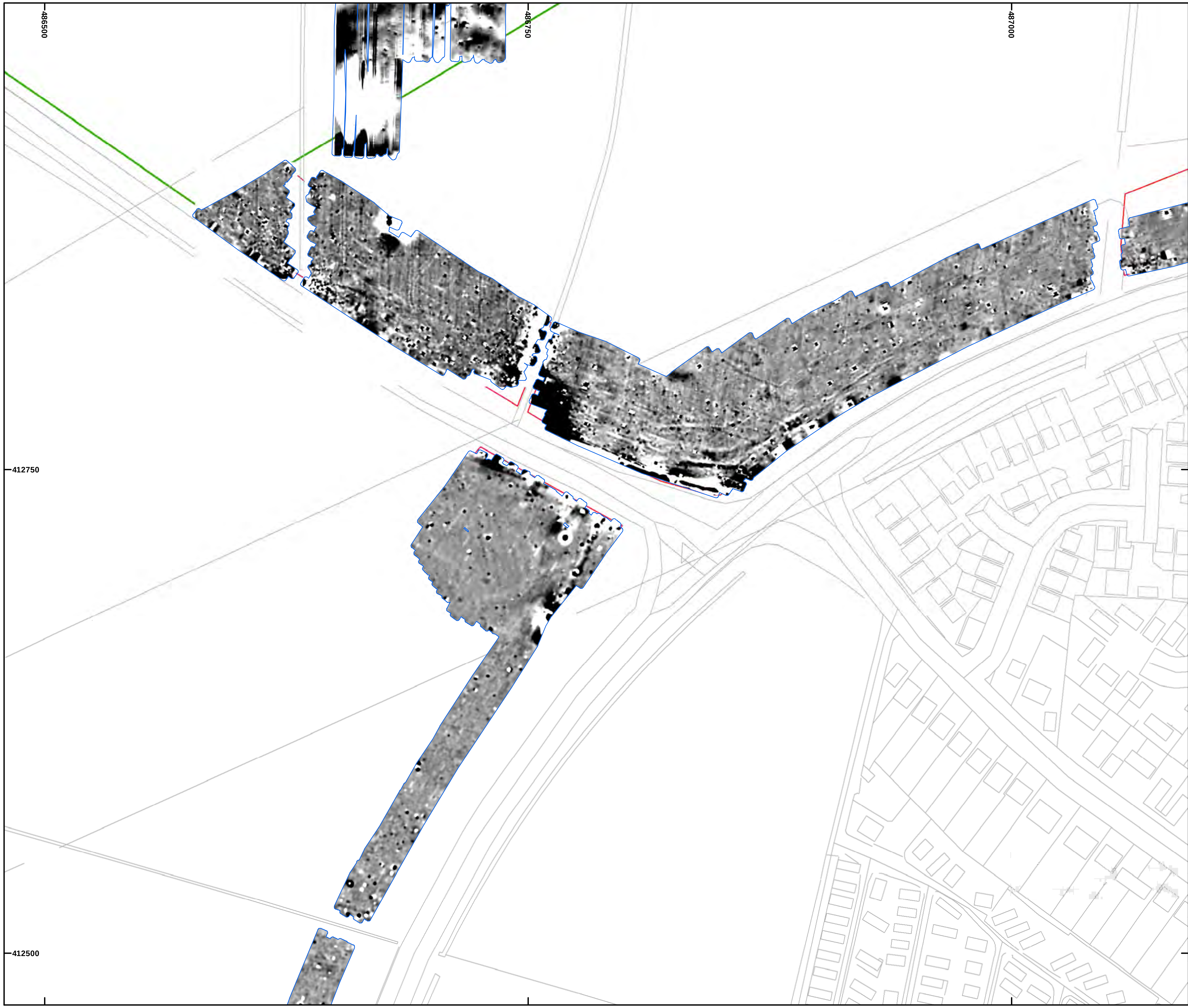
0 100 m

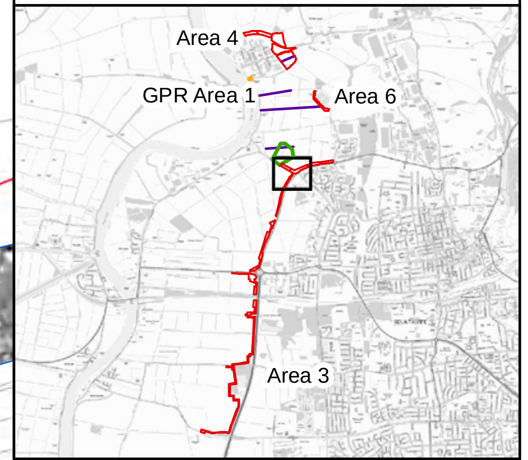
Coordinate system: OSGB36

Date:	15/12/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: interpretation (Area 3 north)

Figure 22





Gradiometer survey
Caesium vapour survey
Detailed survey extents

-2 nT
3 nT

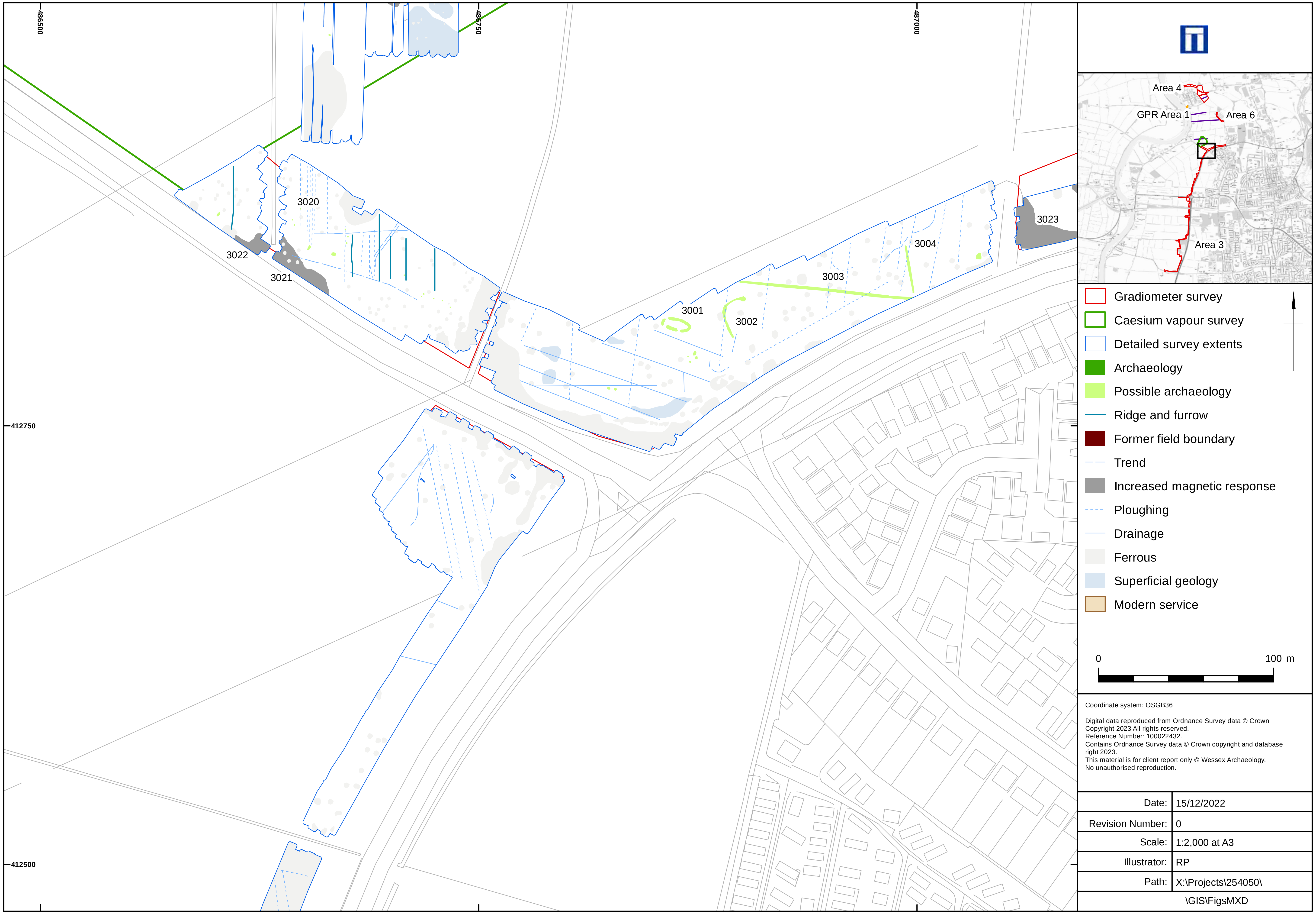
0
100 m

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

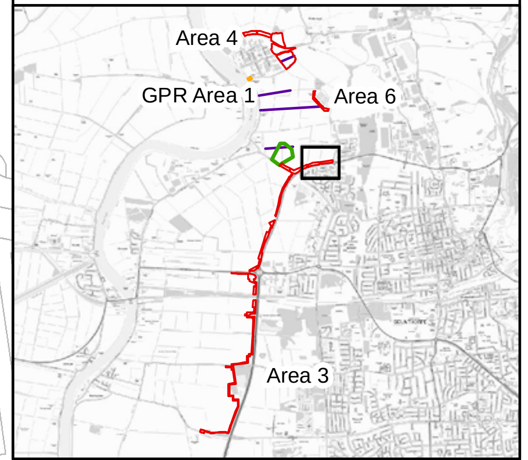
Detailed gradiometer survey results: greyscale plot (Area 3 north, Area 5)

Figure 23



Detailed gradiometer survey results: interpretation (Area 3 north, Area 5)

Figure 24



Gradiometer survey
Caesium vapour survey
Detailed survey extents

-2 nT
3 nT

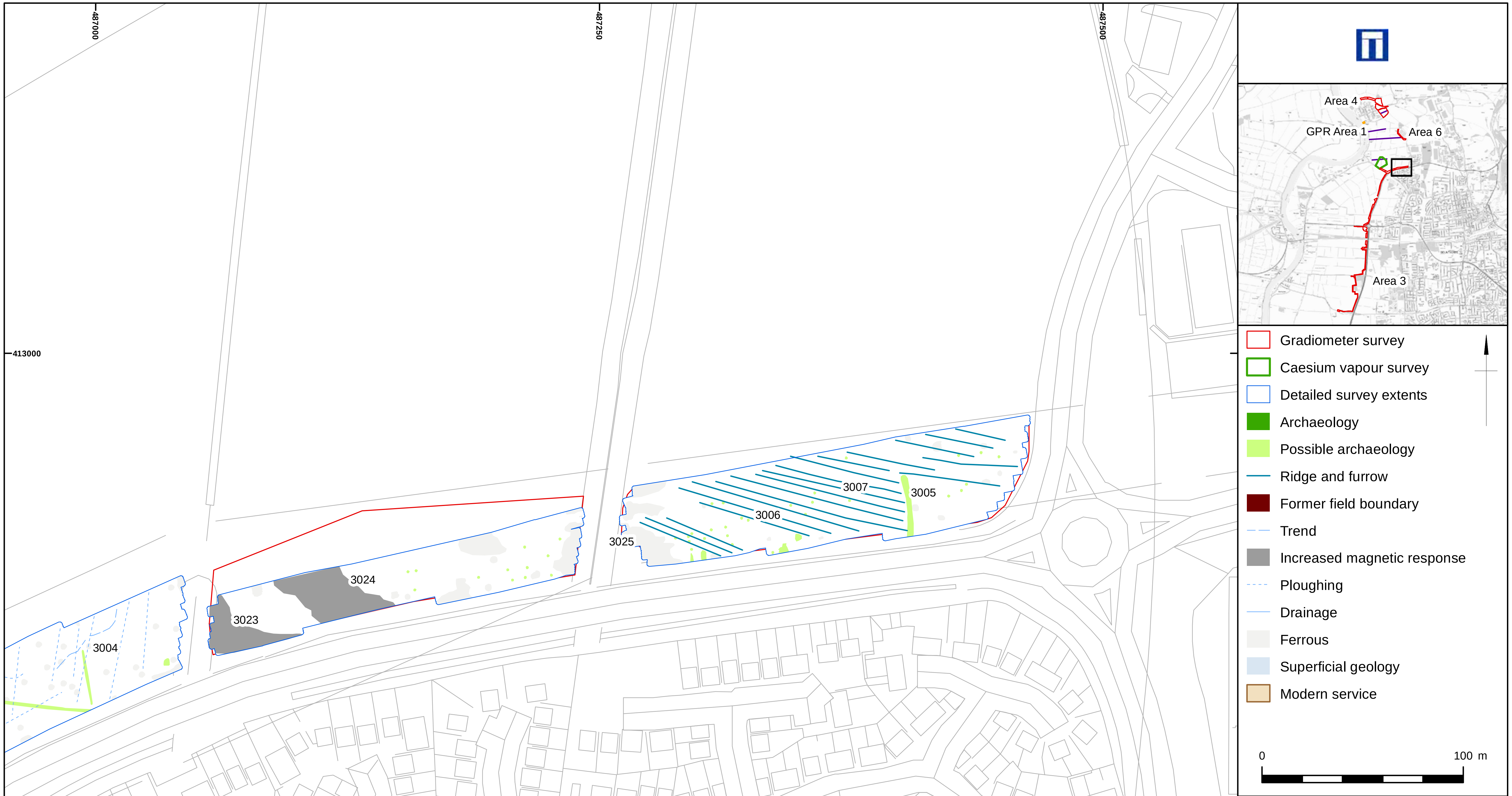
0
100 m

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (Area 5)

Figure 25

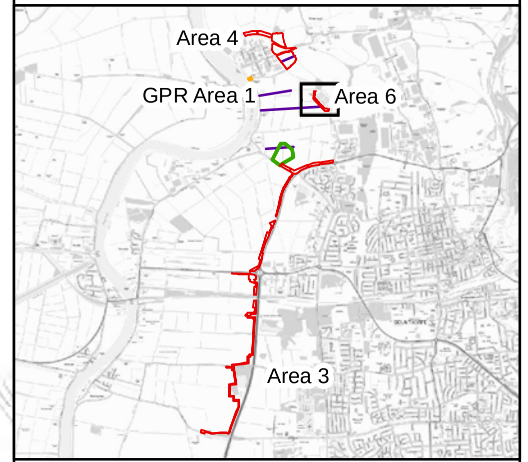


Coordinate system: OSGB36

Date:	15/12/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: interpretation (Area 5)

Figure 26



Gradiometer survey

Caesium vapour survey

Detailed survey extents

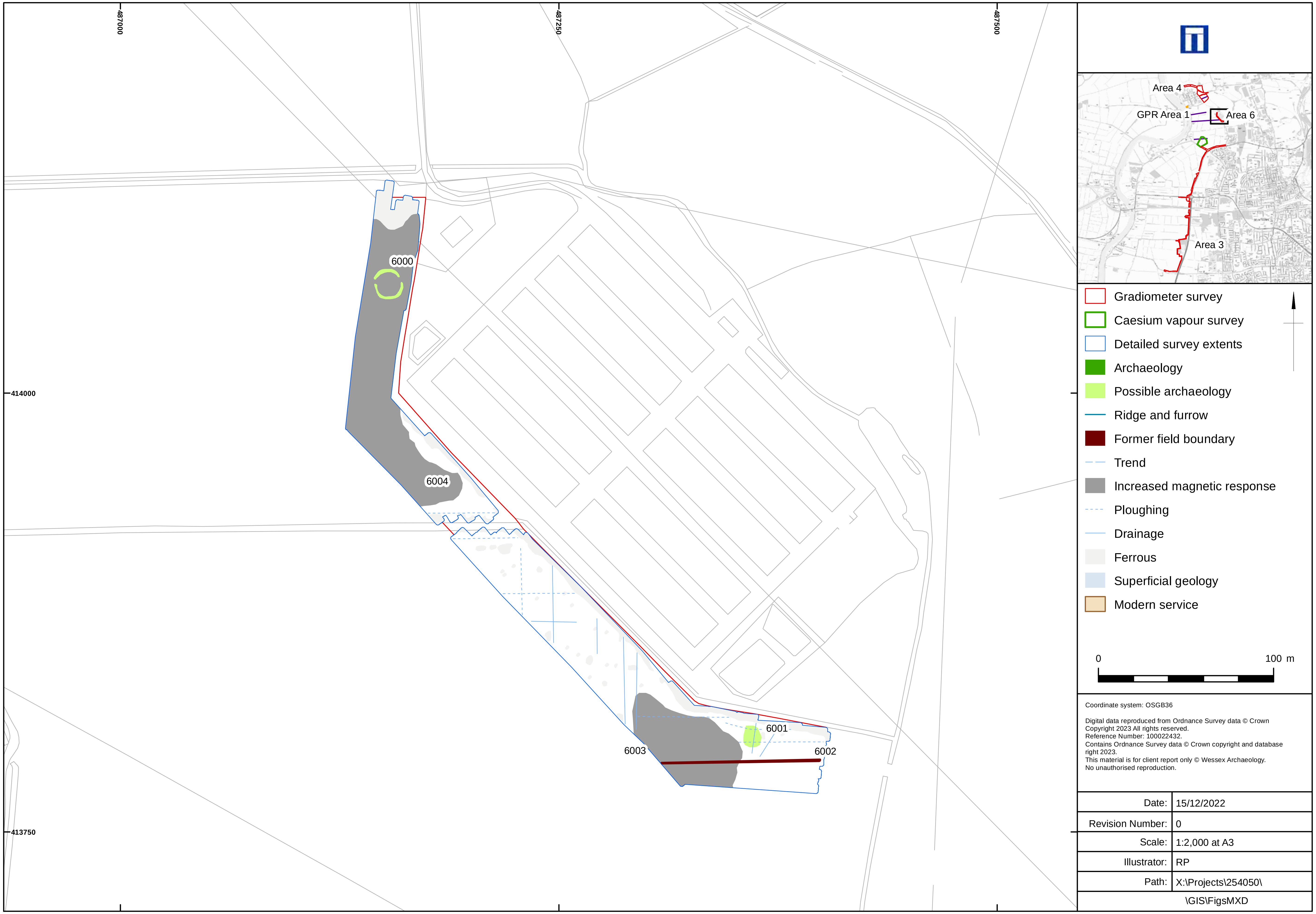
-2 nT 3 nT

0 100 m

Date:	24/01/2023
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

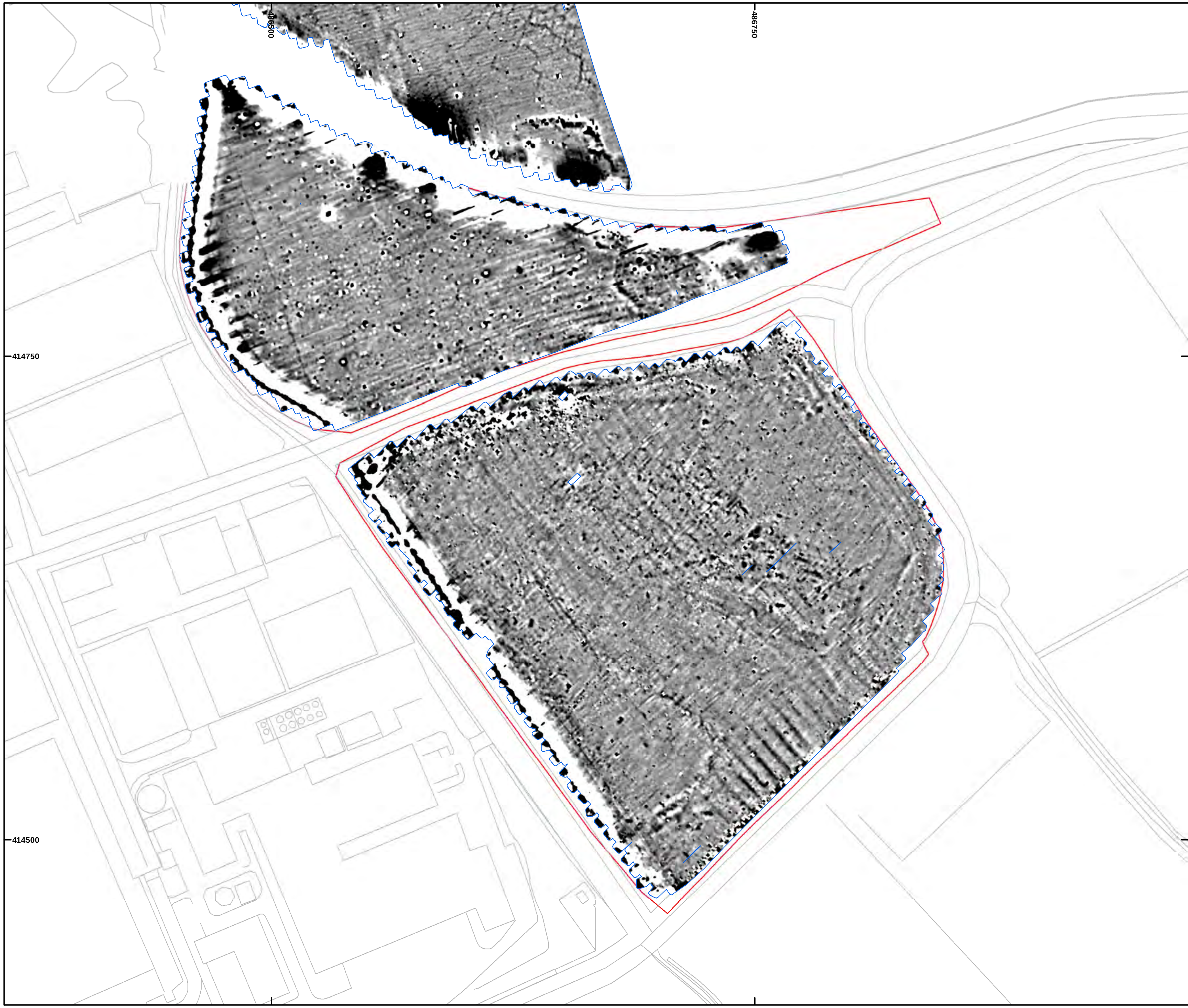
Detailed gradiometer survey results: greyscale plot (Area 6)

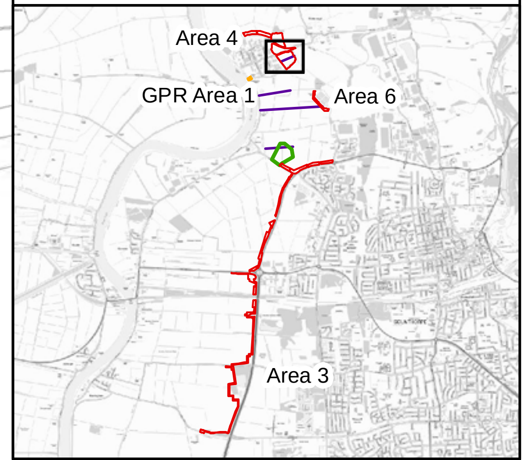
Figure 27



Detailed gradiometer survey results: interpretation (Area 6)

Figure 28





Gradiometer survey

Caesium vapour survey

Detailed survey extents

-2 nT 3 nT

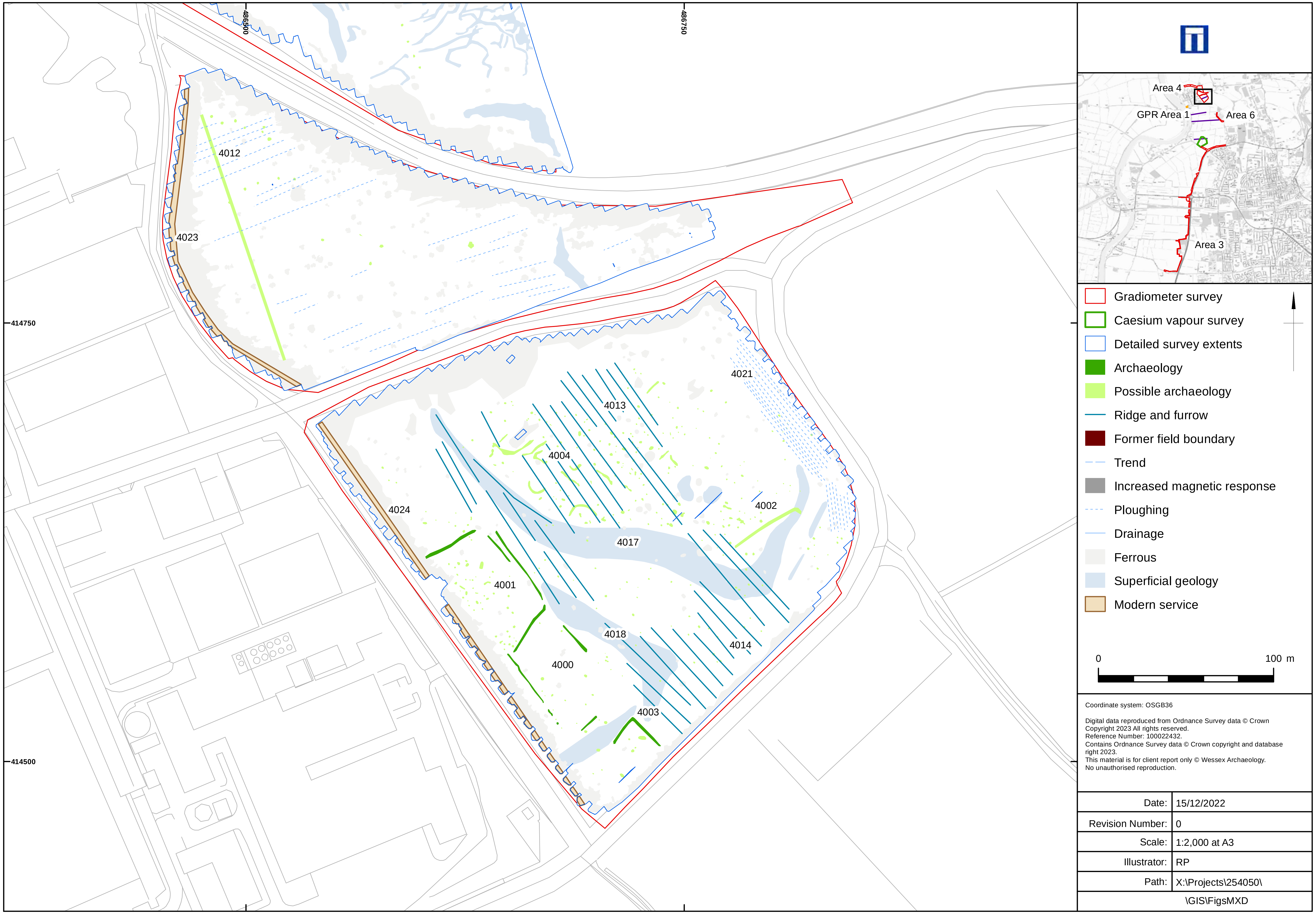
0 100 m

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

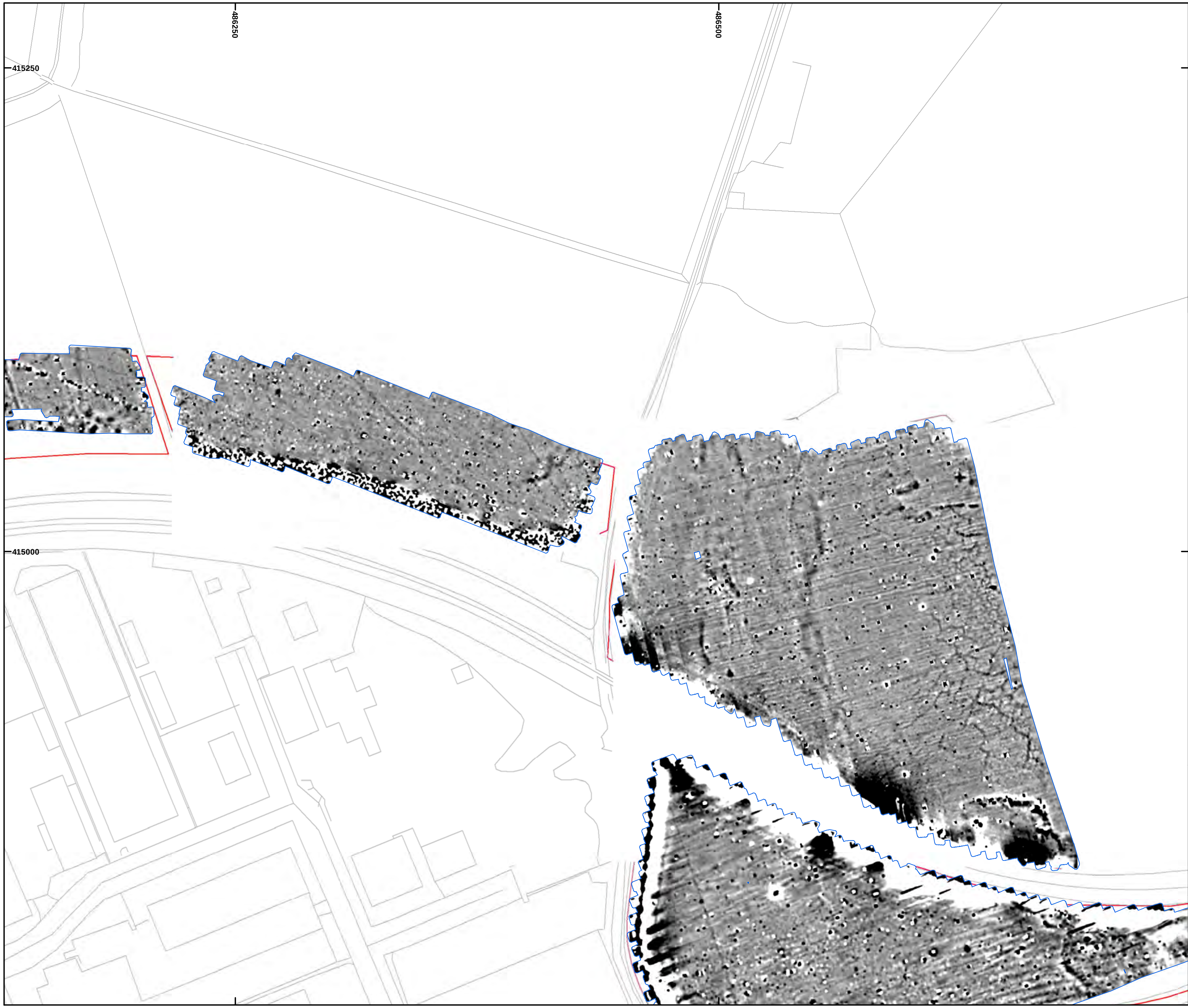
Detailed gradiometer survey results: greyscale plot (Area 4 south)

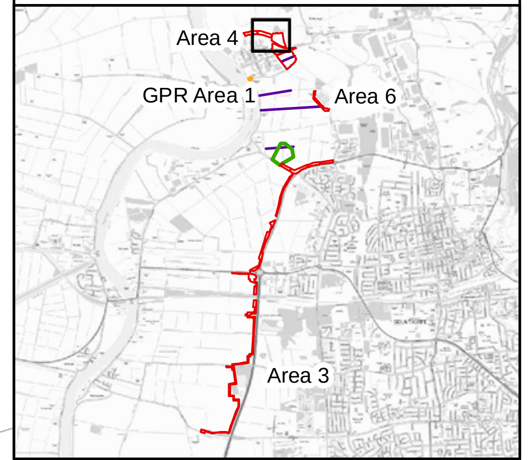
Figure 29



Detailed gradiometer survey results: interpretation (Area 4 south)

Figure 30





Gradiometer survey

Caesium vapour survey

Detailed survey extents

-2 nT 3 nT

0 100 m

Coordinate system: OSGB36

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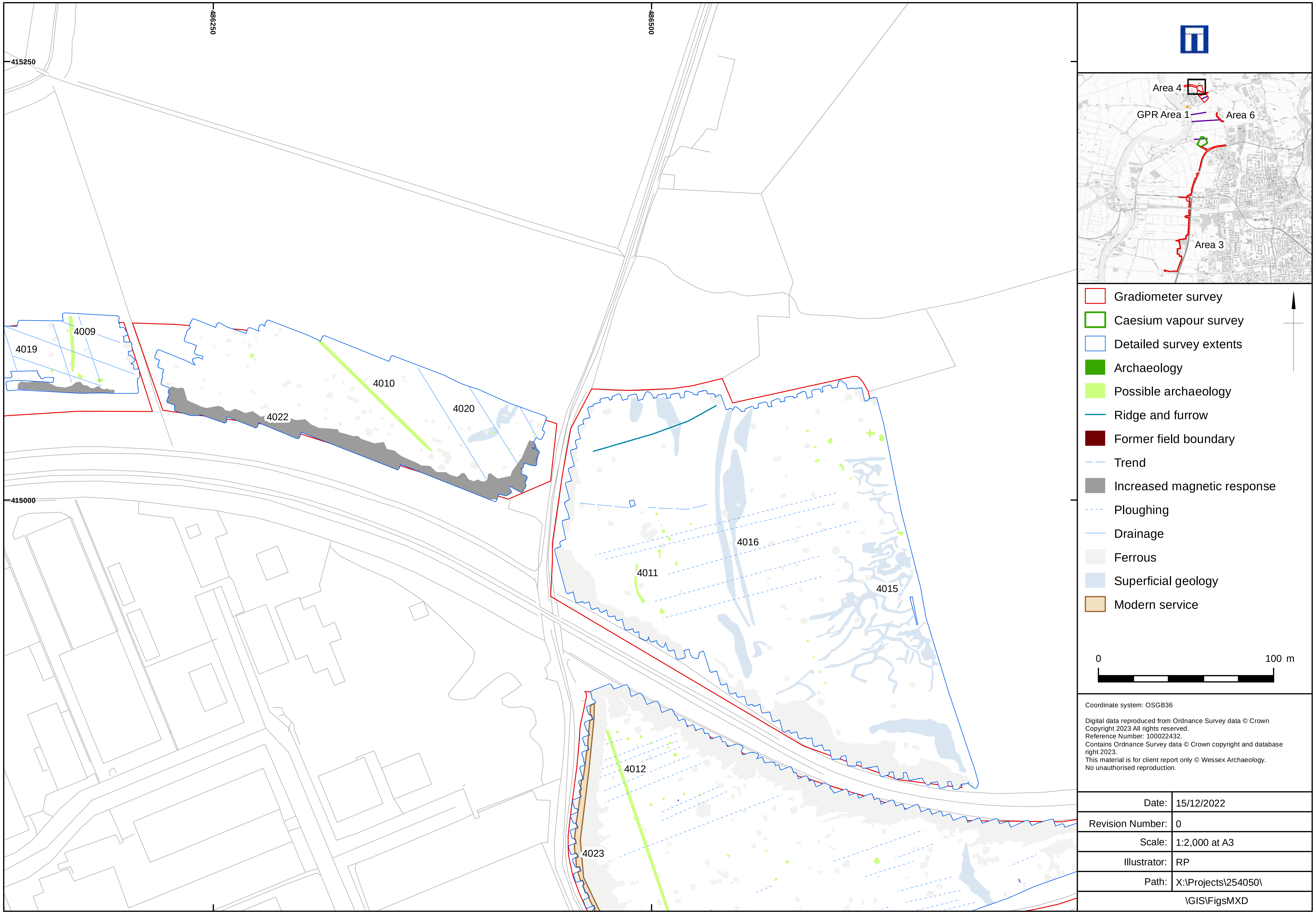
Detailed gradiometer survey results: greyscale plot (Area 4 north)



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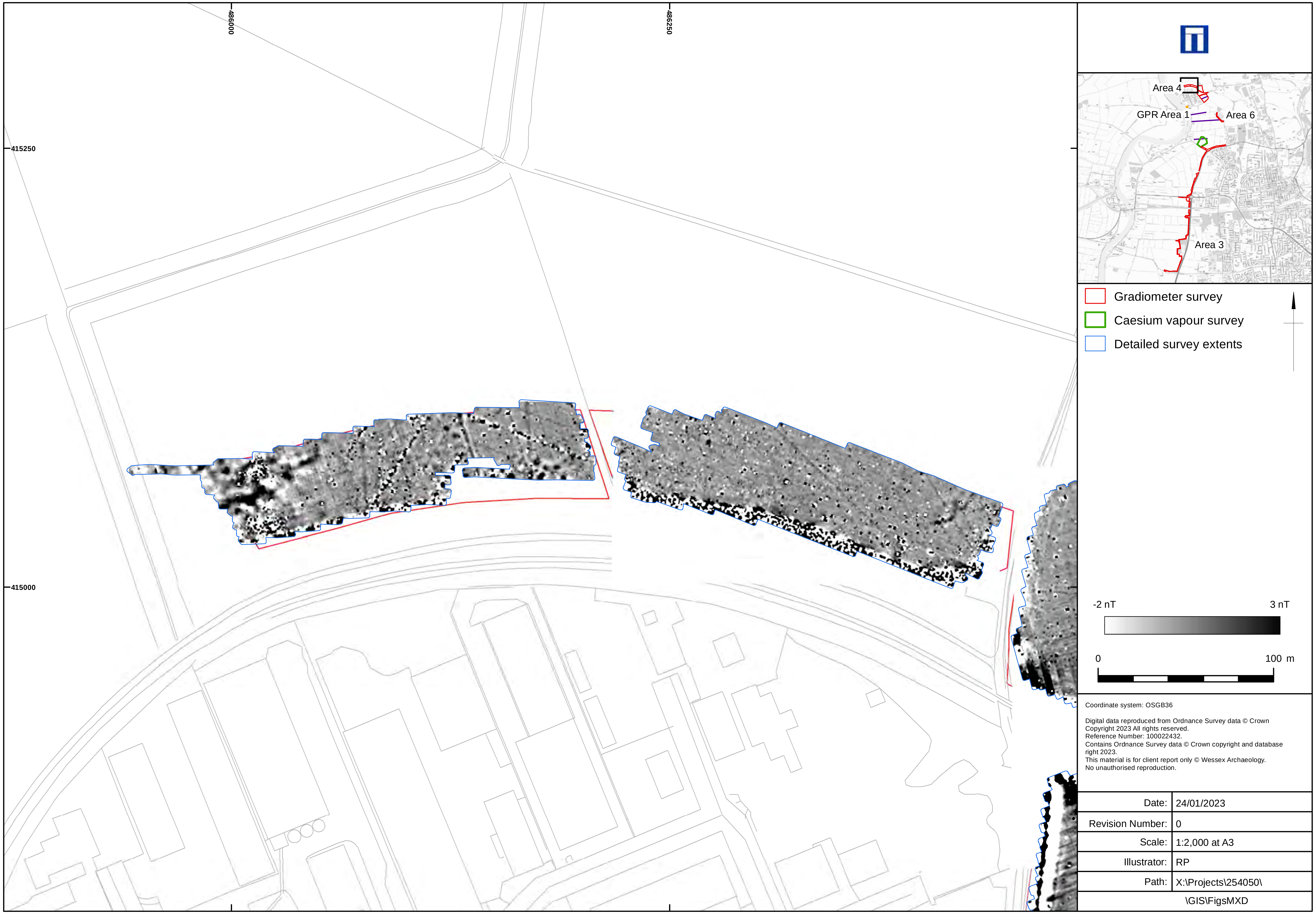
Detailed gradiometer survey results: interpretation (Area 4 north)

Figure 32



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Date:	24/01/2023
Revision Number:	0
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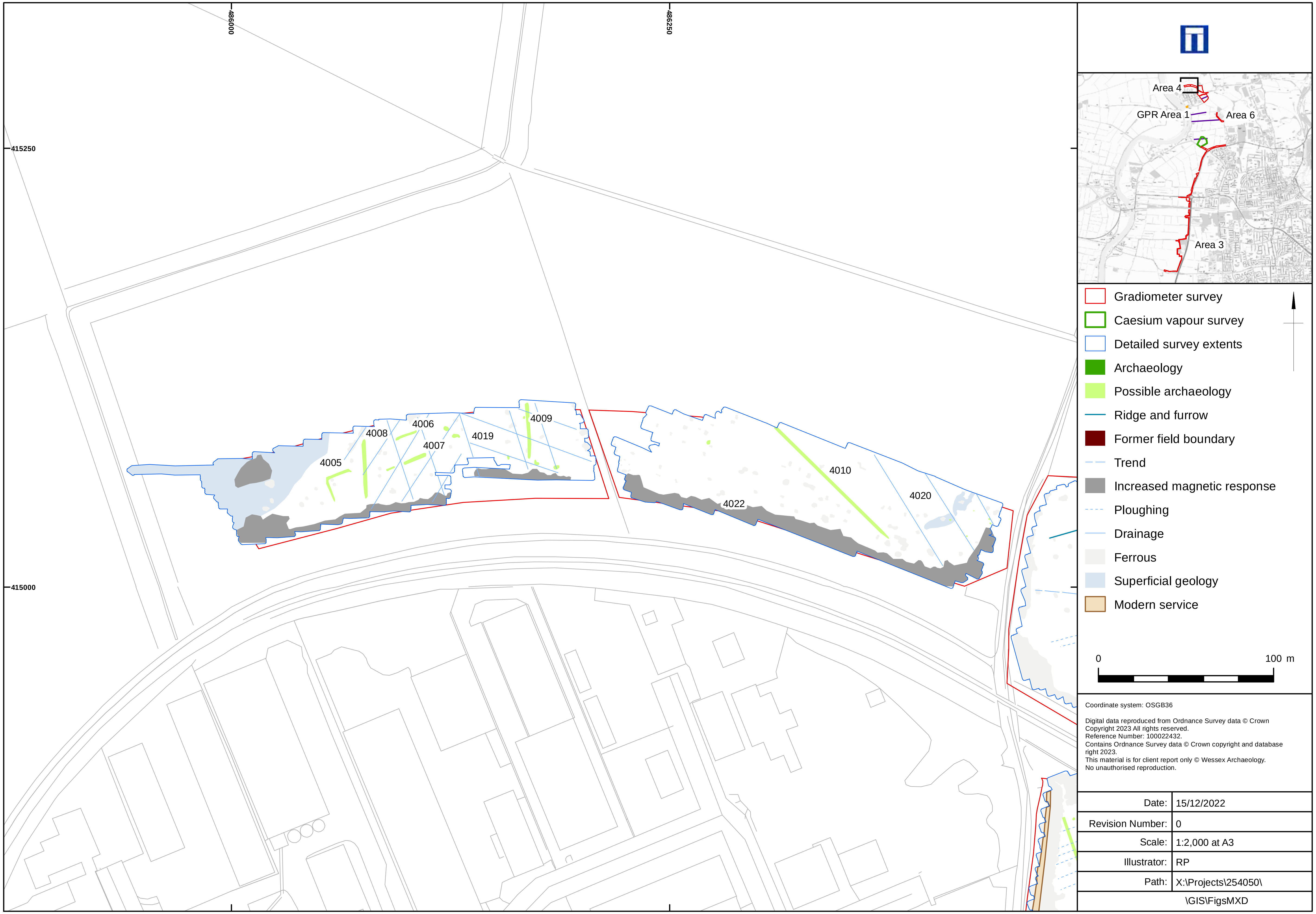
Illustrator:	RP
Path:	X:\Projects\254050\ \GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (Area 4 west)

Figure 33



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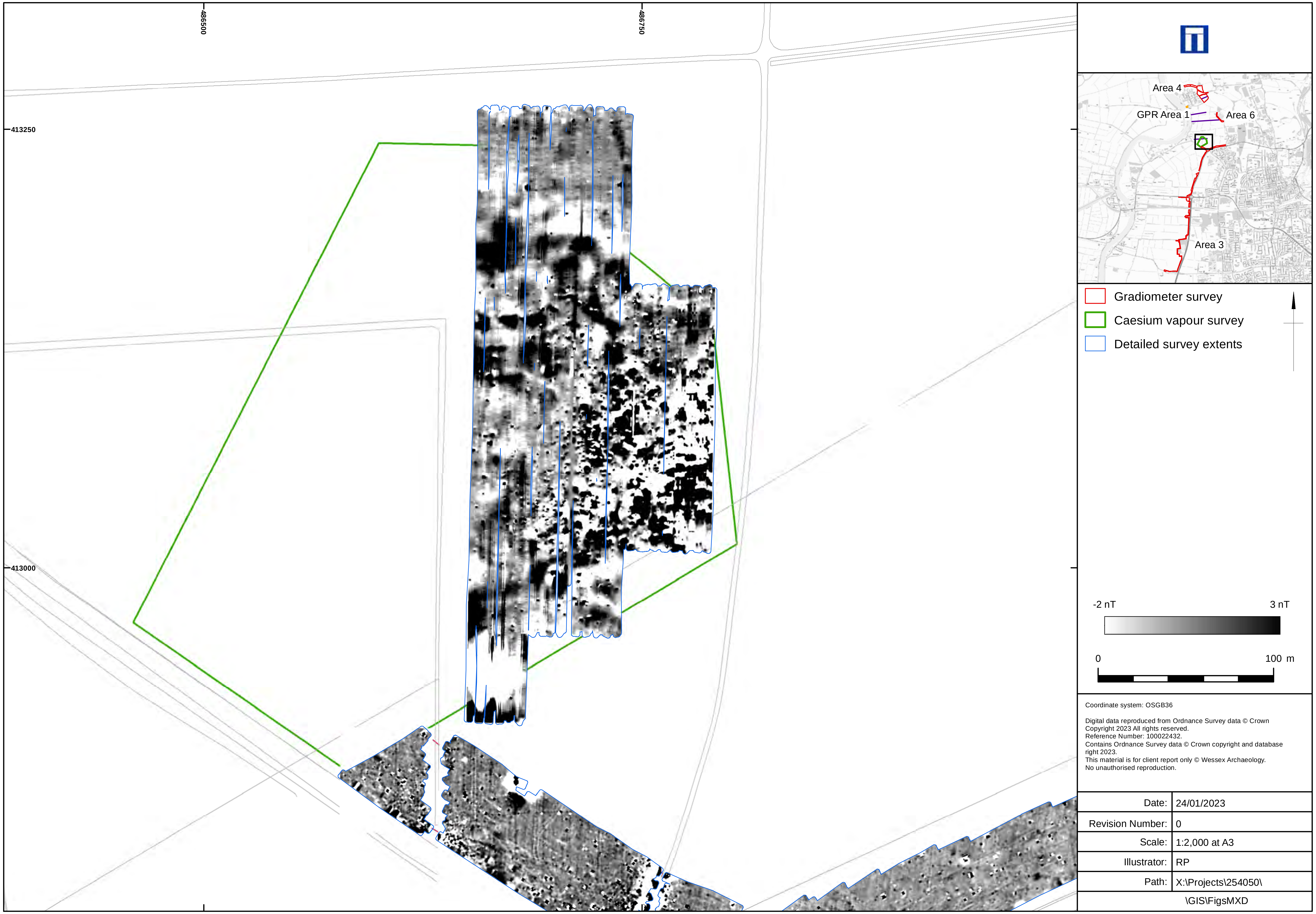
Detailed gradiometer survey results: interpretation (Area 4 west)

Figure 34

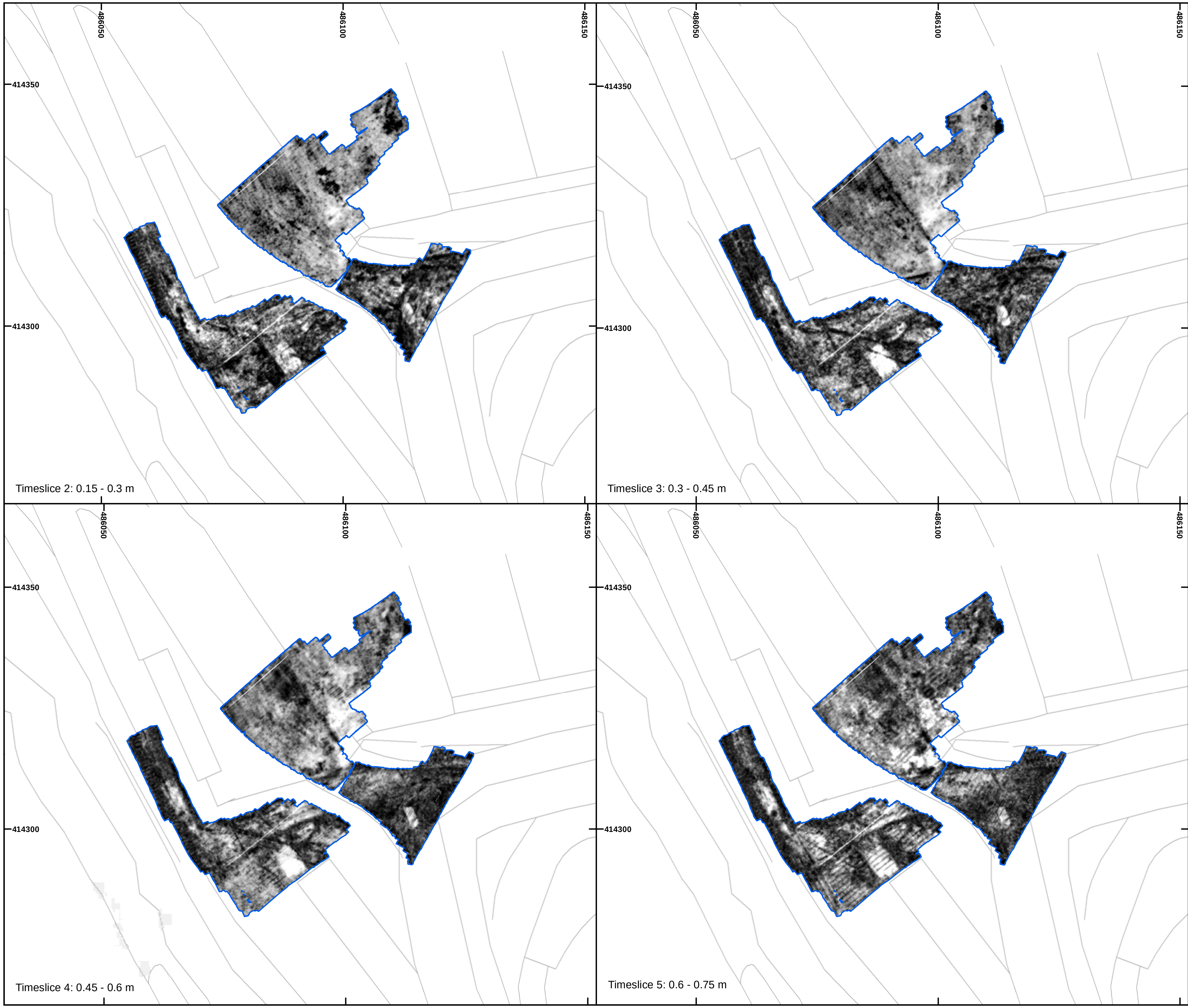


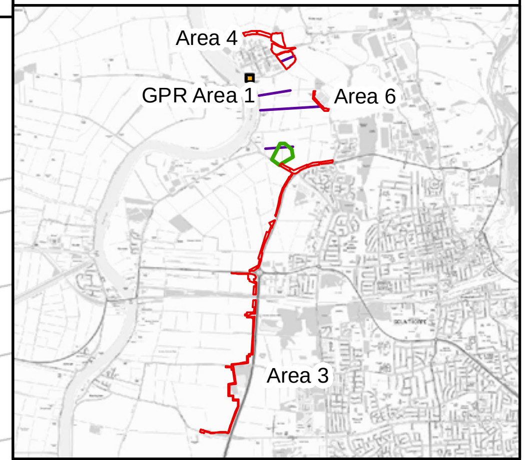
Detailed gradiometer survey results: greyscale plot (Area 3 north, Area 5)

Figure 35

Detailed gradiometer survey results: interpretation (Area 3 north, Area 5)

Figure 36





Detailed Survey Extents

Low amplitude

High amplitude

0

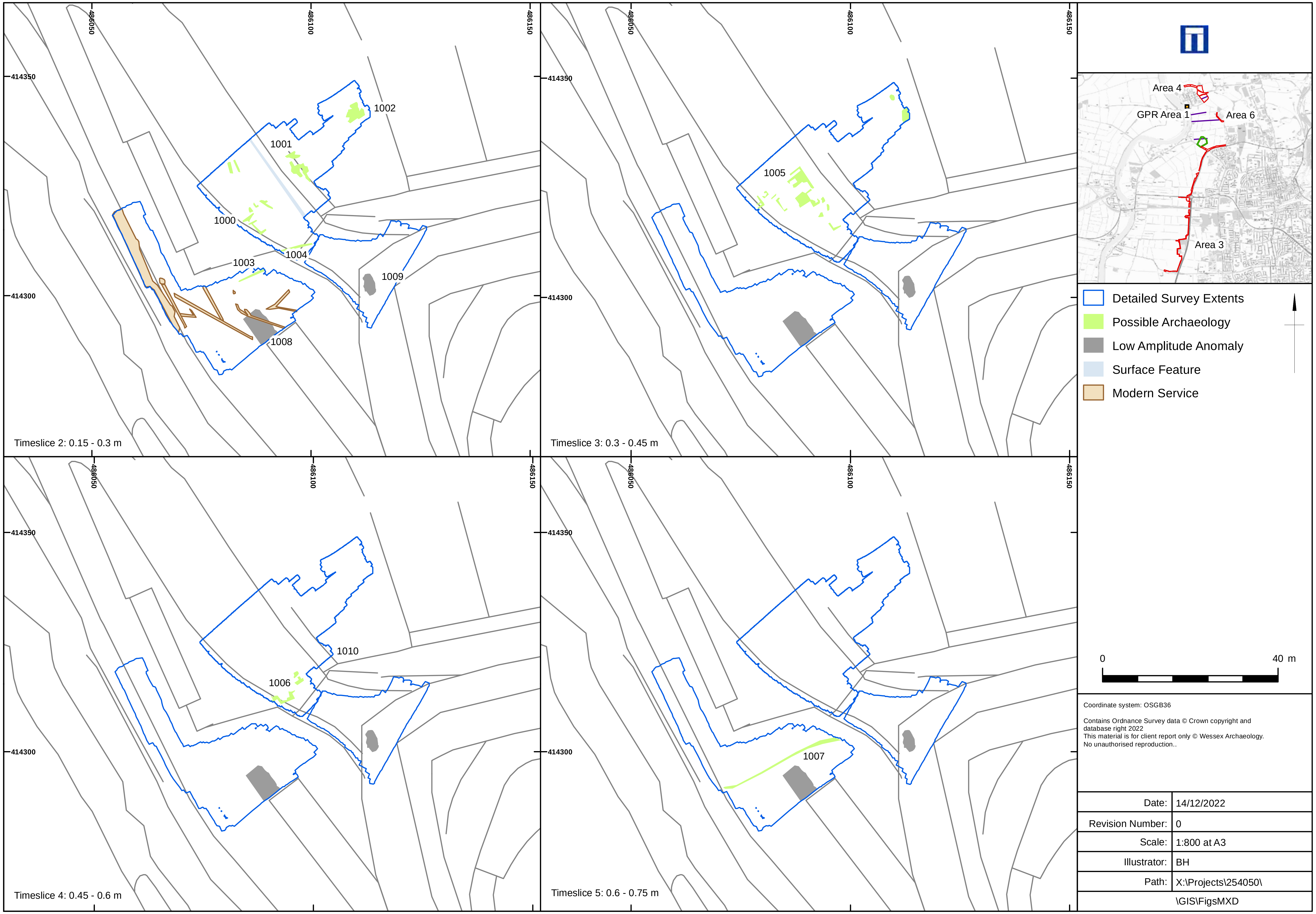
40 m

Coordinate system: OSGB36

Date:	24/01/2023
Revision Number:	0
Scale:	1:800 at A3
Illustrator:	BH
Path:	X:\Projects\254050\ \GIS\FigsMXD

Ground penetrating radar survey results: greyscale plot

Figure 37



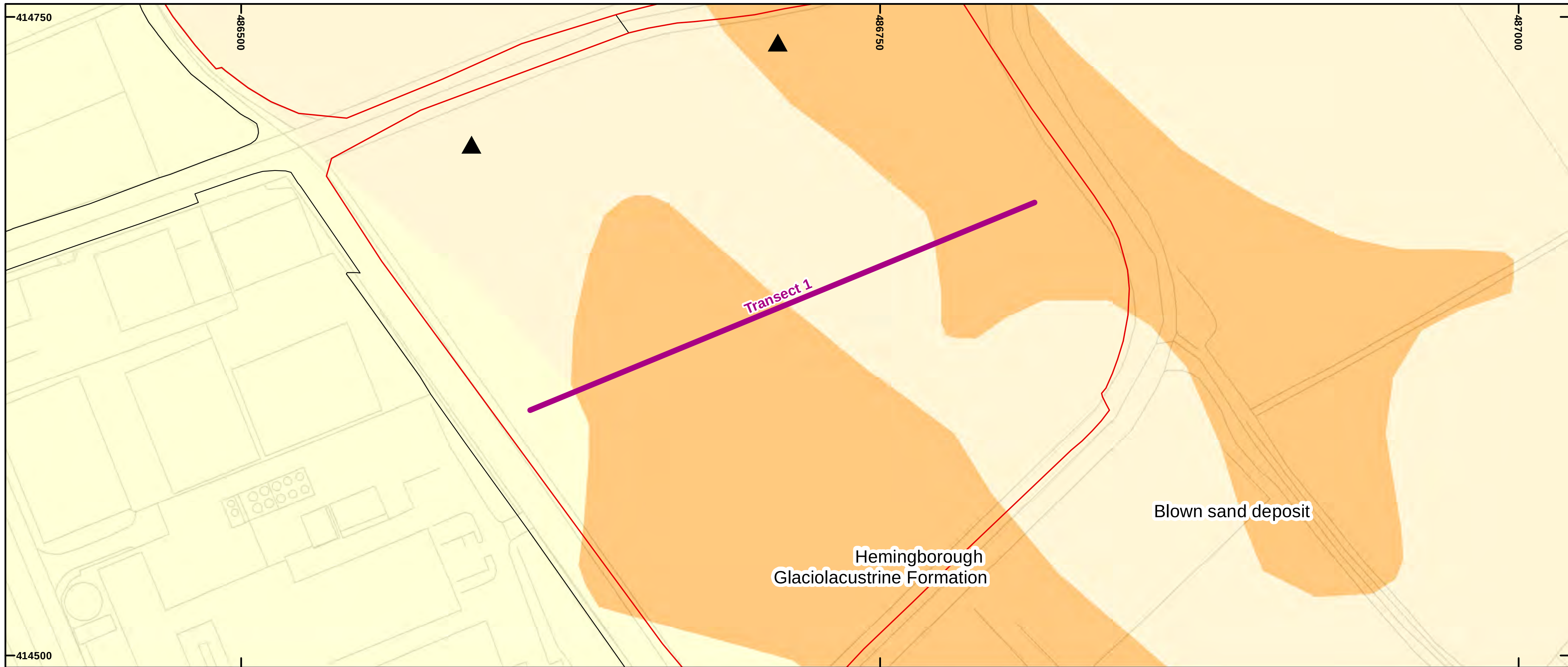
Ground penetrating radar survey results: interpretationt

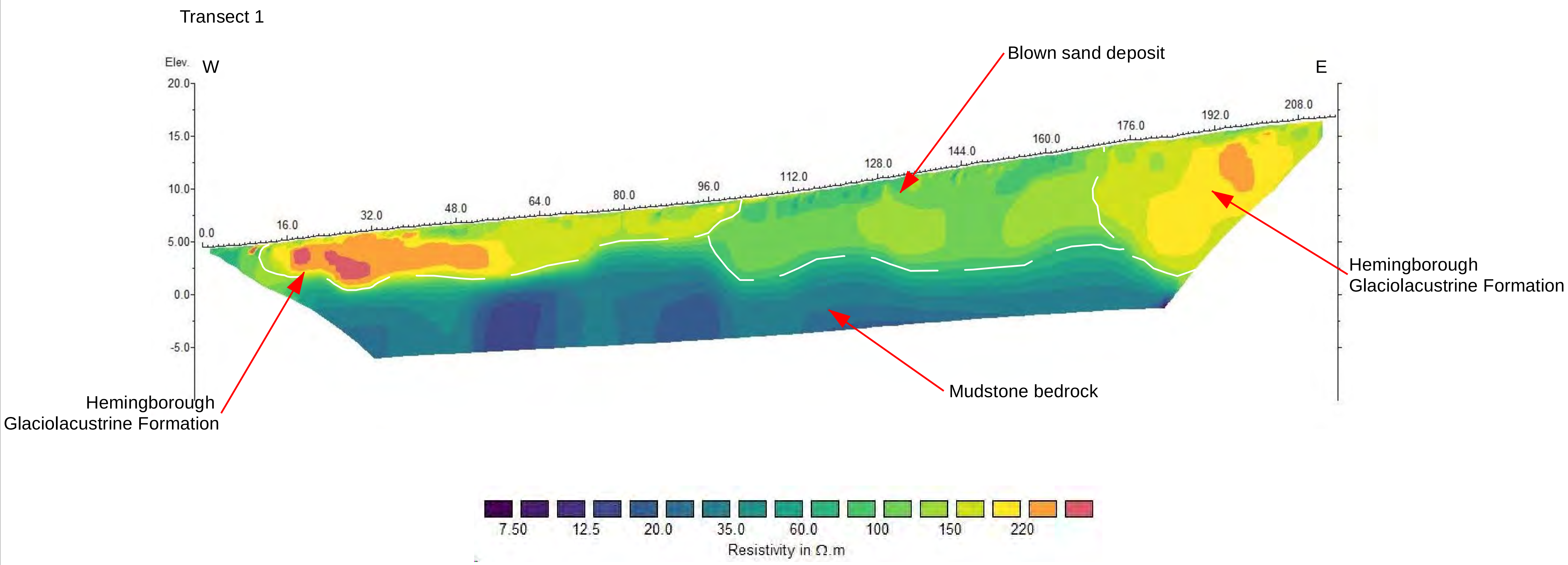
Figure 38

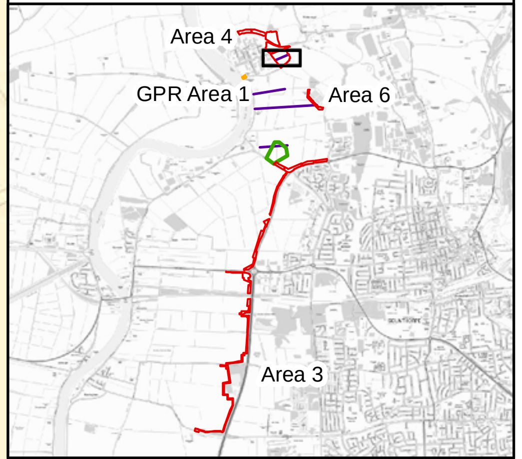
Date:	14/12/2022
Revision Number:	0
Scale:	1:800 at A3
Illustrator:	BH
Path:	X:\Projects\254050\ \GIS\FigsMXD

Ground penetrating radar survey results:overall interpretation

Figure 38







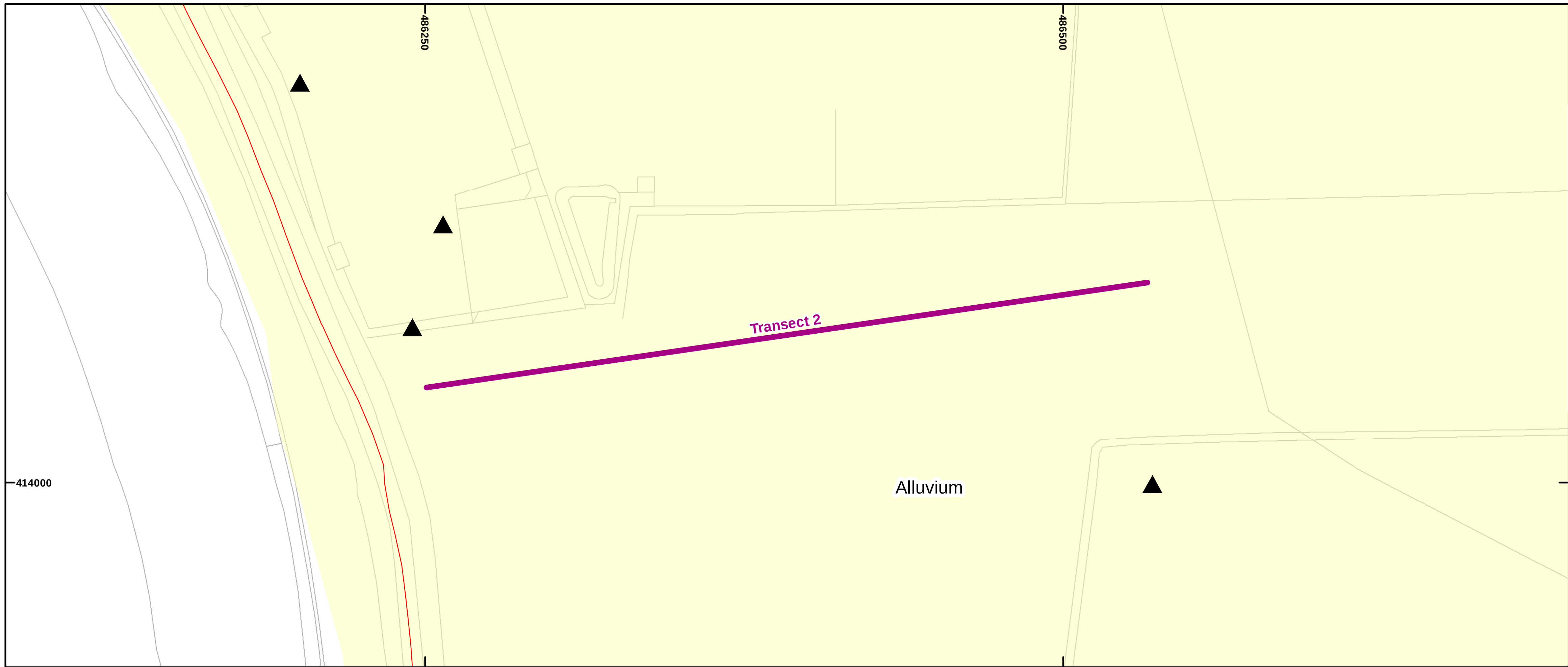
- ▲ Existing boreholes
- ERT transects
- Site boundary - Gradiometer

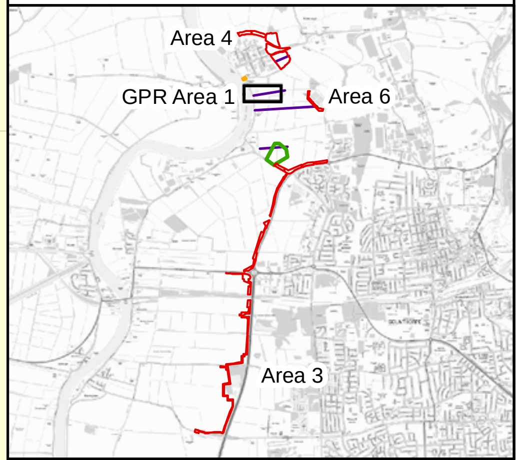
0 100 m

Date:	14/12/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	RP
Path:	X:\PROJECTS\254050\GIS\FigsMXD\ERT

ERT survey results: Transect 1

Figure 40





Existing boreholes

ERT transects

Site boundary - Gradiometer

0 100 m

Coordinate system: OSGB36

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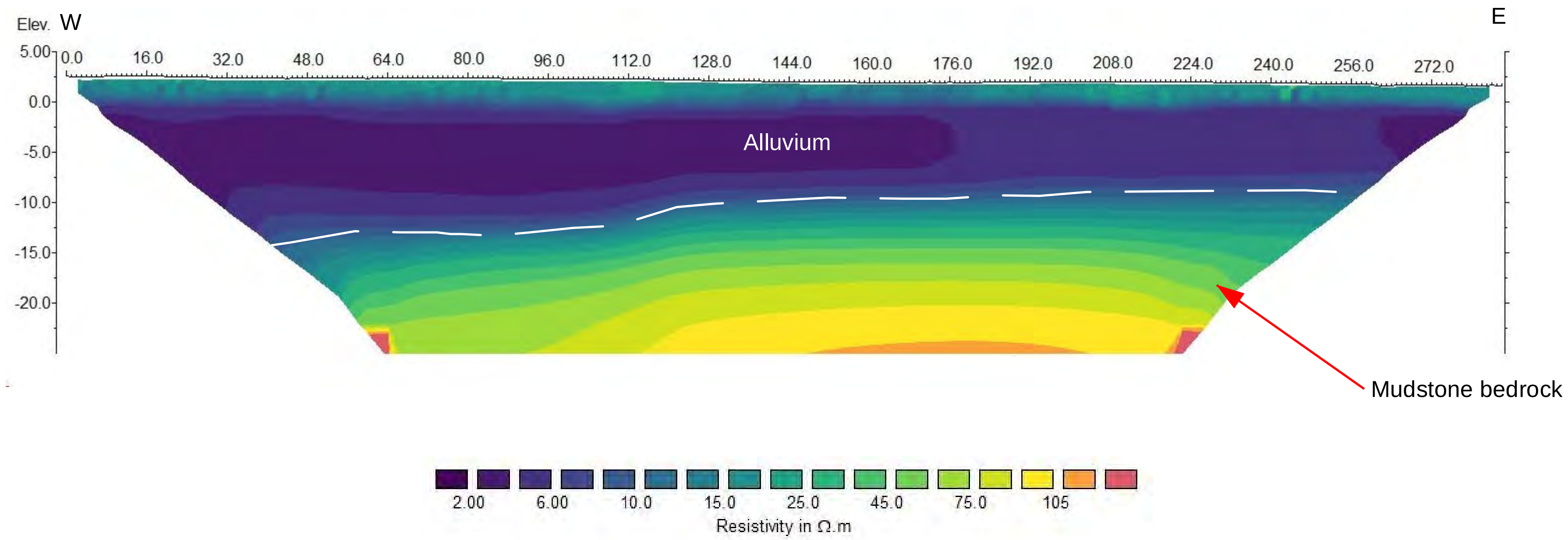
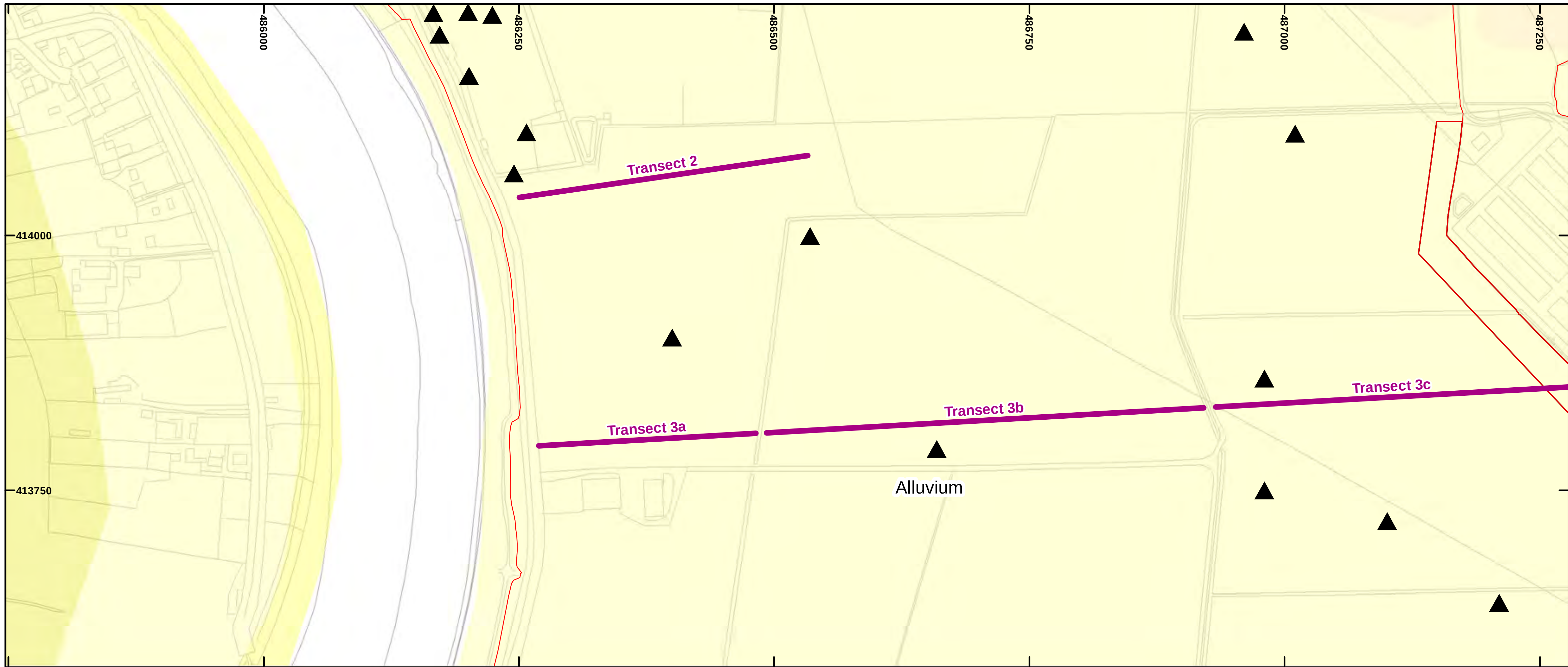
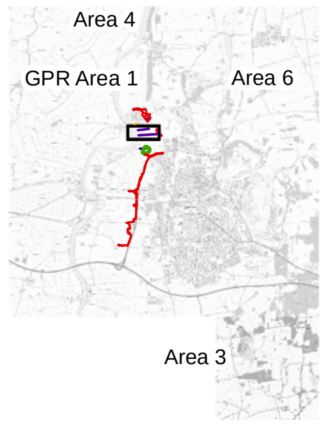
Transect 2



ERT survey results: Transect 2

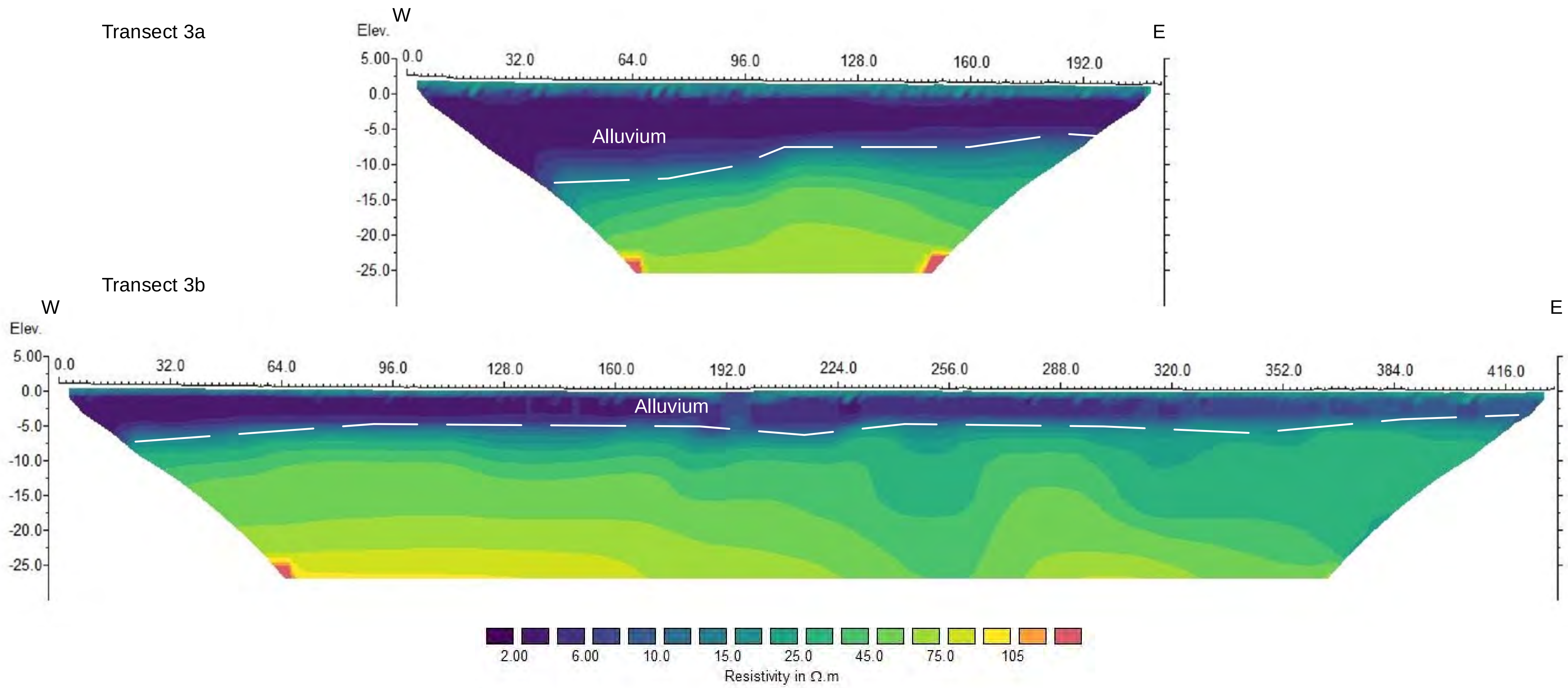
Figure 41





- Existing boreholes
- ERT transects
- Site boundary - Gradiometer

0 250 m



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Date:	24/01/2023
Revision Number:	0
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Illustrator:	RP
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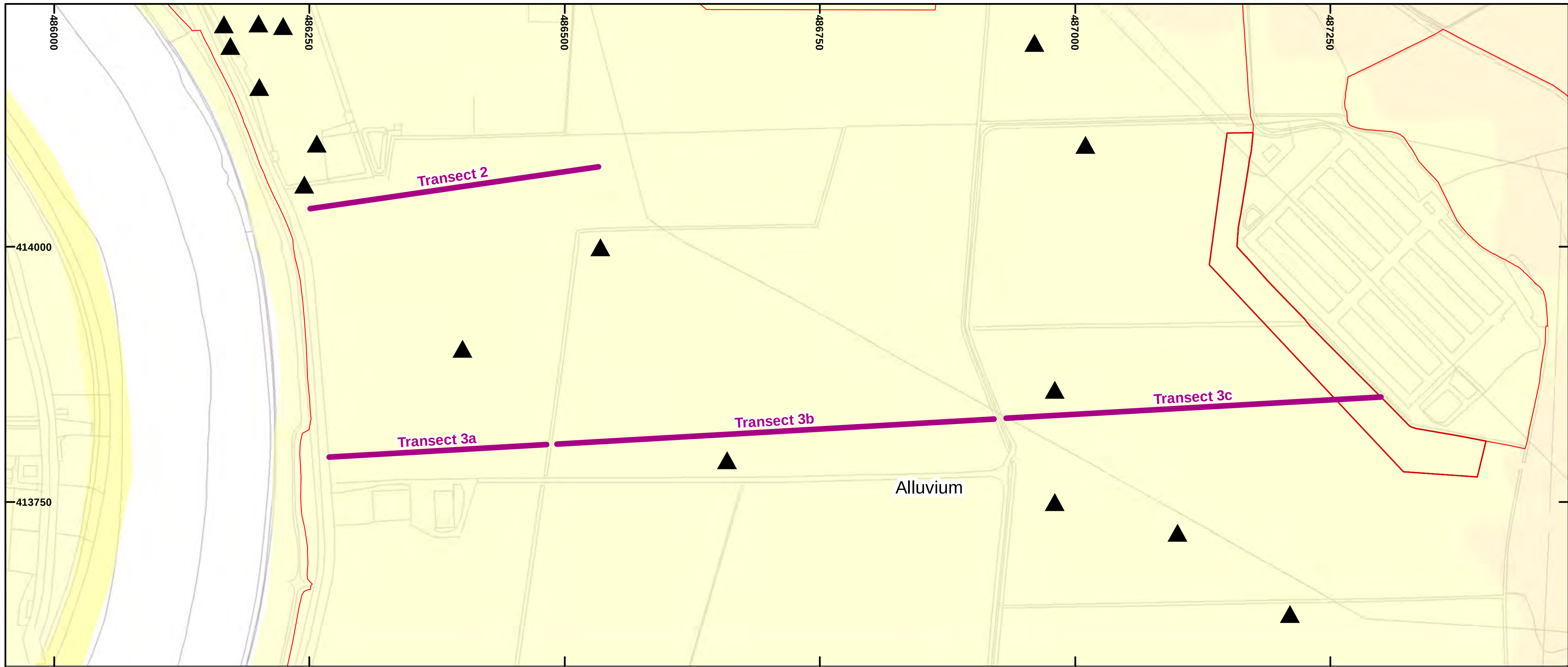
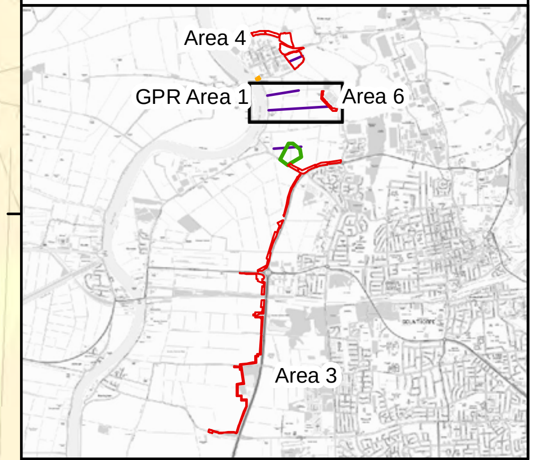
ERT survey results: Transect 3a and 3b

Figure 42





- ▲ Existing boreholes
- ERT transects
- Site boundary - Gradiometer

0 250 m

Coordinate system: OSGB36

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Revision Number:	0
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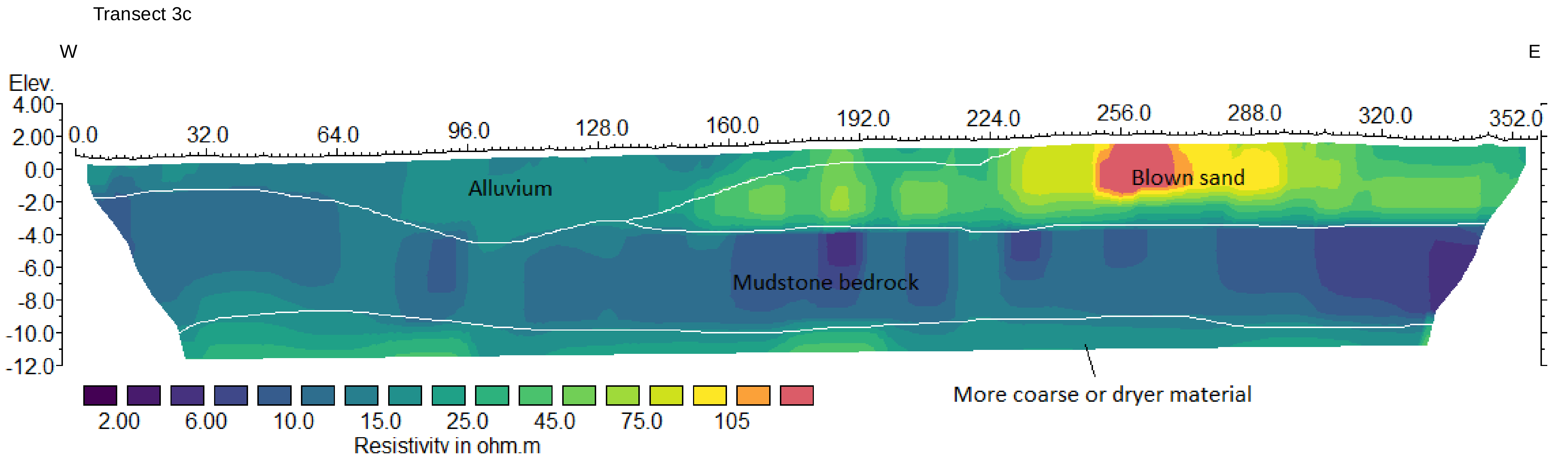

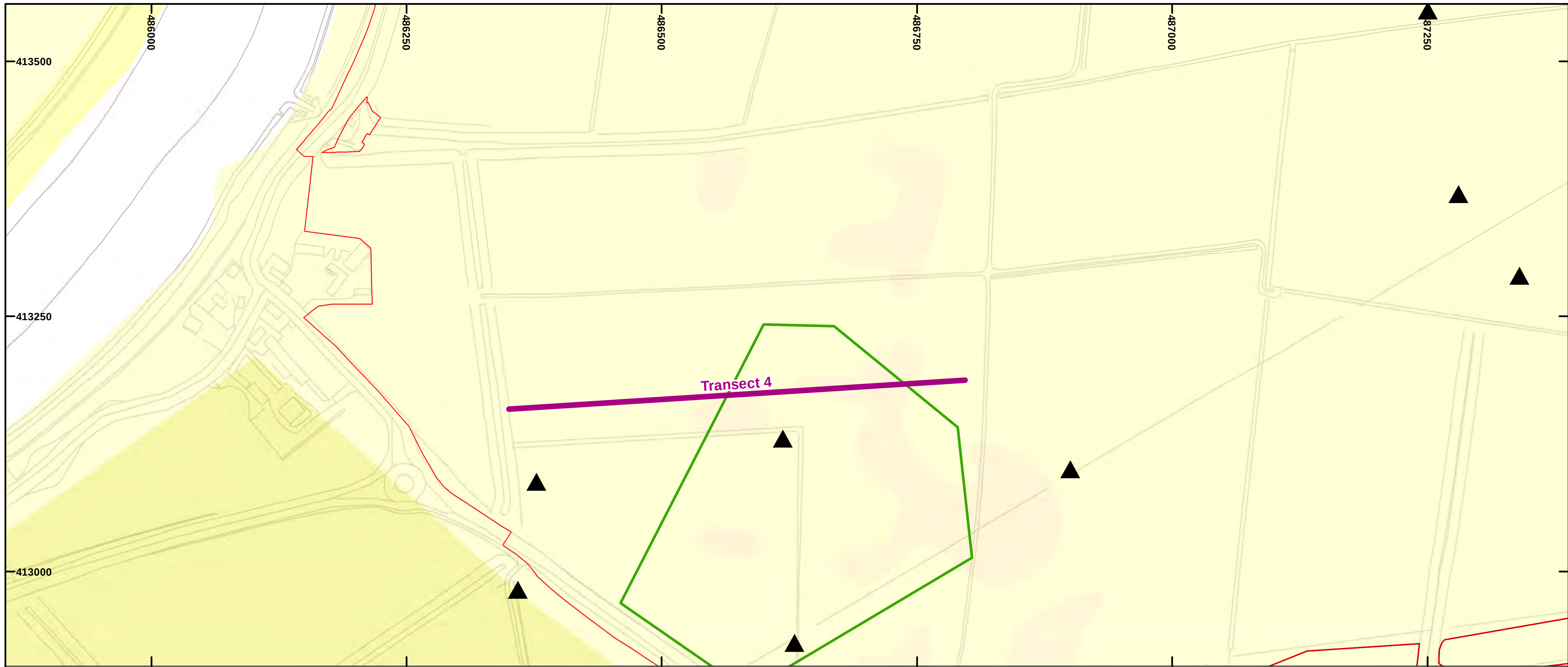

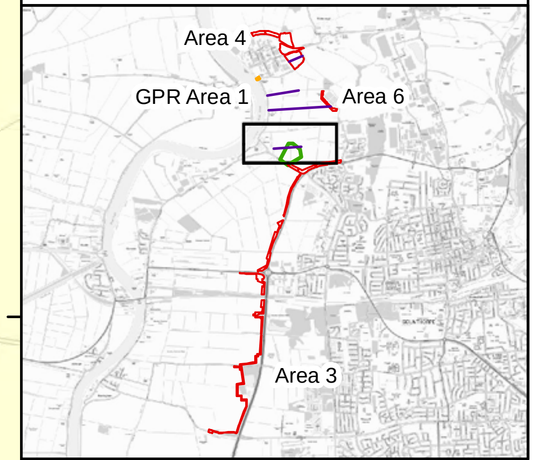

- Existing boreholes
- ERT transects
- Site boundary - Gradiometer

0 250 m

Coordinate system: OSGB36

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Revision Number:	0
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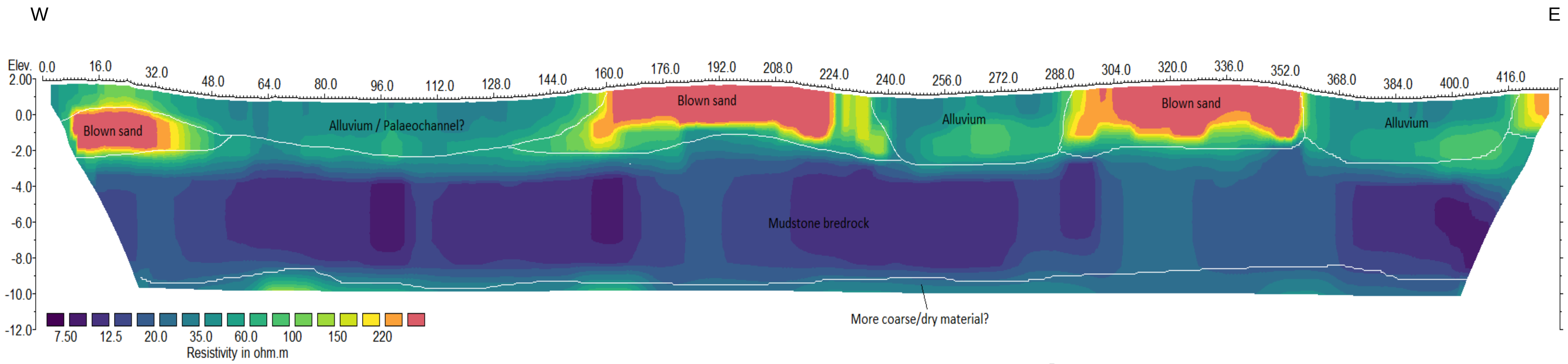
Transect 4



ERT survey results: Transect 4

Figure 44

Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867   Fax: 01722 337562   info@wessexarch.co.uk [redacted]

APPENDIX C GEOARCHAEOLOGICAL SURVEY REPORT

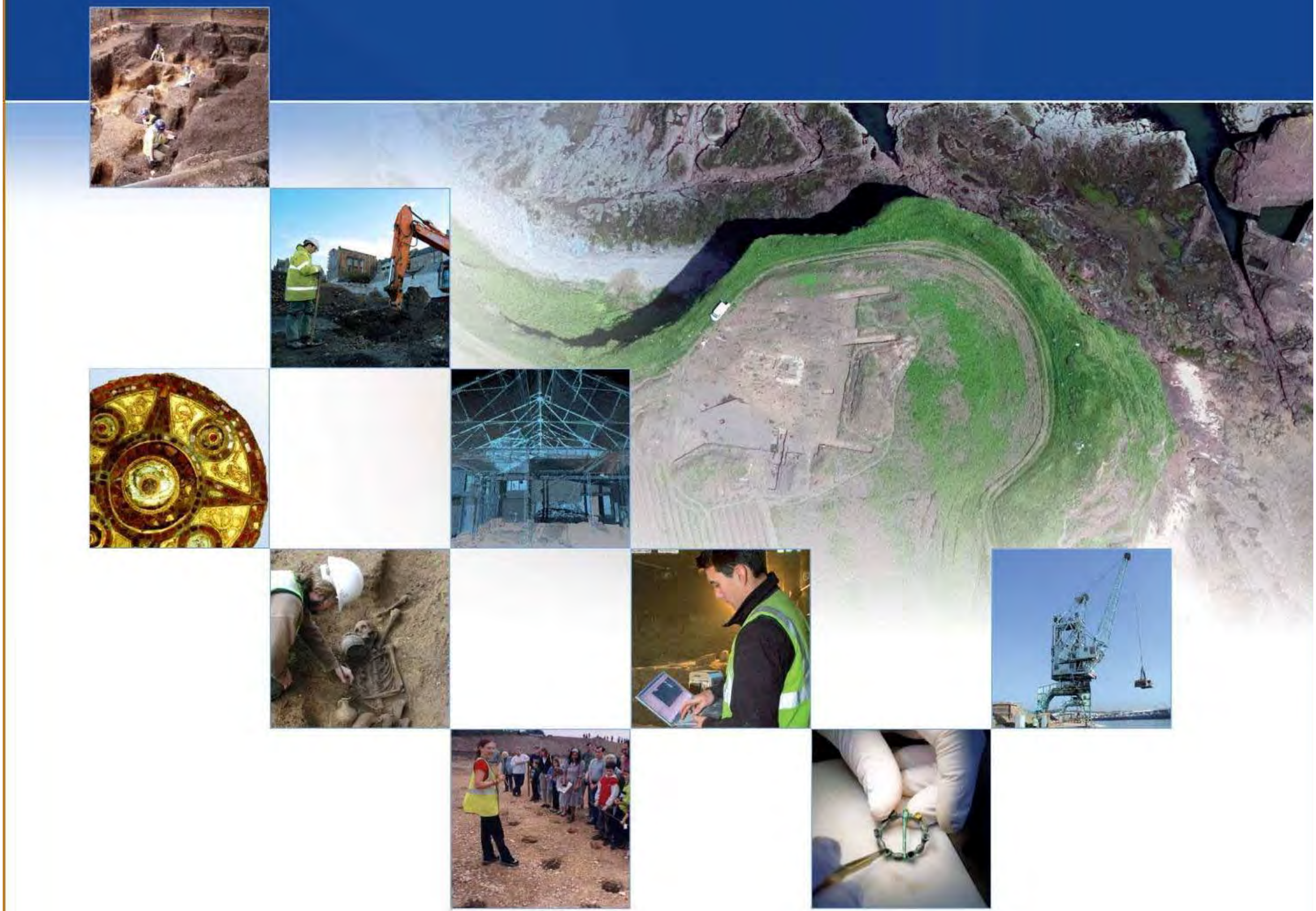
NLGEP: Geoarchaeological Borehole Evaluation and Deposit Model Report

AOC Project No: 53056

Site Code: AOCSOL21

National Grid Reference Number: 486862 413617

Date: April 2023



AOC Archaeology Group

ARCHAEOLOGY | HERITAGE | CONSERVATION

NLGEP: Geoarchaeological Borehole Evaluation and Deposit Model Report

On Behalf of:	**The North Lincolnshire Green Energy Park** Regent Court Princess St Hull, East Yorkshire HU2 8BA
Consultant:	**ERM** 2nd Floor Exchequer Court, 33 St Mary Axe, London EC3A 8AA
National Grid Reference (NGR):	**TA 1676 6108 (centre)**
AOC Project No:	**53056**
Prepared by:	**Jessica Taylor**
Illustration by:	**Jessica Taylor**
Date:	**April 2023**

This document has been prepared in accordance with AOC standard operating procedures.

Author: Jessica Taylor	**Date: 26th April 2023**
Approved by: Virgil Yendell	**Date: 26th April 2023**
Draft/Final Report Stage: Draft	**Date: 26th April 2023**

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Fax. 020 8892 0549
E-mail. london@aocarchaeology.com

NON-TECHNICAL SUMMARY

A geoarchaeological evaluation was undertaken on 26th-30th September 2022 on land adjacent to the Flixborough Industrial Estate, situated at Stather Road, Flixborough, Scunthorpe (NGR TA 1676 6108). The work was undertaken by AOC Archaeology Group for the consultancy ERM on behalf of the client, the North Lincolnshire Green Energy Park (NLGEP).

This document summarises the stratigraphic sequence of geoarchaeological remains and discusses the results in relation to their archaeological and palaeoenvironmental potential. The principal objective of this report is to present the results, refine the research objectives of the project in light of the findings, and make recommendations concerning any subsequent archaeological investigations in order to address these research objectives.

The geoarchaeological evaluation comprised the drilling of 17 purposive geoarchaeological boreholes to a maximum depth of c. 6 to 12m bgl, and the extraction and retention of the cored samples. Geoarchaeological and geotechnical deposit data can be used to identify areas of archaeological potential by characterising the probable nature and depth of sub-surface deposits.
The deposit sequence recorded across the site included Tertiary bedrock of Mercia mudstone which underlies the site, with a surface between approximately -16 and -2m OD. This unit is overlain by Pleistocene glaciofluvial deposits in the northeast, and Sutton Sand or lower alluvium across the rest of the lower study area. The glaciofluvial / glaciolacustrine deposits are overlain with Pleistocene head on the hillslopes of the northeast. They suggest the higher elevations to have been impacted most by higher energy periglacial action. If OSL results prove the silty sands to be the pre-Holocene Sutton Sand, this would suggest the floodplain area to have been exposed and dry for a long period. As a lower alluvial deposit, it would indicate a floodplain of a wide, shallow, and potentially braided river channel with relatively high velocity existed prior to the development of wetland. The lower alluvium / Sutton Sand deposits are overlain with Holocene organics, primarily peat. The peat infills much of the lower surface of the below underlying sands. The organics vary in thickness but are shown to have a relatively level surface. They suggest a long, stable period throughout which the landscape was dominated by wetland environments. In the east, the organics are, at times, directly overlain with topsoil. However, alluvium or warp seals much of the organic unit elsewhere and is generally thickest toward the river. The alluvium or warp is generally of finer fabric than the lower alluvium / Sutton Sand, reflecting a lower energy depositional environment. Topsoil seals the site. Made ground is identified to the north in the Flixborough Industrial Estate and adjacent to the roads throughout, as well as across the southernmost area. It truncates earlier deposits. Four ERT transects were produced across the site (Wessex Archaeology, 2023b) which aided the identification of the alluvium thickness. They also pose questions about the presence of Mercia Mudstone which was not encountered during borehole investigations.

Organic horizons sampled within the borehole interventions have been radiocarbon dated. The dates returned reveal a long period of accumulation ranging between the Late Mesolithic to the Early Iron Age. This suggests a significant portion of the later prehistoric period is likely to be represented in the sequence, with potential for palaeoenvironmental remains capturing the environmental conditions and development as well as archaeological remains associated with wetland and riparian environs.

Development impacts from the currently proposed NLGEP involve truncation of stratigraphic sequences including the deep alluvial deposits of the floodplain directly adjacent to the River Trent, the shallower alluvial sequences further east, and the surfaces of the slopes in the east of the Site.

The impact on archaeological remains could be adequately mitigated by a programme of archaeological evaluation trenching focusing on Zones 2 and 3 where archaeological remains are likely to be nearer to the modern surface and impacted by development works. Trenching is already planned or completed, and outlined in a separate document. The impact on the palaeoenvironmental potential could be adequately mitigated by a programme of specialist paleoenvironmental investigation on the cored samples already obtained. The appropriate mitigation strategy for the site will be decided by and agreed with the Local Authority and their archaeological advisors.

An OASIS form (OASIS ID: aocarcha1-514653) has been completed and an electronic copy of all reports will be deposited with the Archaeological Data Service (ADS). The site archive will be prepared in accordance with local and national guidance and will be deposited with a local repository.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1 This document details the results of a geoarchaeological borehole evaluation at the site of the land adjacent to the existing Flixborough Industrial Estate, Scunthorpe (NGR: TA 1676 6108, Figure 1). The work was commissioned from AOC by ERM on behalf of the client, the North Lincolnshire Green Energy Park (NLGEP).

1.2 The proposed development site (henceforth "the Site") will be situated at Stather Road, Flixbrough, Scunthorpe, on the land adjacent to the Flixborough industrial Estate. The associated District Heat and Private Wire Networks (DHPWN) will run from the NLGEP site and terminate at two locations; the first located in Scunthorpe town centre, at the offices of North Lincolnshire Council, and the other at land adjacent to the M181, to the west of Scunthorpe.

1.3 This report consists of a Stage 3, geoarchaeological borehole evaluation, in order to evaluate the potential of the site to contain significant archaeological remains and to produce a report inclusive of a deposit model. The report follows up on a previous interim report on 11 hand auger locations and 4 boreholes (AOC, 2022b), following which a revised WSI recommending a further set of boreholes to achieve the aims and objectives of the WSI including the research questions. Samples have been collected and retained in order to facilitate possible later geoarchaeological/palaeoenvironmental specialist assessment, but an assessment of this nature is not included at this stage so that the need for further fieldwork can be commented on in a timely manner.

Table 1 Generic stages of geoarchaeological investigation for guidance

Stage	Stage number
Consultancy: Desk based and impact assessment	1
Fieldwork: Geotechnical monitoring	2
Fieldwork: Trench evaluation / borehole evaluation	3
Fieldwork: Watching brief / excavation / mitigation boreholes	4
Post-excavation: Specialist geoarchaeological / palaeoenvironmental assessment	5
Post-excavation: Specialist geoarchaeological / palaeoenvironmental analysis	6
Publication	7

1.4 The geoarchaeological evaluation comprised the drilling of 33 purposive geoarchaeological boreholes to a maximum depth of *c*. 12m bgl, and the extraction and retention of the cored samples. The distribution of these datapoints within the site is illustrated through Figure 3 to Figure 5

1.5 Geoarchaeological and geotechnical deposit data can be used to identify areas of archaeological potential by characterising the probable nature and depth of sub-surface deposits.

1.6 As such, this report will provide recommendations on how investigations pertaining to these works should proceed and how such work will be integrated into the wider findings from the area. The works reported on here were carried out under the Written Scheme of Investigation (WSI, AOC 2022a) for the site, which set out a multi-staged geoarchaeological programme design, summarised below.

1.7 As set out in the WSI (AOC, 2022a), the work described in this report is part of a

- i) Purposive geoarchaeological borehole survey site work
- ii) Electrical Resistivity Tomography (ERT) transects
- iii) Targeted radiocarbon dating of key sediments
- iv) Deposit model update and geoarchaeological survey reporting, including recommendations for specialist palaeoenvironmental assessment
- v) Specialist palaeoenvironmental assessment
- vi) Analysis and/or publication

1.8 This report describes stages i) to iv) of the sequence outlined above and provides recommendations for stage v) and vi)

2 PLANNING BACKGROUND AND PROPOSED DEVELOPMENT

2.1 The site has been subject of a previous Written Scheme of Investigation (WSI, AOC 2022a), and interim report (AOC, 2022b). The following has been outlined previously within those documents, and is taken from the WSI (AOC, 2022a).

2.2 The Applicant is proposing a new Energy Recovery Facility (ERF) and Associated Development (the Project) which constitutes a thermal combustion combined heat and power plant with a potential power output capacity of up to 100 MWe from a total thermal capacity of 316 MWth together with Associated Developments. The location of the project is illustrated on Figure 1.

2.3 The NLGEP will be located on land adjacent to the existing Flixborough Industrial Estate, situated at Stather Rd, Flixborough, Scunthorpe. The associated District Heat and Private Wire Networks (DHPWN) will run from the NLGEP site and terminate at two locations; the first located in Scunthorpe town centre, at the offices of North Lincolnshire Council, and the other at land adjacent to the M181, to the west of Scunthorpe. The full details of the project are presented in the DCO application and Work Plans (Planning Inspectorate, 2023).

2.4 The Site lies within the administrative area of North Lincolnshire Council. Alison Williams provides archaeological advice to North Lincolnshire Council.

2.5 The WSI (AOC 2022a) sets out the methodology for a geoarchaeological borehole and ERT survey, a programme of scientific dating, deposit model update and recommendations for palaeoenvironment assessment

3 LOCATION AND PROPOSED IMPACTS

3.1 Here follows a summary of the location of the development / impact areas as they relate to the proposed development works, as outlined within the WSI (AOC, 2022a).

There are six development areas (Figure 2), outlined below.

3.2 Area 1 (A1) is located at the southwestern corner of the current Flixborough Industrial Estate and the proposed developments include:

- The energy recovery facility (ERF), including carbon capture, utilisation and storage CCUS facility. The Bunker Hall lies within this facility will require the excavation of a shaft up to 10m bgl. Additional impacts are expected from piling associated with the ERF and related tower cranes.

3.3 Area 2 (A2) is located between Stather Road and the B1216 and the proposed developments include:

- A concrete block manufacturing plant and ash treatment facility in the north and from which the main below ground impacts are expected to be from piling.
- A plastic recycling facility, also in the north and from which the main below ground impacts are expected to be from piling.
- A visitor centre, also in the north and from which the main below ground impacts are expected to be excavation of the building footprint to formation level (depth currently unspecified).
- A railhead along the western edge of the northern part and from which the main below ground impacts are expected to be excavation of the footprint to formation level (depth currently unspecified).
- A utilities corridor, aligned north-south from Stather Road, connecting to the hydrogen facility and AGI in the north of Area 3 and continuing to the B1216 in the south, with an east-west aligned section connecting to the railhead terminus.
- Several large ponds associated with the wetland conservation area (depth currently unspecified).

3.4 Area 3 (A3) Stretches from just north of the B1216 southwards down to the B1450 and the proposed developments include:

- A Gas network connection (nature and depth of impact currently undefined).
- A hydrogen production facility (nature and depth of impact currently undefined).
- A hydrogen refuelling facility (nature and depth of impact currently undefined).
- A battery storage facility (nature and depth of impact currently undefined).
- EV vehicle charging facility (nature and depth of impact currently undefined).
- Utilities corridor (nature and depth of impact currently undefined).
- Access roads (nature and depth of impact currently undefined).
- Laydown areas (nature and depth of impact currently undefined).
- The southern district heating and private wire network (DHPWN), consisting of linear impacts alongside existing roads (depth currently undefined).

3.5 Area 4 (A4) is located in the east and north of the Site. The south eastern part of Area 4 is immediately east of the Flixborough Industrial Estate, in a field to the south of First Avenue and the proposed developments include:

- An electrical substation (footprint excavation to unknown depths)
- A hydrogen and natural gas above ground installation (AGI) (nature and depth of impact currently undefined);

The proposed development in the central eastern and northern parts of Area 4 consists of:

- Landscaping (below ground impact currently unknown).

3.6 Area 5 (A5) runs along the A1077 from the Skippingdale Roundabout to Phoenix Parkwayand the proposed developments include:

- The northern DHPWN, consisting of linear impacts alongside existing roads (depth currently undefined).

3.7 Area 6 (A6) is located just over 300m north of the Skippingdale Retail Park and the proposed developments include:

- The construction of a flood bund over the whole footprint of the area.

4 GEOLOGY AND TOPOGRAPHY

4.1 The following is taken from the WSI (AOC, 2022a).

1.1 A north-south aligned mudstone ridge dominates the geology of the study area, upon which the historic settlements of Flixborough, Crosby and Scunthorpe are situated. The mudstone and Ironstone bedrocks are shallow to full marine deposits from the Triassic (c. 251-201 Mya) and Jurassic (c. 201-145 Mya). The mudstone ridge forms the eastern edge of the meandering Trent Valley, which is filled with deep Holocene (12,000 years ago – present) alluvium (clay, silt, sand, and peat) and overall represents uniform to varied riverine deposition across a floodplain. The eastern edge of the valley and west side of the mudstone ridge is characterised by thick drifts of 'windblown sand', which appear to have derived from late glacial sands (BGS, 2023) and in some cases are overlain by alluvium. The sand, occasionally classified as Sutton Sand Formation, is a fine silty sand formed during the Devensian to Holocene (115 thousand years ago onwards) and represents an aeolian or wind-blown redeposition of underlying glaciolacustrine deposits or bedrock.

4.2 The superficial deposits recorded across the area also consist of clay and silt Warp (BGS, 2023), which Burke et al (2015) describe as "an artificially deposited silt and clay sequence formed in the last two or three centuries by controlled flooding to raise the land level and improve the quality of agricultural land." Warping is part of a programme of labour-intensive and largescale engineering, evidenced by historical accounts and relic engineering/drainage features (Van de Noort, 2004). However, definitively applying the term to strata primarily based on lithological description of deposits alone may be problematic. The BGS themselves say, that lithologically, Warp is indistinguishable from any other 'natural' tidal deposit (Burke et al., 2015). This highlights the specific difficulty of identifying at what depth a unit of Warp begins and ends. As such, this term appears to be of limited use in initially categorising or interpreting deposits without supporting chronostratigraphy, evidence of relic engineering/drainage features, and specific historical accounts.

4.3 The British Geological Survey (BGS, 2023) indicates that A1 and A2 are underlain by bedrock of Mercia Mudstone. This is a predominantly red siltstone, of a semi-terrestrial to shallow marine origin, which formed approximately 52 to 247 Mya in the Early Triassic Period, and now rises to form the north-south ridge.

4.4 A4 is underlain by the Scunthorpe Mudstone and Penarth Group limestones (c. 206-201 Mya, BGS 2023), of brackish and fully marine origin, and Scunthorpe Mudstone of marine origin (also c. 206-201 Mya).

4.5 The superficial deposits across A1 and A2 mostly consist of alluvial deposits and are identified as being in the region of 3 to 17m thickness (BGS borehole SE81SE21). Limited deposits of windblown sands are identified as being approximately 3m in thickness and lie in the south of the development area between A1 and the B1216 (BGS borehole SE81SE77).

4.6 In A4 the superficial deposits include some limited Hemingbrough Glaciolacustrine Formation. The later was probably deposited in a low energy, pro-glacial lake environment that developed during the Devensian (c. 0.116 to 0.0118 Mya), ahead of the southward advancing ice sheet (Ford et 2003). As well windblown sand formed during the Devensian to Holocene (115 thousand years ago onwards) as underlying glaciolacustrine deposits or bedrock was reworked.

4.7 The British Geological Survey (BGS, 2023) indicates that most of the northern Laydown area is underlain by the marine Charmouth Mudstone Formation (c. 199-182 Mya). To the west and east lie the Frodingham Ironstone Member and Pleistocene Ironstone, marine shoal/shallow marine deposits of the early Jurassic, which formed c. 199-190 Mya. The superficial deposits to the east and west of the northern Laydown area consist of Devensian to Holocene (115 thousand years ago onwards) windblown sands, however, within the northern Laydown area the superficial deposits were previously removed by the cutting for the Dragonby Railway.

4.8 The British Geological Survey (BGS, 2023) indicates that the southern Laydown area, within A3, is entirely underlain by Mercia Mudstone Formation. The superficial deposits across the southern Laydown area, within A3, consists mostly of Warp with some very limited alluvial survival in the south.

5 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

5.1 The following background is taken from the WSI (AOC, 2022), which should be referred to for the HER and figure references. This information was originally derived from Chapter 12 of the PEIR Archaeology and Cultural Heritage Assessment and the DCO (pers. comm. ERM 04/08/21). This should be read in conjunction with these documents and is included here for easy comparison to the results.

Prehistoric and Roman Evidence (Pre AD410)

5.2 A single Palaeolithic asset is located approximately 780m outside the nearest part of the Order Limits. It comprises the findspot of a tanged flint blade of Late Upper Palaeolithic date, i.e., from the end of the Palaeolithic period. It was said to have been found on windblown sand at Risby Warren/Crosby Warren, along with a cache of obliquely backed points. These artefacts may indicate the site of a temporary hunting camp. Early prehistoric activity is known within the region through pollen analysis, which indicates that forests were beginning to be cleared during the Mesolithic period. Evidence for seasonal occupation during the Mesolithic and Neolithic period is also evident in environmental remains and flint scatters. Many of the Mesolithic flint scatters in the vicinity of the Site, are located on or immediately adjacent to (and reference sandy contexts in their descriptions) deposits of wind-blown sand depicted in BGS data. These sandy deposits mantle the high ground overlooking the Trent Valley. Notable Neolithic to Bronze Age flints and Roman pottery have been found in Willow Holt Sand Quarry, immediately to SE of A4 (PEIR Chapter 3). There is considerable evidence of human activity dating from the Mesolithic onwards, comprising findspots, evidence of occupation sites and the potential for significant peat deposits and palaeoenvironmental remains to be buried under alluvium.

Early Medieval and Medieval (AD 410-1485)

5.1 The scheduled monument of Flixborough Saxon nunnery and site of All Saints medieval church and burial ground is located adjacent to the Order Limits and was partially excavated between 1989 and 1991. Excavations uncovered parts of 40 buildings, 39 of which were of early medieval date. During the 8th and earlier 9th centuries, two rows of modest buildings arranged end to end stood either side of a shallow depression in which accumulated a large amount of refuse. This asset was first observed in section in a commercial sand pit. Prior to archaeological excavation, two metres of windblown sand overburden (aeolian reworking of post-glacial sands) had to be removed my mechanical excavation from above the archaeological remains. This overburden preserved but also concealed the site from view before it was exposed by sand quarrying. The scheduled monument also contains the site of the church that served the deserted village of North or Little Conesby. A hoard of Middle-Saxon woodworking tools (DBA asset 221) deposited within two lead tanks was found during sand quarrying at Flixborough in 1994 adjacent to the southwestern side of the scheduled monument, adjacent to where early medieval occupation remains were excavated in 1933 ahead of destruction for sand extraction.

5.2 During the late medieval period, a worsening climate (known as the ‘Little Ice Age’) and poor rural economic stability, along with outbreaks of the Bubonic Plague, reduced the quantity and quality of grain production, leading to land being lain to pasture and creating opportunity to encourage peasant migration to urban centres. Deserted settlements are relatively common within the region, including those found at the village of North or Little Conesby and Swalcliffe. Flixborough Stathe was the historic river port linked to Flixborough on the high ground to the east by road. Shallow buried remains of the medieval port are likely to have been disturbed by twentieth century development of the wharf.

Post-Medieval and Modern (AD 1485-Present)

5.3 The study area comprises expanses of 20th century light industrial activity, agricultural activity, including evidence of historic agricultural practices; including field patterns, hedgerows, tracks, and post-medieval and modern housing; including commercial buildings and road and rail infrastructure; and Flixborough Staithe river port.

5.4 On 1 June 1974, an explosion in a cyclohexane plant at Nypro UK (a chemical plant) occurred at the Flixborough industrial estate, resulting in the deaths of 28 people, with 36 people seriously injured. At the time of the disaster, Nypro UK produced the chemical caprolactam, used in the production of nylon, from cyclohexanone. Cyclohexanone was produced by partially oxidising hot liquid. The HSE website summarises the incident ‘The cyclohexane formed a flammable mixture and subsequently found a source of ignition. At about 16:53 hours there was a massive vapour cloud explosion which caused extensive damage and started numerous fires on the site". Fall-out from the explosion is a potential source of historical contamination.

5.5 The ERF facility is being developed on a site at Flixborough Stathe, formerly occupied by a series of large round storage tanks, which are likely to have contained fuels, other process chemicals, and where large quantities of coal and other solid fuels were also formerly stored.

6 GEOARCHAEOLOGICAL AND PALAEOENVIRONMENTAL BACKGROUND

6.1 The following was previously outlined within the WSI (AOC, 2022a).

6.2 The character and distribution of past human activity can be better understood through the consideration of the past landscape or environmental context. The topography and nature of the ancient land surface during the early Holocene, the current geological epoch and equivalent to the early Mesolithic (c. 11,500 BP or 10,000 BC), is dictated by and inferred from the surface of the Pleistocene superficial deposits (the previous epoch) and older solid geology (e.g. gravel or chalk). Overlying the Pleistocene - or older - deposits, Holocene deposits may preserve palaeoenvironmental evidence (e.g., pollen, diatoms, ostracods) of landscape development, from local channel migration and vegetation change to regional effects of climate and relative sea level change. In combination, likely preservation of palaeoenvironmental remains and deposit data (e.g. depth and character) provides a comparative framework to assess archaeological potential. Peat represents vegetated and waterlogged landscapes (e.g., marshland) which developed, within local or regional fluctuations of hydrology. The anaerobic and acidic conditions of the deposit are particularly conducive to organic preservation. Palaeoenvironmental remains from floodplain deposits, especially peat, provide information on the nature and timing of environmental change and the interplay with past human activity (HE, 2015a; HE, 2015b).

6.3 During the latter stages of the last (Devensian) Ice Age (18000BP), Lincolnshire was covered by an ice lobe (North Sea Lobe) extending down the eastern margins of the North Sea Basin as far as North Norfolk, depositing extensive till and glaciofluvial sands and gravels across the region. The ice lobe blocked the Humber Gap and thus the natural drainage eastwards and northward to the North Sea was prevented. This prevention of drainage into the sea resulted in the formation of a large ice-dammed lake known as Lake Humber within which deposits of lacustrine clays, silts and sands were laid down some of which are mapped by the BGS to extend into the north-east of the Site. The cold dry conditions of the late Devensian period also resulted in the aeolian (windblown) transportation of fine-grained silt sized material which was deposited on to the Lincoln Edge east of the Site. The melting of the ice sheet at the end of the Devensian led to the gradual silting up of Lake Humber. By c11000BP the flow of the River Trent north across the lacustrine deposits towards the North Sea was re-established. The River Trent was initially characterised by braided channels. There was limited vegetation cover and the sediments on the floodplain were susceptible to wind erosion which in turn led to the deposition of aeolian sands. At the start of the Holocene as sea level began to rise, rivers incised through the lake deposits to reach base level. The channels thus transformed from wide braided stream to narrow single channels. As sea levels continued to rise the river channels aggraded and the deeply incised river valleys became infilled with the alluvium which now covers the Trent valley floor (Ellis, 1998: 10-12). Gaunt (1994) estimates the depth of channel incision and fill to be in excess of 20m in the area. Climatic amelioration and continued rising sea levels results in the development of wetlands at about 5000BP. A combination of impeded runoff and overbank flooding led to the development of extensive floodplain peats during the later prehistoric and early historic periods. No absolute dates are currently available for the onset of peat development in the lower Trent valley north of Gainsborough. Extensive areas of floodplain mire peats and alluvium would have characterised the Trent floodplain from the mid-Holocene until the introduction of drainage and warping on the post-medieval periods.

6.4 The study area lies at no more than 4.5m AOD and the wider landscape is notable for its vast expanses of flat featureless terrain. There is a paucity of securely dated paleoenvironmental analyses from the lower Trent valley. Limited detailed information exists about the nature extent and depth of the depositional sequences in the lower Trent valley. The influence of riverine alluviation and the exact location of abandoned meanders required further elucidation. The spatial and temporal development of the wetlands and the nature of the pre-wetland landscape remain poorly understood. The paleoenvironmental record for the earliest part of the Holocene in the Trent valley is sparse, with data available from Girton, Bole Ings (Dinnin, 1997) and Lake L1 of the Lincolnshire Lakes Project. Radiocarbon dating in correlation with pollen samples from the Lincolnshire Lakes project east of the southern part of A3 dates the lower pollen samples to approximately 7000BP, and upper samples to approximately 300BP. Comparable organic deposits in the lower Trent Valley began to accumulate around the same time as channel stabilisation approximately 8500BP (Stein, 2014). Correlation between the depth and date of deposits at different locations across the Lake L1 Site proved to be somewhat variable, suggesting that either peat accumulated at different rates at different locations, or perhaps material has become truncated through erosion (AOC, 2017).

6.5 Bole Ings, located towards Nottinghamshire provides a comparable early Holocene pollen record (Brayshay and Dinnin, 1999; Dinnin, 1997) dating from 8240 ± 60 BP to 2780 ± 60 BP. Zone 1 of the sequence (8240±60 BP to 6280 ±70 BP) provides evidence of a landscape dominated by Pinus, Ulmus, and Corylus with some Quercus. These species represent a wooded environment, with a dense deciduous woodland canopy (Brayshay and Dinnin 1999, 119). A similar landscape dominated by woodland is also found in the sequences from Lake L1 (AOC, 2017).

6.6 The presence of Corylus, and gradual rise in Alnus at Bole Ings, also indicates an increasingly wet environment. Corylus frequently inhabits dry and basic pH level soils suggesting that Corylus was occupying drier areas of the wetland margin and the surrounding landscape (Brayshay and Dinnin 1999, 119). Alnus and Corylus were found to be consistently present at Lake L1 and gradually increase throughout the sequence suggesting a similar wet environment (AOC, 2017).

6.7 Marine environments continued to reach into the Lower Trent Valley throughout the Mesolithic, as evidenced by alternating marine and freshwater deposits as far upstream as Gainsborough (Knight and Howard, 2004: 31; Lillie and Neumann, 1998: 22). Pollen sequences from this period demonstrate expanding reed swamp and fen carr landscapes, with additional evidence of densely wooded areas on dryer land (Knight and Howardy, 2004: 31). A similar stabilising riverine environment continued into the Neolithic with dense woodland located on drier land. Evidence of occupation from as early as the Mesolithic has been recovered from the area of Flixborough including a large concentration of Late Mesolithic and Neolithic flint found at Sand Pits, Flixborough in 1928.

6.8 Coring undertaken at Flixborough as part of the Humber Wetlands Project (Lillie, 1998: 45-52) revealed a complex stratigraphic sequence of intercalated peats and clays which documented periods of alluvial deposition and periods of stabilisation. Similarly archaeological evaluation and coring at the Lake L1 site east of the southern section of A3 as part of the Lincolnshire Lakes project revealed a complex sequence of interbedded peats and clays overlain by warped sediments. Numerous layers of buried organic peats, and finely laminated sections containing sands and clays were apparent. Changes appeared to be abrupt with no gradual transition between varying deposition types. This was interpreted as a possible indication that the sediments had been truncated or eroded, but it was also considered possible that rapid environmental change took place e.g. inundation of marine waters (AOC, 2017).

6.9 It is possible that occupation of the lower areas of the Trent valley was intermittent prior to the postmedieval period due to the nature of the wetland environment and the rise and fall in sea level, and therefore settlements of medieval or earlier date would often be situated on slightly higher ground. However, periods of low sea level allowed regular cultivation and exploitation of this resource-rich environment which can be seen from previous finds of tools and pottery. Palaeoenvironmental survey undertaken as part of the Humber Wetlands Project indicated that some of the wetlands dried out during the Mesolithic period (Van de Noort et. al., 1995: 359) allowing for a wider range of land use, and woodland clearance during the Bronze Age indicates a shift towards agriculture (ibid). A bog-body is known from the Amcotts area (Lillie, 1998: 45).

6.10 Roman occupation of the area is known from various finds including Romano British pottery on the modern surface of the floodplain at Amcotts (Lillie, 1998: 52).

6.11 The Early Medieval site at Flixborough provides ample evidence for the exploitation of the River Trent floodplain into the historical period. Historically there have been brick and tile manufacturers operating at various scales along the Trent and the nearby Keadby Canal.

6.12 Fletcher writing in 1858 about the course of the River Trent in the vicinity of the Site notes that it had considerably altered its course in the 18th century noting that ‘in earlier times’ it was at this point a large expanse of water that during the ebb of the tide occupied more than one channel. In 1836, between Hook Staithe and the Amcott windmill, on the western side of the modern River Trent, an old staithe was excavated and removed. It appears that this staithe and associated embankment were built to alter the course of the river and reclaim the land for the estate as farmland. A borehole transect excavated as part of the paleoenvironmental survey of the lower Trent valley revealed deposits relating to alluvial channel infill near Amcott and thus likely relate to this earlier channel (Lillie, 1998: 48). Pollen and diatom samples taken from deposits within this channel provide some evidence of the channel environment and diatoms indicate that both freshwater and brackish flow was present in this channel from the middle Mesolithic until 1858.

6.13 Sir Cornelius Vermuyden, born Tholen, Netherlands in 1590, was a Dutch engineer who carried out the initial drainage and recovery of the land in the vicinity of the Site. This was started in 1626, by means of digging drainage dykes and leading them to nearby rivers, in order to drain the land. The land was more workable but swampy and boggy areas remained in many places. Makin Durham was commissioned under the first Dun Drainage Act of the 1830s, to warp certain areas of Yorkshire and Lincolnshire, as he had perfected the adequate and technical procedure of 'warping' (Armstrong, 1981: 20).

6.14 Large-scale drainage of the area was undertaken during the post-medieval period and by the nineteenth century, with the construction of drains such as the Burton and Flixborough Drain and the Lysaght's Drain along with the warping of fields, the area was successfully transformed from wetland into farmland (Lillie, 1998b: 103). Warping was the practice of letting turbid river water flood onto arable land, so that its suspended sediment could settle to form a fertile layer, before letting the water drain away. In this way poor soils were covered with fine silt, and their rentable value was increased (Smith, 2014: 83). Two types of warping were employed within the vicinity of the Site; flood warping and cart warping. Flood warping involved enclosing the fields within embankments and allowing flooding of the field over several years in order to deposit silt and raise the level of the land to reduce the flood risk (Shephard, 1976). Cart warping involved the manual excavation of alluvial sources such as an infilled palaeochannel and its deposition or spreading across the ground surface. Warping in the vicinity of the Site was commenced in 1835 from the inlet of the Neap House drain, with warping on the south side of the drain carried out between 1840 and 1845, and on the north side between 1845 and 1850 (Lillie, 1998b: 110). Further records for the Flixborough area record evidence of the Sheffield family employing additional cart warping to further improve higher ground within the Site to the north of Neap House in 1869 (Lillie 1998b 104).

6.15 Deposits of warp also served to mask the peaty and acidic soils that had developed on the alluvial deposits either side of the Trent. The warping also helped to reduce the impact of waterlogging that resulted from seasonal tidal regimes (Lillie, 1998b: 103). Deposits up to 2.5m in depth have been recorded between Flixborough and the Flixborough Industrial Estate with deeper deposits extending eastwards within the Site towards the modern channel where depths of up to 6m of warp have been recorded.

6.16 Drainage and ploughing within the Site in the post medieval and modern periods resulted in changing water regimes and likely desiccation of Holocene organic deposits. To date, the most recent part of the paleoenvironmental record spanning the last 200 years has received only limited investigation (Lillie and Neumann, 1998).

6.17 The flat land adjacent to the Trent with ample cooling water and excellent communication links with the Yorkshire coalfields provided ideal sites for the large power station at Keadby and also the chemical plant at Flixborough which in 1974 was the site of Britain's worst industrial explosion.

Previous Works

6.18 During the course of the Humber Wetland project, a borehole transect was placed across the Trent and extended into the north part of the Site. A total of 24 boreholes were excavated over a distance of just over 5km from borehole SE827140 north-west of Amcotts Grange to Flixborough at SE875142 (Lillie, 1998: 45). On the western side of the River Trent near Amcott the boreholes excavated revealed evidence for the aforementioned earlier channel of the Trent. On the eastern side of the modern course of the River at Flixborough 13 boreholes were excavated and provided insight into the nature of the floodplain.

6.19 Investigations at Flixborough Grange, to the north of the site (Smith and Lillie, 2008; Lillie and Bunting, 2016), recorded organic deposits on the eastern margins of the floodplain, similar to that recorded in A2 and A3, they were interpreted as either channel abandonment and infilling, or floodplain margin deposits (mire) but paleoenvironmental investigation (diatom and pollen) could not determine the precise nature of their formation.

6.20 The BGS has recorded a wide range of boreholes in the vicinity of the Site. Boreholes SE81SE41-

SE81SE53 located between A2 and A3 were all sunk to depths of less than 5m and revealed a topsoil overlying organic clays with some peat which in turn overlay medium to fine sand deposits. Boreholes sunk at the jetty at Flixborough Stather (SE81SE214- SE81SE217) revealed a stratigraphy of peaty clay and sand with a basal gravel resting on Mercia Mudstone at c -15m AOD.

6.21 Further works were undertaken in the vicinity of Flixborough Stather within A1 by Ian Farmer Associates in 2018. Six boreholes, designated BH1 to BH6 were sunk in this area. Made Ground was encountered in all boreholes to a maximum thickness of 2.10m and consisted of a gravelly sand/sandy gravel with brick, concrete, slag, sandstone and mudstone content. The alluvial deposits consisted of soft laminated sandy clays often found to contain peat fibres and were occasionally organic. These upper laminated clays were underlain in boreholes BH3, 4 and 6 by a peat deposit at depths of between 4.70 to 6.70mbgl extending to depths of between 11.70 to 12.30mbgl. The peat and organic clays were underlain by a gravelly sand deposit at 11.70 to 12.50mbgl and for a thickness of between 4.90 to 7.10m. Weathered Mercia Mudstone was encountered at 17.10 to 19.40mbgl generally as a red brown sandy gravelly clay. Mercia Mudstone bedrock was encountered at depths of between 20.10 to 22.60mbgl (IFA, 2018: 7-8).

6.22 A recent programme of borehole and test pit monitoring (AOC, 2021), in combination with previous work undertaken on the Humber Wetlands project, revealed basal deposits of fine sand of probable aeolian origin which was likely deposited during the late glacial period. The sands were encountered intermittently across the boreholes and could not always be distinguished from alluvial deposits. Overlying the sands and in some case cut into the sands are a series of organic deposits which likely represent the presence of a number of Late Glacial to Early Holocene infilled channels or wetland areas. The channels/wetlands are infilled with between 0.5m to 7m of peat and intercalated organic silts and clays which are indicative of stable periods of vegetated wetland development along the floodplain of the late glacial/early Holocene River Trent. The organic deposits are overlain by up to 8m of silty sand to clay representing natural overbank deposition or human induced floodplain accretion (Warp).

6.23 Development impacts may affect buried Holocene horizons or deposits of archaeological or palaeoenvironmental significance. Although it is difficult to ascertain with certainty the potential of the deposits to contain archaeological remains, the nature of the deposits observed suggested any archaeological remains present within the alluvial floodplain areas may take the form of prehistoric localised dryland activity (i.e. short-lived flint and/or faunal ‘camp site’ assemblages) to floodplain exploitation (i.e., brushwood trackways and platforms, fish traps, etc.). Archaeological remains are more likely to be found in the sandier drier areas to the east of the floodplain.

7 ZONES OF ARCHAEOLOGICAL POTENTIAL

7.1 Zones of Archaeological Potential have been previously identified based on previous deposit models. The following is taken from the Written Scheme of Investigation (AOC, 2022a).

7.2 Based on the known geological and archaeological setting of the site three linear north-south aligned zones were previously identified and are taken here from the DCO (pers. comm. ERM 04/08/21), these represent varying archaeological potential within which the main development impacts are proposed and are here combined with the findings of the geoarchaeological monitoring of GI works (AOC, 2021):

Archaeological Zone 1

7.3 Trent Valley Alluvium. This comprises that portion of the Trent floodplain that lies immediately east of the current river channel and within which deep deposits (up to c.12-13m deep) of peat and/or peaty clay have been recorded in boreholes. Until the drainage and warping schemes of the seventeenth century onwards, this zone would have been too wet for cultivation and intermittently flooded for much of the year. It is unlikely that significant remains of settlement will be encountered in this area, with the possible exception of Flixborough Stathe itself (the site of the ERF plant) where medieval riverside activity is known to have occurred. There is potential for earlier prehistoric activity and material (e.g., flint scatters, wooden revetments, boats, votive deposits of metalwork) to occur, although this is potentially buried beneath deep alluvial and warp deposits.

7.4 The organic deposits found across the zone could indicate short-lived periods of stabilisation and wetland development within a more active fluvial environment, later fluvial erosion of well-formed peats, periods of soil development and waterlogging atop previously dry land surfaces. The latter being the least likely considering the generally low-lying floodplain nature of the landscape in question. Alternatively, they could be related to the warp also known in the area. Investigations to the north of the site (Lillie, 2008; Lillie and Bunting, 2016) recorded organic deposits on the eastern margins of the floodplain, similar to that recorded in A2 and A3, they were interpreted as either channel abandonment and infilling, or floodplain margin deposits (mire) but paleoenvironmental investigation (diatom and pollen) could not determine the precise nature of their formation.

7.5 Either way the peat represents a stabilisation or cessation of sediment accumulation and could record possible horizons of human activity; provide an environmental context for any human activity or landscape development (i.e. through pollen and other botanical remains, diatoms, ostracods and insects); and through radiocarbon dating could provide a chronology for the sequence of alluvial or sand deposition; placing any nearby archaeological finds within a developing landscape context and contributing to the regional palaeoenvironmental record.

7.6 Areas A1, A2 and the northern part of A3 fall within this zone (see section 3 for more detail on the proposed developments in each area).

Archaeological Zone 1 - Development Area 1

7.7 The main ERF plant, including piling and the excavation of a shaft up to 10m bgl – falls within Archaeological Zone 1 as outlined above. The ERF facility is being developed on a site at Flixborough Stathe, formerly occupied by a series of large round storage tanks, which are likely to have contained fuels, other process chemicals, and where large quantities of coal and other solid fuels were also formerly stored. Flixborough Stathe was the historic river port linked to Flixborough on the high ground to the east by road. It seems likely that any remains of the medieval port will have been relatively shallow and therefore disturbed or destroyed by twentieth century activity at the wharf.

7.8 A ground investigation comprising 6 boreholes was carried out at the main ERF plant (A1), within this zone in 2018 (IFA, 2018). This revealed the presence of varying depths of made ground (0.75-2.1m) containing brick, concrete, tarmac, slag, mudstone and sandstone. This lay above some 4-5m of alluvial silty clay with occasional organic content. From around 6m below ground level to c.12.5m all boreholes encountered a deep deposit of fibrous peat including large pieces of wood. This correlates with observations of peat deposits and potential palaeochannels of the Trent at the site of the proposed wind farm at Flixborough Grange to the north and in the area of the Lincolnshire

Lakes to the south. Carbon dating of the peat deposits at Flixborough Grange indicate dates early in the fourth millennium BC (during the Neolithic period) for its early formation and the 8th-6th centuries BC (Early Iron Age) for its later phases. Given that the proposals include the excavation of a bunker hall to a depth of 10m below ground level, there will be significant disturbance caused to these deposits which have archaeological potential as well as palaeoenvironmental significance.

7.9 The thickest, deep peat deposits were located in BH6 (4.7-11.7m bgl) during investigations by IFA in 2018 and peat deposits in MW7 (AOC, 2021) were not bottomed during the recent monitoring programme. Development proposals include the excavation of a bunker hall to a depth of 10m below ground level within A1, and thus there will be risk of disturbance of these deposits which have high palaeoenvironmental potential. The report on the GI monitoring (AOC, 2021) recommended locating a further geoarchaeological borehole within this area between these two points in order to retrieve samples from the full Holocene sequence.

Archaeological Zone 1 - Development Area 2 and 3

7.10 The development area between the ERF plant and the B1216 (A2) falls within archaeological Zone 1 and includes piling associated with a concrete block manufacturing plant, ash treatment facility, a plastic recycling facility; and footprint excavation to unknown depths for a visitor centre, a railhead, a utilities corridor and several large ponds.

7.11 The northern part of A3, just to the north of the B1216, also lies just within Archaeological Zone 1 and includes a Gas network connection, a hydrogen production facility, hydrogen refuelling facility, battery storage, EV vehicle charging, utilities corridors, access roads and laydown areas, and the start of the southern DHPWN.

7.12 The report on the GI monitoring (AOC, 2021) recommended, that in order to improve the distribution of data points across A1 and A2 it may be beneficial to undertake a number of purposive geoarchaeological boreholes running west to east across these areas and drilling to the base of the Holocene sequence. This would have the added benefit of extending the Humber Wetlands transect (Lillie, 1998), thus providing a more robust understanding of the paleoenvironmental context and archaeological potential of the site and any archaeological remains found by ongoing investigations. In A2 a west to east hand auger transect was also proposed, broadly following the route of Transect 5 (Figure 8) with interventions at 25 to 50m intervals over c. 1200m.

7.13 The report on GI monitoring (AOC, 2021) also recommended Electrical Resistivity Tomography (ERT) transects in the location of previous or proposed borehole transects and another ERT transect between the two (Figure 6). An additional east west aligned ERT transect was subsequently added to WSI for the current work to the south of A2 and into the northern part of A3, following consultation with NLC (AOC, 2022). ERT may be able to identify sub-surface structures and lithological changes, which in combination with any new or existing borehole data could then fill in the gaps between the borehole locations and provide a more robust and complete cross section of the deposits.

Archaeological Zone 2

7.14 The majority of A3 lies within this Archaeological Zone which lies on the edge of the Trent valley and extends from ‘Archaeological Zone 1’ in the west to the base of the west-facing slopes of ‘Archaeological Zone 3’ in the east. Predominantly the impacts over much of the area will be from the southern DHPWN, which are so far undefined. In the very north of A3 some undefined impacts associated with a gas network connection, hydrogen production facility, hydrogen refuelling facility, battery storage, and EV vehicle charging are also expected. Deposit records show thinner but relatively well-preserved organic alluvial deposits interleaved between the Upper and Lower alluvium/warp/sand (AOC, 2021). Much of this zone was historically occupied by uncultivated and unenclosed common land, including areas of sandhills on Brumby Common, at the southern end of the Site. There is the potential for significant archaeological remains to occur in this zone, from settlement of the Neolithic or Bronze Age periods to potentially seasonal occupation in the Iron Age, Roman and medieval periods. There are a number of cropmark sites in the area to the west of the Foxhills Industrial Estate which may be late prehistoric or Roman in date.

7.15 The report on the GI monitoring (AOC, 2021) recommended a purposive geoarchaeological borehole survey retrieving continuous cored samples in a location between TP12 and TP14 in order to target the possible infilled channel/wetland sequence of high palaeoenvironmental potential and also possibly retrieve OSL dates from the underlying sands (at least 5m bgl). The aim being to help reconstruct the changing prehistoric to post-medieval landscape across the project area, enabling any nearby archaeological finds to be placed within a developing landscape context and contributing to the regional palaeoenvironmental record.

7.16 Recent work at Brumby Common (Trent and Peak Archaeology, 2021) recorded varied thickness of peat in the vicinity, up to c.1.2m, but did not record peat below 2.53m OD. The peat samples from Brumby Common did not produce plant macros fossils for radiocarbon dating and at least one of the humic/humin radiocarbon dating couplets were erroneous. The GI monitoring (AOC, 2021) of TP12 recorded peat below c. -1m OD. It was thus proposed to undertake a borehole as close to TP12 in order to sample this deep peat and tie it into, and improve the chronology of, the other numerous records of peat deposits already existing for other parts of A3.

Archaeological Zone 3

7.17 Development areas A4, A5, and A6 lie within this zone. The main impacts are from A4 including an electrical substation with footprint excavation to unknown depths, and undefined impacts from a gas network connection and hydrogen production facility. A5 includes the northern DHPWN, consisting of linear impacts alongside existing roads (depth currently undefined) and impacts for A6 involve the construction of a flood bund over the whole footprint of the area.

Archaeological Zone 3 - Development Area 4

7.18 A4 recorded a single intervention, during the GI monitoring (MW08 AOC, 2021), which indicated depths of windblown sand extending below 5m bgl. A4 is located within ‘Archaeological Zone 3’ on the sandy slopes to the east of the valley. These slopes are rich in archaeological remains, including significant multi-period remains of Neolithic, Bronze Age, Iron Age and Roman date from the sand and gravel quarry at Willow Halt and the mid-late Anglo-Saxon settlement at Flixborough. Purposive geoarchaeological boreholes retrieving continuous cored samples would allow for OSL dating of the sand sequence and also allow for palaeoenvironmental assessment of deep and potentially better-preserved deposits within A4.

Archaeological Zone 3 - Development Area 5

7.19 A5 lies within Archaeological Zone 3. No interventions were undertaken in this area during the monitored GI works, although previous BGS interventions to the south (SE81SE1 AOC, 2021) recorded only windblown sand and Mudstone. It is likely that there is little geoarchaeological potential within deeply buried deposits in this area. The northern DHPWN runs through this area, consisting of linear impacts alongside existing roads (depth currently undefined). The near surface archaeological potential will be covered by a comprehensive watching brief covered under another WSI (ERM, 2022).

Archaeological Zone 3 - Development Area 6

7.20 A6 pertains to the footprint of a flood bund to be constructed in front of a poultry farm less than 400m north of the Skippingdale Retail Park. The area lies within Archaeological Zone 3, and on the boundary with Zone 2. Previous BGS interventions to the northwest (SE81SE46, BGS 2023) does record c.1.5m of clayey peat, over suspected windblown sand. The results of the purposive geoarchaeological boreholes in A4 and the eastern part of Archaeological Zone 4, mentioned above, as well as a trial trench evaluation in A4 (ERM, 2022), will inform the evaluation and mitigation plan. However, a single auger hole was proposed in this area as part of the current work in order to link up the sequences from previous known and proposed locations.

8 RESEARCH AIMS AND OBJECTIVES

8.1 Geoarchaeology is the application of earth science principles and techniques to the understanding of the archaeological record (HE, 2015a). It involves the examination of sub-surface deposit sequences, through coring or exposed sections, in order to identify site formation processes or landscape features of archaeological interest. Deposit models are often employed in geoarchaeology, these are conjectural maps and cross-sections used to investigate the archaeological significance, potential impact, or accessibility of buried deposits (HE, 2020). Geoarchaeological approaches often form part of a wider programme of archaeological investigation.

8.2 The standards set out by the Chartered Institute for Archaeologists for archaeological field evaluation (CIfA, 2020) apply to geoarchaeological evaluation, and the purpose of such is:

- To 'determine, as far as is reasonably possible, the nature of the (geo)archaeological resource within a specified area using appropriate methods and practices.'
- To be 'a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of (geo)archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site…. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate.'
- But the (geo)archaeological resource should not be 'needlessly disturbed or damaged or inappropriate or excessive cost incurred' when evaluation is undertaken in support of a planning application.

8.3 Archaeological evaluation should enhance previous work and provide sufficient information upon which to base effective decisions concerning mitigation. Therefore, an evaluation can highlight the need for further WSIs and archaeological work to fulfil planning conditions.

8.4 The overall objective for the boreholes, deposit modelling and any subsequent on site works or off site palaeoenvironmental assessment is to evaluate the archaeological and palaeoenvironmental potential and likely significance of the deposits present, so that the impact of the development can be understood, and informed decisions made regarding appropriate mitigation. As part of this overarching objective and in order to fulfil the general aims, the specific objective of these works at the Site are defined as:

8.5 To monitor the geotechnical investigations and obtain geoarchaeological boreholes, in order to observe and record the deposit sequence and its distribution across the site and provide samples for palaeoenvironmental assessment.

8.6 The general aims of the investigation at the Site are defined as:

- To identify and characterise the Pleistocene and Holocene geoarchaeological and palaeoenvironmental potential of deposits within the Site.
- To use this information to provide a Site wide understanding of landscape evolution and human activity across the area through time.
- Produce a comprehensive site archive and report.
- To enable the archaeological advisor to North Lincolnshire Council to make an informed decision on the requirement for any further work.
- To make available to interested parties the results of the investigation.

8.7 The specific aims of the investigation at the Site are defined as:

- To update the deposit model for the Site mapping areas of and retaining samples from the alluvial deposits and potentially areas of peat or waterlogged material within the deeper areas of the Trent Valley.
- To update the deposit model for the Site mapping areas of and retaining samples from the windblown sand on the rising mudstone ridge and edge of the Trent Valley, and record potential old land surfaces that may highlight horizons of possible past human activity buried by, within, or atop those sequences.
- Inform the potential for, and likely location of, archaeological remains within the Site.
- To provide samples for and undertake range finder scientific dating in order to construct a chronostratigraphic framework for the site and in reference to previous investigations in the area.
- To set out recommendations for and undertake palaeoenvironmental assessment required in order to provide a chronologically robust understanding of the palaeoenvironmental sequence affected by the development.
- To provide a transect linking the low-lying and deep alluvial sequences, of high palaeoenvironmental potential, with the higher ground of greater potential for past settlement and occupation.

8.8 The specific research questions of the investigation at the Site are defined as:

- RQ1: What does the deposit sequence on the site reveal about the landscape evolution of the site and the River Trent, especially in relation to previous investigations?
- RQ2: How do the deposits recorded within the site relate to each other and how do they contribute to our understanding of the landscape evolution of the project area?
- RQ3: How does the character, extent, and scientific dating of organic horizons compare to those located in the vicinity of the site and do any samples retained have further potential for scientific dating (radiocarbon or OSL) and contributing to the project wide chronology?
- RQ4: Can greater differentiation in the warp/alluvial/windblown deposits be ascertained, by

character, date or depositional context?

- RQ5: Can the palaeoenvironmental sequences sampled provided any further information about past channel routes or wetland onsite?
- RQ6: Can the ERT data provided any further information about past channel routes or wetland onsite?

8.9 The final aim is to make public the results of the investigation, subject to any confidentiality restrictions, through the ADS and OASIS website.

9 METHODOLOGY

Origin and Purpose of Deposit Modelling in Archaeology

9.1 AOC's geoarchaeological methodology followed the previously produced WSI covering this work and conforms to best professional practice as summarised in the appropriate Chartered Institute for Archaeologists Guidelines for Evaluation (CIfA, 2020) and Historic England's guidelines for geoarchaeology (HE, 2015a and HE, 2020).

9.2 The purpose of a geoarchaeological deposit model as outlined by Historic England (HE, 2020) is to:

- identify areas of low or high archaeological potential
- avoid blanket evaluation coverage and inform appropriate mitigation strategies
- aid communication with construction professionals
- facilitate palaeoenvironmental reconstruction

9.3 The character and distribution of past human activity can be better understood through the consideration of the past landscape or environmental context. Such an approach is often required by archaeological advisors and the local planning authority on floodplains where the deposit sequence can vary from thin alluvium or peat, with shallowly exposed ancient land surfaces, to complex and thick sequences of interchanging alluvium and peat, covering deeply buried ancient land surfaces.

9.4 The topography and nature of the ancient land surface during the early Holocene, the current geological epoch and equivalent to the early Mesolithic (*c*. 11,500 BP or 10,000 BC), is dictated by and inferred from the surface of the Pleistocene superficial deposits (the previous epoch) and older solid geology (e.g., mudstone, brickearth, gravel or chalk). Overlying the Pleistocene – or older – deposits, Holocene alluvium may preserve palaeoenvironmental evidence (e.g., pollen, diatoms, ostracods) of landscape development, from local channel migration and vegetation change to regional effects of climate and relative sea level (RSL) change. In combination, likely preservation of palaeoenvironmental remains and deposit data (e.g., depth and character) provides a comparative framework to assess archaeological potential. Peat represents vegetated and waterlogged landscapes (e.g., marshland) which developed, within local or regional fluctuations of hydrology. The anaerobic and acidic conditions of the deposit are particularly conducive to organic preservation. Palaeoenvironmental remains from floodplain deposits, especially peat, provide information on the nature and timing of environmental change and the interplay with past human activity (HE, 2015a; HE, 2015b).

9.5 Modelling software (Rockworks & ArcGIS) is often used to create two and three-dimensional deposit models of the buried topography and overlying strata on the site. The data used may be readily available British Geological Survey (BGS 2023) geological information, recent geotechnical data from the client, or data past archaeological investigations. The depth and distribution of the various deposits is mapped in schematic cross-sections (transects) or plan, showing the elevation (Digital Elevation Model, DEM) or thickness (Isopach), of deposits or stratigraphic units. The model often culminates in schematics maps showing areas of archaeological potential.

Onsite Borehole Evaluation

9.6 Previous work undertaken as an earlier phase (AOC, 2022b) consisted of four purposive borehole locations drilled across the site (Figure 3-5, AOC53056_BH1-4). As well as a further 12 hand auger holes (Figure 3-4, AOC53056_AH1, 5, 9, 12, 13, 16, 20, 24, 26, 27, 30, 31) across the Site, and the obtained samples retained. Machines boreholes were drilled by a rotary rig under the supervision of a geoarchaeologist / environmental archaeologist. Hand augers were undertaken by a geoarchaeologist.

9.7 As part of the most recent phase of work seventeen additional purposive geoarchaeological borehole locations approximately 100mm in diameter were drilled across the site (Figure 72, AOC53056_BH5-8, WS1-13). The core samples were retained. Boreholes were drilled by windowless sample (WS locations) and rotary (BH locations) rigs under the supervision of a geoarchaeologist/environmental archaeologist. Where appropriate, service pits (approximately 300mm x 300mm) were hand-dug to c 1.2m at each location, and the holes CAT-scanned for live services at regular intervals by the sub-contractor or by AOC during this process.

9.8 Continuous samples were collected through the alluvial deposits down to *c.* 12m bgl or the surface of the underlying pre-Holocene drift/solid geology, whichever was encountered first. The cores recovered were undisturbed 0.45m to 1.5m long plastic tubes, roughly 100mm diameter. The cores were retained. The borehole locations were surveyed in by the AOC contractor, with each position located to a six-figure national grid reference, and the elevation measured to metres above ordnance datum.

9.9 On site or back in the AOC laboratory, the geoarchaeologist photographed and logged the Holocene sediments revealed in the boreholes according to standard geological criteria (Jones et al., 1999; Tucker, 2003). Preliminary interpretation of the deposit sequence sampled in the cores was made in order to produce an overview of the lithology that characterises the stratigraphy and identifies formation processes.

9.10 The borehole cores were adequately sealed and labelled and stored in the AOC laboratories controlled storage for use during the subsequent stages of the project. As a general rule cores have a shelf life limited to 3-4 years.

Deposit Model

9.11 In order to create the deposit model, the geotechnical data was entered into a digital database (Rockworks 20). Any recent geotechnical logs supplied by the client or previous archaeological work onsite were given the prefix ‘CP’ for cable percussion, ‘RT’ for rotary, ‘WS’ for window samples, ‘AH’ for auger holes, ‘TP’ for test pits, or ‘TR’ for trenches. BGS logs (BGS, 2023) added to the database were given a prefix relating to the two-letter grid square of its national grid reference e.g. TQ. A total of 177 sedimentary logs were included in the deposit model. The distribution of this data set is presented in Figure 2 and the data references for the sedimentary logs are presented in Appendix A. The numbers of each type are:

- BGS historic deposit data (BGS, 2023): 44
- Client supplied GI/SI data: 79
- AOC deposit data: 64

9.12 Each lithology type (gravel, sand, silt, clay etc.) was given a unique colour (primary component) and pattern (secondary component) enabling visual correlation of the sediment components of deposits across the site. By examining the relationship of the lithology types (both horizontally and vertical) in preliminary and iterative transects, correlations can inform the site-wide deposit groups. The grouping of these deposits is based on the lithological descriptions, which represent distinct depositional environments, coupled with a wider understanding of the local floodplain sequences. Thus, a sequence of stratigraphic units ('facies'), representing certain depositional environments, and/or landforms can be reconstructed both laterally and through time.

9.13 Inverse distance weighted (IDW, weighting =2, number of points =12) digital elevation model (DEM) and thickness (Isopach) plots were produced for key deposits (i.e. units defining major changes in the environment and modes of deposition) and surface horizons. These highlight major features of the topography through time. In this respect, the most common surface plot depicts the surface of the Pleistocene (or older) deposits (Figure 14) gives an approximation of the topography of the site as it existed at the beginning of the early Mesolithic period c 10,000 years ago. The development of the Holocene floodplain is likely to have been influenced by the topography inherited from the Pleistocene/Late glacial period. This surface would have dictated the course of later channels, with gravel high points forming areas of dry land within the wetlands, and lower lying areas forming the main threads of later channels. Many of the additional surface or thickness plots are more representative of deposit survival than time-specific landscapes.

9.14 The overlying deposit sequence across the site depicted by the stratigraphic units, as representative of specific depositional environments and/or landforms laterally and through time for the site and immediate vicinity, is illustrated in profile or transect form (Figures 6-10). Such transects present a straight-line correlation between the data points, extrapolating the stratigraphic units identified within each borehole.

9.15 By examining the surface and thickness plots in combination with the vertical deposition shown in the transects areas of archaeological potential can be mapped (Figure 2). These characterise the differing geoarchaeological and archaeological potential and significance of single stratigraphic units, deposit sequences containing multiple stratigraphic units, or specific landforms and depositional environments.

10 RESULTS

Borehole logs

10.1 The log tables for the geoarchaeological boreholes undertaken by AOC are presented below, with locations shown on Figures 3-5. For completeness, the logs for the hand auger locations and 4 boreholes that were previously included within the interim report (AOC53056_AH1, 5, 9, 12, 13, 20, 24, 26, 27, 30, 31, AOC53056_BH1-4: AOC, 2022b), are replicated below in Table 2 to Table 17.

10.2 Seventeen additional purposive geoarchaeological borehole locations approximately 100mm in diameter were drilled across the site Figure 3 to Figure 5,). The logs tables for the most recent boreholes (AOC53056_BH5-8, WS1-13), those not covered by the previous interim, are presented below in Table 18 to Table 34.

Table 2 Deposit log for AOC53056_AH1

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH1		486250.99	413251.025	1.811644		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.81	1.45	0.00	0.36	0.36	CLAY, silty. Light Brownish Grey (10YR 6/2). firm, friable. Moist. Homogenous. Gradual lower boundary. Stone: none Rootlets: rare Rooting: none. TOPSOIL Mid brownish grey.	Topsoil
1.45	0.81	0.36	1.00	0.64	SILT, clayey. Greyish Brown (10YR 5/2). Stiff. Homogenous. Dry. V occ. charcoal fragments V. occ. plant remains Stone: none Rootlets: none Rooting: none. Alluvium? Mid brownish yellow and light bluish grey mottled	Holocene - Upper Alluvium
0.81	0.26	1.00	1.55	0.55	SILT, clayey. Light Brownish Grey (10YR 6/2). Firm, friable. Homogenous. Moist. Gradual lower boundary. Mid yellowish grey. Not in selection. Stone: none Rootlets: occasional Rooting: none. Possible alluvium?	
0.26	-0.19	1.55	2.00	0.45	PEAT, clayey. Very Dark Greyish Brown (10YR 3/2). Firm. Homogenous. Moist. Fibres visible throughout layer. Stone: none Rootlets: none Rooting: none. Peat.	Holocene - Organic Deposits
-0.19	-0.50	2.00	2.31	0.31	SILT, clayey. Bluish Grey (10B 5/1). Firm. Bedded. Moist. Sharp lower boundary. Moderate plant remains, which becomes more frequent toward base Stone: none Rootlets: frequent Rooting: occasional. Alluvium Mid to light blue/grey.	

-0.50	-0.82	2.31	2.63	0.32	PEAT, clayey. Dark Greyish Brown (10YR 4/2). Firm, friable. Moist. Sharp lower boundary. Plant remains frequent Stone: none Rootlets: frequent Rooting: occasional. PEAT.	
-0.82	-1.68	2.63	3.49	0.86	PEAT, woody. Dark Reddish Brown (2.5YR 2.5/3). Firm, friable. Moist. Stone: none Rootlets: none Rooting: none. PEAT.	
-1.68	-3.65	3.49	5.46	1.97	PEAT, reedy. Yellowish Brown (10YR 5/4). Firm, friable. Moist. Stone: none Rootlets: none Rooting: none.	

Table 3 Deposit log for AOC53056_AH5

Intervention		Easting	Northing	Elevation		
AOC53056_AH5		486452.02	413260.007	1.23644		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.24	0.84	0.00	0.40	0.40	CLAY, silty. Yellowish Brown (10YR 5/6). Firm. Homogenous. Moist. Crop cover Stone: none Rootlets: - Rooting: - Topsoil / ploughsoil.	Topsoil
0.84	0.40	0.40	0.84	0.44	SILT, clayey, Greyish Brown (10YR 5/2). Firm, friable. Moist. Sharp lower boundary. An. Bn. fragments: rare Stone: none Rootlets: rare Rooting: none. Subsoil. Mid orange brown with mid grey mottling	Holocene - Upper Alluvium
0.40	0.01	0.84	1.23	0.39	Very Dark Greyish Brown (10YR 3/2). Firm. Dry. Stone: none Rootlets: none Rooting: none. Peat. Becomes more yellow at base from c. 1.10m.	Holocene - Organic Deposits
0.01	-0.62	1.23	1.86	0.63	Light Brownish Grey (2.5Y 6/2). Soft. Homogenous. Saturated. Stone: none Rootlets: none Rooting: none. Aeolian SAND Mid to light grey and greyish brown. From wet to saturated at c. 1.5mbgl. Location terminated due to loose, saturated sand collapse.	Holocene - Aeolian Sands

Table 4 Deposit log for AOC53056_AH9

Intervention		Easting	Northing	Elevation		
AOC53056_AH9		486650.95	413062.92	0.690924		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.69	0.39	0.00	0.30	0.30	CLAY, silty. Greyish Brown (10YR 5/2). Firm. Homogenous. Moist. Very gradual lower boundary. Stone: none Rootlets: frequent Rooting: none. Topsoil / Ploughsoil.	Topsoil
0.39	0.09	0.30	0.60	0.30	CLAY, silty. Yellowish Brown (10YR 5/6). Firm. Homogenous. Moist. Very sharp lower boundary. Stone: none Rootlets: rare Rooting: none. Subsoil.	
0.09	-1.18	0.60	1.87	1.27	PEAT, humified. Black (10YR 2/1). Soft, friable. Moist. Stone: none Rootlets: none Rooting: none. PEAT. Becomes slightly clayey and firmer at c. 1.35mbgl.	Holocene - Organic Deposits
-1.18	-1.31	1.87	2.00	0.13	Yellowish Brown (10YR 5/8). Firm. Homogenous. Wet. Stone: none Rootlets: none Rooting: none. Fine to coarse SAND.	Holocene - Aeolian Sands

Table 5 Deposit log for AOC53056_AH12

Intervention		Easting	Northing	Elevation		
AOC53056_AH12		486857.01	413313.962	0.634347		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.63	0.20	0.00	0.43	0.43	CLAY, silty. Mid greyish brown, dry to slightly moist, firm, friable, silty CLAY. Frequent rootlets, occasional small stones (subangular to subrounded). Very occasional small ceramic fragments.	Topsoil

0.20	0.03	0.43	0.60	0.17	SILT, clayey. Subsoil. Mid yellow brown, very compact clayey SILT. Occasional dark brown patches c. 5mm in diameter. Very occasional small to medium stones (rounded to subrounded).	
0.03	-0.17	0.60	0.80	0.20	Very dark brownish grey, friable, firm PEAT, Humified. Attempted twice but cermaic obstruction hit in both locations.	Holocene - Organic Deposits

Table 6 Deposit log for AOC53056_AH13

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH13		486900	413321.027	0.457444		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.46	0.09	0.00	0.37	0.37	CLAY, silty. Greyish Brown (10YR 5/2). Firm, friable. Homogenous. Moist. Gradual lower boundary. Small ceramic fragments toward base, moderate to frequent Stone: none Rootlets: frequent Rooting: occasional. Topsoil / ploughsoil.	Topsoil
0.09	-0.06	0.37	0.52	0.15	CLAY, silty. Dark Greyish Brown (10YR 4/2). Firm, friable. Homogenous. Moist. Sharp lower boundary. Frequent very small ceramic fragments Stone: none Rootlets: occasional Rooting: none. Subsoil.	
-0.06	-0.54	0.52	1.00	0.48	PEAT, humified. Reddish Black (10R 2.5/1). Firm, friable. Wet. V. frequent wood / plant remains Stone: none Rootlets: occasional Rooting: occasional. PEAT.	Holocene - Organic Deposits
-0.54	-1.84	1.00	2.30	1.30	Very Dark Greyish Brown (10YR 3/2). Soft. Saturated. Stone: none Rootlets: occasional Rooting: none. Peaty SAND - transitional? Earlier peat?	

-1.84	-2.54	2.30	3.00	0.70	Brownish Yellow (10YR 6/6). Soft. Saturated. Stone: none Rootlets: none Rooting: none. Aeolian SAND Cannot retain sand, too saturated and loose. End of bore.	Holocene - Aeolian Sands

Table 7 Deposit log for AOC53056_AH16

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH16		487111.45	413290.23	1.174495		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.17	0.66	0.00	0.51	0.51	CLAY, silty. Greyish Brown (10YR 5/2). Firm. Moist. Sharp lower boundary. Moderate very small ceramic fragments at base of deposit. Occasional dark grey to black patches. Stone: rare small sub-rounded Rootlets: occasional Rooting: rare. Ploughsoil. More friable toward base from c. 0.45mbgl.	Topsoil
0.66	-0.03	0.51	1.20	0.69	PEAT, humified. Black (2.5YR 2.5/1). Firm, friable. Moist. Stone: none Rootlets: none Rooting: none. PEAT	Holocene – Organic Deposits
-0.03	-0.99	1.20	2.16	0.96	PEAT, woody. Very Dark Greyish Brown (10YR 3/2). Firm, friable. Wet. Sharp lower boundary. Stone: none Rootlets: none Rooting: none. PEAT, woody and a little bit reedy.	
-0.99	-1.00	2.16	2.17	0.01	Light Brownish Grey (10YR 6/2). Firm. Homogenous. Wet. Stone: none Rootlets: none Rooting: none. Aeolian SAND? DARK brownish grey. Two attempts to extend hole resulted in empty, wet auger - termination at 2.17mbgl.	Holocene - Aeolian Sands

Table 8 Deposit log for AOC53056_AH20

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH20		487254.16	413400.01	1.21567		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.22	0.74	0.00	0.48	0.48	CLAY, silty. Light Brownish Grey (10YR 6/2). Firm. Homogenous. Moist. Gradual lower boundary. Stone: none Rootlets: frequent Rooting: none. Topsoil/ploughsoil Mid brownish grey.	Topsoil
0.74	0.63	0.48	0.59	0.11	Very Dark Greyish Brown (10YR 3/2). Firm, friable. Moist. Sharp lower boundary. Stone: none Rootlets: none Rooting: none. PEAT deposit.	Holocene - Organic Deposits
0.63	-0.88	0.59	2.10	1.51	Light Grey (10R 7/1). Firm. Bedded. Moist. Stone: none Rootlets: none Rooting: none. Aeolian Sands? Bedded mid and light grey slightly silty SAND (fine to medium). Becomes mid yellow brown at 2.72mbgl. Saturated and watery 2-2.1mbgl. Became saturated and very difficult to get auger in and out, terminated at 2.1mbgl. 2-2.1m not retained.	Holocene - Aeolian Sands

Table 9 Deposit log for AOC53056_AH24

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH24		486349.01	413900.07	2.309862		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
2.31	1.95	0.00	0.36	0.36	CLAY, silty. Light Brownish Grey (2.5Y 6/2). Firm. Homogenous. Moist. Gradual lower boundary. Stone: none Rootlets: frequent Rooting: occasional. Topsoil / ploughsoil.	Topsoil

1.95	1.81	0.36	0.50	0.14	CLAY, silty. Greyish Brown (10YR 5/2). Firm. Homogenous. Moist. Diffuse lower boundary. Stone: none Rootlets: rare Rooting: none. Subsoil.	Holocene - Upper Alluvium
1.81	0.03	0.50	2.28	1.78	CLAY, silty. Bluish Grey (10B 6/1). Firm. Homogenous. Moist. Stone: none Rootlets: occasional Rooting: rare. Alluvium. Mid bluish grey with mid orange mottling, changing between blue / grey and more yellow brown in bands over depth. Water table at 1.90mbgl. Organic remains increase from 2m.	
0.03	-0.07	2.28	2.38	0.10	PEAT, clayey. Very Dark Greyish Brown (10YR 3/2). Firm. Moist. Very gradual boundary. Plant remains frequent Stone: none Rootlets: frequent Rooting: occasional. Peat band.	Holocene – Organic Deposits
-0.07	-2.69	2.38	5.00	2.62	SILT, clayey. Dark Bluish Grey (10B 4/1). Soft. Bedded. Moist. Stone: none Rootlets: occasional Rooting: rare. Alluvium with peaty / organic inclusions Very woody towards 5mngl.	Holocene - Lower Alluvium

Table 10 Deposit log for AOC53056_AH26

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH26		486587.99	413900.02	1.337877		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.34	1.04	0.00	0.30	0.30	Dark brown, silty CLAY. Soft, homogenous, dry, friable in top 0.20m. Diffuse lower boundary.	Topsoil
1.04	0.09	0.30	1.25	0.95	Mid grey-brown, slightly silty CLAY. Soft, moist, homogenous. Orange manganese throughout. From 0.9m onward potential peat deposits begin, still clay but darker, more organics and silty, wet.	Holocene - Upper Alluvium
0.09	-0.31	1.25	1.65	0.40	Dark black/grey/brown PEAT. Homogenous, moist. Spongy to fibrous, some woody patches.	Holocene - Organic Deposits

-0.31	-1.06	1.65	2.40	0.75	Dark brown, soft, fibrous, woody PEAT. Moist with intense sulphuric smell. Potentially hit water table at 1.9mbgl.	
-1.06	-1.36	2.40	2.70	0.30	Dark grey-brown, wet, woody and fibrous PEAT. Homogenous, diffuse upper boundary.	
-1.36	-3.66	2.70	5.00	2.30	Peaty CLAY. Less fibrous with some wood fragments. 3.85m dark brown grey, soft, moist, to 5m more clayey, diffuse upper boundary. Blue/grey. Soft and silty, organic clay. Homogenous, and manganese / iron / organic. Lens of peat between 4.6-4.7mbgl.	Holocene - Lower Alluvium

Table 11 Deposit log for AOC53056_AH27

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH27		487219.95	413912.95	1.878774		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.88	1.42	0.00	0.46	0.46	Topsoil. Dark brown silty CLAY. Soft to friable. Homogenous. Occasional stones. Dry, moderately sharp lower boundary.	Topsoil
1.42	1.18	0.46	0.70	0.24	Subsoil. Mid orange brown silty CLAY. Friable, homogenous, dry, diffuse boundary at base.	
1.18	0.83	0.70	1.05	0.35	Humic / peaty deposit. Dark clayey PEAT. Black/brown, spongy to plastic, soft, moist, homogenous.	Holocene - Organic Deposits
0.83	0.66	1.05	1.22	0.17	Mid brown / grey SAND. Dry, streaky, slightly sorted.	Holocene - Aeolian Sands
0.66	0.33	1.22	1.55	0.33	SAND, dark grey brown. Slightly silty content, homogenous, fine sand. Diffuse boundaries. Moist.	
0.33	-0.12	1.55	2.00	0.45	SAND, orange / brown. Homogenous, soft, wet, gradual boundary.	

Table 12 Deposit log for AOC53056_AH30

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH30		486626.02	414642.02	6.200014		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
6.20	5.98	0.00	0.22	0.22	Dark grey/brown silty SAND. Friable to firm, homogenous, dry, moderately sharp boundary. Moderate stones.	Topsoil
5.98	5.83	0.22	0.37	0.15	Sandy GRAVELS. Orange / brown, firm / compact. Homogenous, frequent angular stones, dry. Failed due to gravels at 0.37mbgl.	Pleistocene - Gravels

Table 13 Deposit log for AOC53056_AH31

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_AH31		486598.98	414693.02	7.393005		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
7.39	7.09	0.00	0.30	0.30	Dark grey brown silty SAND. Moderate stones. Friable, dry, homogenous. Diffuse lower boundary.	Topsoil
7.09	6.49	0.30	0.90	0.60	Mid orange brown SAND. Friable to firm. Homogenous, dry, becomes slightly more gravelly towards base. Failed at 0.90mbgl due to gravel.	Pleistocene - Gravels

Table 14 Deposit log for AOC53056_BH1

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_BH1		486156.23	414369.65	2.91456		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
2.91	2.86	0.00	0.05	0.05	Dark to mid grey CONCRETE. Removed with core cutter. Solid.	Made Ground - Victorian to Modern
2.86	2.07	0.05	0.84	0.79	Mid to light grey CONCRETE with gravel inclusions. Aroma of chlorine and eggs. Hand dug to 0.50mbgl; water to 0.15mbgl and very compact type 1 - CVI	
2.07	1.98	0.84	0.93	0.09	Black organic sandy, gravelly SILT. Redeposited alluvium? Moist, soft/compact - mixed.	Made Ground - Redeposited Alluvium

1.98	-2.19	0.93	5.10	4.17	Stiff grey to yellowish brown silty CLAY, with a gradual gradient to brown with depth. Very occasional small chalky inclusions. Becomes mottled mid orange-brown / grey from c. 1.20mbgl, and light bluish grey with mid yellow brown mottling from 1.30mbgl. 1.80mbgl darker grey band with organic inclusions until c. 1.95mbgl. Frequent black speckles beneath this, in mid grey / reddish brown / blue grey mottled silty CLAY. Firm, moist. Black speckles become larger and more frequent from c. 3.8-4.2mbgl. Light grey mottling.	Holocene - Upper Alluvium
-2.19	-2.79	5.10	5.70	0.60	Banded, layered, bedded mid brown, mid grey, and dark grey peat. Frequent reedy and woody pieces.	Holocene - Organic Deposits
-2.79	-4.89	5.70	7.80	2.10	As 0.93-5.1mbgl, with woody and reedy pieces and softer. Organic inclusions become more frequent with depth, almost becoming small peat bands from 6.5-6.75mbgl, 7.12-7.22mbgl, and 7.3-7.4mbgl.	
-4.89	-5.99	7.80	8.90	1.10	Clayey, woody PEAT. Occasional very large wood pieces. Firm, wet. Dark brownish grey to very dark reddish brown. Horizontal banding - bedded. Occasional clayey bands - more alluvial than peaty.	
-5.99	-7.84	8.90	10.75	1.85	Clayey PEAT. Less woody below c. 8/9mbgl. Bedded, wet. Firm to stiff.	
-7.84	-8.59	10.75	11.50	0.75	Became very hard at c. 11.5mbgl. Rig lifted. 'purebore' polymer used. VERY slow drilling from here relative to above. Rig lifted. Frequently woody from c. 10.75mbgl. Very dark brown to black, woody, humified PEAT.	
-8.59	-9.59	11.50	12.50	1.00	SAND (core sample not opened but retained for OSL dating).	Pleistocene - Lower Sutton Sand

Table 15 Deposit log for AOC53056_BH2

Intervention		Easting	Northing	Elevation		
AOC53056_BH2		486663.9	414628.878	7.336347		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
7.34	6.84	0.00	0.50	0.50	Mid brown sandy (fine to coarse) SILT. Vegetation cover. Loose, slightly moist. TOPSOIL / PLOUGHSOIL	Topsoil
6.84	6.14	0.50	1.20	0.70	Subsoil? Colluvium/head? Very sandy SILT. Loose, moist. Mid orange brown. Occasional stones (subrounded to subangular, small to large) which increase in frequency with depth.	Pleistocene – Head /Holocene – Aeolian Sands
6.14	6.04	1.20	1.30	0.10	Colluvium/Head? Compact gravelly (fine to coarse) SAND (medium to coarse). Moist. Gravel is angular to subrounded. Mid orange brown.	
6.04	5.94	1.30	1.40	0.10	Colluvium/Head? Very hard, compact, sandy (fine to coarse), silty GRAVEL (fine to coarse) - white and grey.	
5.94	5.84	1.40	1.50	0.10	Mid brown gravelly (fine to coarse, rounded to angular), clayey SAND (medium to coarse). Moist, very compact.	Pleistocene - Gravels
5.84	4.34	1.50	3.00	1.50	Mid brown to mid yellow with light grey mottling. Wet, compact. Silty, sandy (fine to coarse) GRAVEL (fine to coarse, subrounded to subangular) with occasional cobbles. Gravels.	
4.34	1.66	3.00	5.68	2.68	Clayey SAND (fine to coarse). Soft to firm wet. Varying levels of clay - clayey bands 3.52-3.59, 3.71-3.87, and alternating clayey sand / sandy clay onwards every 5-15cm. Mid to light yellow brown.	Pleistocene - Glaciofluvial Deposits
1.66	1.34	5.68	6.00	0.32	Similar to above, with clayey sand / sandy clay, but finer layers and bedding, mid greyish orange, and mid to light yellow and light grey. Some lower bedding layers (c.2-5mm thick) include small stones (<3mm, rounded to subrounded). LAMINATED CLAY/SAND	

1.34	-0.16	6.00	7.50	1.50	Same as 3-5.68mbgl	

Table 16 Deposit log for AOC53056_BH3

Intervention		Easting	Northing	Elevation		
AOC53056_BH3		486700.06	413066.048	0.899715		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.90	0.45	0.00	0.45	0.45	TOPSOIL. Crop cover. Sandy (fine to coarse), clayey SILT. Ploughsoil. Frequent rootlets, firm/firm, moist. Dark brownish grey.	Topsoil
0.45	-0.20	0.45	1.10	0.65	PEAT. Very dark brown to black, firm, moist to wet. Bedded / amorphous, mixed. Woody / reedy. Frequent large pieces of wood. Sharp lower boundary.	Holocene - Organic Deposits
-0.20	-3.32	1.10	4.22	3.12	SAND - OSL sample taken at 1.5-3mbgl; liner stuck in sampler so removal difficult and some sample lost at ends - sample very disturbed. Fine to medium, little coarse. Mid to light grey and yellow brown patchy colour. Saturated, soft/loose. Becomes grey with depth. Occasional black patches, occasional small to medium (subrounded to rounded) stones. Sharp lower boundary.	Holocene - Alluvium / Aeolian Sands
-3.32	-4.33	4.22	5.23	1.01	Mid to dark brownish grey, firm, homogenous. Very clayey SILT. No notable inclusions. Becomes bedded from 4.5mbgl - laminations of mid blue-grey and mid brown. Firm, plastic, wet to moist. Very sharp lower boundary.	
-4.33	-5.79	5.23	6.69	1.46	Bedded silty SAND (fine). Mid grey-brown to brown with patches of black, which are occasionally very coarse and sparkly. Very firm / solid. Wet to saturated. Fine, soft fabric.	Pleistocene - Lower Sutton Sands
-5.79	-6.79	6.69	7.69	1.00	Mid to dark bluish grey, firm to stiff, very clayey SILT. Brown mottling upper. Very stiff lower. Slightly blocky structure in places, similar to mudstone. Horizontally blocky.	Tertiary Bedrock - Mercia Mudstone

-6.79	-10.10	7.69	11.00	3.31	As 5.23-6.69mbgl. Slightly coarser (fine to medium) with occasional coarser and finer patches (likely bands but samples was tipped into new liner after getting stuck - very disturbed. Coarser from c. 9.5mbgl, with occasional stones (rounded to subangular, small to medium).	

Table 17 Deposit log for AOC53056_BH4

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_BH4		486089.99	409611.058	2.565646		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
2.57	1.07	0.00	1.50	1.50	Topsoil / Made Ground. Plant cover (wild flowers) - sparse and patchy. Compact, dry to moist. Silty SANDY (fine to coarse). Mid grey-brown and mid orange brown. Friable. Moderate rootlets. Rooting from 1.4-1.5mOD. More of a mid orange-brown at this depth, and moist. Occasional dark grey patches.	Topsoil Overlying Warp
1.07	-1.24	1.50	3.81	2.31	Coarse / medium SAND. Wet to saturated. Loose. Mid to light grey-brown, changing to mid yellow-brown at c. 2.35mbgl. No inclusions observed. Gradual lower boundary. Firm. Becomes mid grey with dark grey lenses and patches from c. 3mbgl. Fine, dark grey silty SAND (fine) band at 3.4-3.46mbgl. Organic silt band at 3.67-3.70mbgl.	Holocene - Warp / Aeolian Sands
-1.24	-1.40	3.81	3.97	0.16	PEAT. Humified. Very dark brown. Fine, silty. Firm, moist. Sharp lower boundary but with thin lenses beneath within sand.	Holocene - Organic Deposits

-1.40	-3.43	3.97	6.00	2.03	SAND, fluvial? Fine to coarse, slightly silty SAND. Mid to light grey-brown / yellow brown. Firm, wet. Lenses of the above peat in upper section to 4.08mbgl. Saturated from c. 5mbgl - sample lost below 5.20m; sampler jammed in casing, liner jammed in sampler.	Holocene / Pleistocene - Lower Sutton Sands

Table 18 Deposit log for AOC53056_BH5

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_BH5		486299.92	413900.05	2.4271		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
2.43	1.63	0.00	0.80	0.80	Topsoil - mid greyish brown sandy SILT. Compact, homogenous. Large % rooting with rare subangular stones.	Topsoil
1.63	1.23	0.80	1.20	0.40	Subsoil - mid reddish greyish brown sandy silty CLAY. Occasional rooting and subangular stones. Compact, firm, homogenous. Dry. Gradual boundary.	
1.23	0.03	1.20	2.40	1.20	Mid brownish grey silty CLAY. Compact. Firm. Homogenous. Slightly moist. Very slight bluish tinge. No inclusions. Diffuse boundary.	Holocene - Upper Alluvium / Warp / Sutton Sand
0.03	-1.97	2.40	4.40	2.00	Mid bluish grey clayey SILT. Silk-like texture. Moderate vegetation present. Compact. Firm. Slightly moist and slightly mixed. Alluvium? Case empty from c. 3.4-4.4mbgl.	
-1.97	-4.77	4.40	7.20	2.80	Mid bluish grey clayey SILT. Silk-like texture. Sterile. Compact. Firm. Moist. Alluvium. Empty samples from c. 5.2-7.2m	
-4.77	-6.47	7.20	8.90	1.70	Mid bluish grey clayey SILT. Wet. Compact, especially towards 8m. Some orange patches. Vegetation beginning to show occasionally at 8m.	
-6.47	-7.37	8.90	9.80	0.90	PEAT. Dark brownish black silty PEAT. Organics present moderately - wood and fibrous. Compact. Firm. Moist. Sharp boundary.	Holocene - Organic Deposits
-7.37	-8.97	9.80	11.40	1.60	Mid grey SAND. Moist. Compact. Firm. Sterile. Empty from c. 10.2-11.4m.	Holocene - Lower Alluvium / Sutton Sand
-8.97	-9.47	11.40	11.90	0.50	Mid greyish brown silty SAND. Compact and moist. Sharp boundary. Rare vegetation.	
-9.47	-9.52	11.90	11.95	0.05	Mid grey blue SAND. Moist. Compact. Sterile. Sharp boundary.	Pleistocene - Sutton Sand
-9.52	-9.57	11.95	12.00	0.05	Mid brownish yellow SAND. Moist. Compact. Sterile.	

Table 19 Deposit log for AOC53056_BH6

Intervention		Easting	Northing	Elevation		
AOC53056_BH6		486653.53	413899.77	0.905602		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.91	0.41	0.00	0.50	0.50	Topsoil - mid brownish grey silty CLAY with high % rooting. Compact. Dry. Diffuse boundary.	Topsoil
0.41	-0.09	0.50	1.00	0.50	Subsoil? Mid greyish silty CLAY. Moderate rooting. Compact. Firm. Diffuse boundary.	Holocene - Upper Alluvium / Warp / Sutton Sand
-0.09	-3.09	1.00	4.00	3.00	PEAT. Highly organic. Dark brownish black silty clayey PEAT. Moist. Soft. Slight greenish hue c. 3.5mbgl. Less fibrous organics. Clayier than above. Moist. Soft. Empty case 3.7-4m	Holocene - Organic Deposits
-3.09	-5.09	4.00	6.00	2.00	Mid greyish black clayey SILT. Fine. Sticky texture. Moist. Compact. Occasional vegetation. Homogenous.	
-5.09	-6.49	6.00	7.40	1.40	PEAT - high % of woody, fibrous vegetation with silty clay. Moist. Soft but compact. Gradual boundary.	
-6.49	-8.09	7.40	9.00	1.60	SAND. Sterile SAND. Moist. Compact. Slightly coarse. Dark bluish grey.	Holocene - Lower Alluvium / Sutton Sand
-8.09	-8.99	9.00	9.90	0.90	SAND. Still sand but a mid grey slightly coarser sand. Moist. Compact. Sterile. Gradual boundary.	
-8.99	-9.99	9.90	10.90	1.00	Fine SAND - orange brown in colour. Sterile. Compact. Moist. Gradual boundary.	
-9.99	-10.09	10.90	11.00	0.10	Mid greyish black fine SAND. Only visible for 0.1 of tube. Appears compact and moist. Sterile.	

Table 20 Deposit log for AOC53056_BH7

Intervention		Easting	Northing	Elevation		
AOC53056_BH7		486299.93	413253.75	1.621606		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.62	1.12	0.00	0.50	0.50	Topsoil - mid greyish brown sandy CLAY. Compact. Dry. Crumbly. High % of rooting with occasional subangular stones of up to 30mm. Homogenous. Gradual boundary.	Topsoil
1.12	0.72	0.50	0.90	0.40	Subsoil - light greyish brown sandy CLAY. Dry, crumbly. Compact. Occasional rooting and subangular stones up to 20mm. Homogenous. Gradual boundary.	

0.72	0.22	0.90	1.40	0.50	Light brownish yellow clayey SAND. Rare rooting. Compact. Dry. Homogenous. Fairly fine. Gets clayier as it gets deeper so when at 1.5m it's a sandy clay. Homogenous. Sharp boundary.	Holocene - Upper Alluvium / Warp / Sutton Sand
0.22	-4.78	1.40	6.40	5.00	PEAT - dark brownish black clayey silty PEAT. Fibrous. Compact. Moist. Gets more fibrous with depth.	Holocene - Organic Deposits
-4.78	-6.38	6.40	8.00	1.60	Coarse grey SAND. Moist. Compact. Sterile. 6.5-8m taken for OSL.	Holocene - Lower Alluvium / Sutton Sand
-6.38	-7.08	8.00	8.70	0.70	Mid greyish brown CLAY. Sterile. Moist. Compact and firm. Sharpish boundary.	
-7.08	-7.58	8.70	9.20	0.50	Grey CLAY with tints of brown. Sterile. Compact and firm. Moist. Sharp boundary.	
-7.58	-9.38	9.20	11.00	1.80	Mid greyish brown SAND. Moist. Compact. Occasional black mineral flecks. Becomes wet with depth. Fairly fine at c. 10.5mbgl. Compact and firm. Voids in recovery 9.5-10.5m.	

Table 21 Deposit log for AOC53056_BH8

Intervention		Easting	Northing	Elevation		
AOC53056_BH8		486406.31	413253.99	1.533232		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.53	0.83	0.00	0.70	0.70	Topsoil - mid greyish brown sandy CLAY with high % roots, occasional subangular stones up to 30mm. Dry. Compact. Firm. Homogenous. Gradual boundary.	Topsoil
0.83	0.53	0.70	1.00	0.30	Subsoil? - mid yellow brown clayey silty SAND. Dry and compact but loose when disturbed. Occasional rooting and subangular stones up to 20mm. Gradual boundary.	Holocene - Upper Alluvium / Warp / Sutton Sand
0.53	-1.67	1.00	3.20	2.20	PEAT. Silty, clayey PEAT. Dark brownish black, moist. Compact but friable. Fibrous - becoming more so with depth. Gradual boundary.	Holocene - Organic Deposits
-1.67	-4.17	3.20	5.70	2.50	Mid grey SAND. Coarse. Moist. Compact and sterile. Sand running out leaving empty liners 3.5-5mbgl.	Holocene - Lower Alluvium / Sutton Sand
-4.17	-4.87	5.70	6.40	0.70	Coarse mid yellow brownish SAND. Moist. Compact. Sterile. Sharp boundary.	
-4.87	-5.07	6.40	6.60	0.20	Mid yellowish brown slightly sandy silty CLAY. Compact but friable. Moist. Sterile.	
-5.07	-6.27	6.60	7.80	1.20	Mid brownish grey silty CLAY. Compact but friable. Sterile. Moist. Gradual boundary.	
-6.27	-7.17	7.80	8.70	0.90	Fine greyish brown SAND. Sterile. Compact. Moist. Empty from 8.2-8.7.	

-7.17	-7.57	8.70	9.10	0.40	Fine mid brown SAND. Slightly coarse. Compact. Moist. Sterile. Sharp boundary.	
-7.57	-7.77	9.10	9.30	0.20	Compact grey CLAY. Sterile. Moist. Sharp boundary.	
-7.77	-8.87	9.30	10.40	1.10	Coarse mid greyish brown SAND. Sterile. Moist. Compact. Empty from 9.6m.	
-8.87	-9.47	10.40	11.00	0.60	Slightly fine mid brown SAND. Moist. Compact. Sterile.	

Table 22 Deposit log for AOC53056_WS1

Intervention		Easting	Northing	Elevation		
AOC53056_WS1		486499.96	413899.98	1.751561		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.75	1.20	0.00	0.55	0.55	Topsoil. Turfed. Very stiff. Friable ish. Mid grey brown. More compact than other locations, perhaps because on trackway. Rooting throughout. Clayey SILT. Gradual boundary.	Topsoil
1.20	0.25	0.55	1.50	0.95	Mid blue-grey wih mid orange mottling. Moderate rooting. Stiff. Silty CLAY. Becomes mid yellow brown at c. 1mbgl.	Holocene - Upper Alluvium / Warp / Sutton Sand
0.25	-0.56	1.50	2.31	0.81	Mid to dark blue-grey, firm, moist. Clayey SILT. Band of higher organic content (reedy pieces) c. 1.62-1.67m and 1.81-1.86m. Very reedy at c. 2.3m. Void from 2-2.26m.	
-0.56	-1.80	2.31	3.55	1.24	Very dark brown, reedy and woody, humified PEAT. Very potent. Soft to firm. Wet. Gradual lower boundary.	Holocene - Organic Deposits
-1.80	-2.30	3.55	4.05	0.50	Very soft. Wet. Slightly clayey SILT. Frequent wood and reed fragments. Mid to dark grey.	
-2.30	-4.26	4.05	6.01	1.96	Silty PEAT. Very dark grey-brown. Very soft. Wet. Moderate wood fragments. Humified in places. More humified 5.10-5.50m. Silty PEAT from 5.5m.	
-4.26	-5.25	6.01	7.00	0.99	Mid grey SAND (fine to coarse). Wet. Water c. 6.25m - becomes saturated. Sucked out lower sample. Water under high pressure. Barrel briefly jammed in casing.	Holocene - Lower Alluvium / Sutton Sand

Table 23 Deposit log for AOC53056_WS2

Intervention		Easting	Northing	Elevation		
AOC53056_WS2		486750.2	413899.95	0.963402		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.96	0.41	0.00	0.55	0.55	Topsoil. Crop cover. V stiff.	Topsoil

0.41	-0.09	0.55	1.05	0.50	Slightly clayey SILT interbedded with slightly sandy (fine) SILT. Light yellow brown and light to mid grey-brown. Occasional orange staining. Stiff but easily loosened.	Holocene - Upper Alluvium / Warp / Sutton Sand
-0.09	-0.19	1.05	1.15	0.10	Mid blue-grey mottled with dark grey and yellow brown. Firm. Moist. Very silty CLAY.	
-0.19	-0.24	1.15	1.20	0.05	Reedy, silty PEAT band. Compression of peat 1-2m.	Holocene - Organic Deposits
-0.24	-0.32	1.20	1.28	0.08	Mid blue-grey mottled with dark grey and a little yellow brown. Firm. Moist. Very silty CLAY. Sharp lower boundary.	
-0.32	-1.84	1.28	2.80	1.52	Very dark brown. Wet. Fibrous PEAT. Frequent wood and reed pieces.	
-1.84	-2.70	2.80	3.66	0.86	Wet/saturated dark grey brown fibrous silty PEAT. Similar to above. Humified in places.	
-2.70	-3.67	3.66	4.63	0.97	Very dark brownish grey slightly clayey SILT. Frequent wood fragment. Wet. Very soft.	
-3.67	-4.04	4.63	5.00	0.37	Wet. Soft. Woody, humified PEAT. Very dark brown.	
-4.04	-4.49	5.00	5.45	0.45	Very dark brownish grey slightly clayey SILT. Frequent wood fragment. Wet. Very soft. Frequent peaty pockets.	
-4.49	-5.28	5.45	6.24	0.79	Wet/saturated dark grey brown fibrous silty PEAT. Similar to above. Humified in places. Large wood fragments.	
-5.28	-5.44	6.24	6.40	0.16	Sandy saturated PEAT.	
-5.44	-5.77	6.40	6.73	0.33	Light grey SAND (fine to coarse).	Holocene - Lower Alluvium / Sutton Sand
-5.77	-6.04	6.73	7.00	0.27	Silty CLAY. Grey. Stiff.	

Table 24 Deposit log for AOC53056_WS3

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_WS3		486855.26	413900.03	0.838918		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.84	0.29	0.00	0.55	0.55	Topsoil. Crop cover.	Topsoil
0.29	0.08	0.55	0.76	0.21	Light yellow brown soft fine sandy (fine) SILT. Friable. Firm. Bedded.	Holocene - Upper Alluvium / Warp / Sutton Sand
0.08	-0.12	0.76	0.96	0.20	Stiff grey silty CLAY. Occasional dark grey and bright orange patches.	
-0.12	-2.21	0.96	3.05	2.09	Firm / friable. Very dark brown to black. Humified PEAT. Clayey. Becomes moist c. 1.5m. Reed pieces. Woody pieces below 2m.	Holocene - Organic Deposits
-2.21	-3.30	3.05	4.14	1.09	Dark grey brown clayey PEAT with wood.	
-3.30	-4.08	4.14	4.92	0.78	Very woody humified PEAT. Very dark brown. Big wood. Wet.	

-4.08	-4.16	4.92	5.00	0.08	Light grey SAND (fine to coarse). Sand blow up casing 5-6m, no retrieval.	Holocene - Lower Alluvium / Sutton Sand

Table 25 Deposit log for AOC53056_WS4

Intervention		Easting	Northing	Elevation		
AOC53056_WS4		486965.11	413899.99	0.770907		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.77	0.17	0.00	0.60	0.60	Topsoil. Stiff. Friable. Dry.	Topsoil
0.17	-0.01	0.60	0.78	0.18	Light yellow brown. Dry. Laminated slightly sandy (fine) SILT. Blocky laminae. Sharp boundary.	Holocene - Upper Alluvium / Warp / Sutton Sand
-0.01	-0.15	0.78	0.92	0.14	Very stiff. Dry. Dark grey with orange mottling. Occasional rootlets. Very silty CLAY. Sharp boundary.	
-0.15	-0.83	0.92	1.60	0.68	Dry. Very dark brown. Humified PEAT. Firm / friable. Moist from 1.60m.	Holocene - Organic Deposits
-0.83	-3.22	1.60	3.99	2.39	Very dark brown to black. Humified PEAT. Moist. Friable. Woody. Reedy. Wet / saturated and very soft at top of sample. Very dark grey patch on one side at 3.94-4m. Touched sand at base - sharp boundary. Grey.	
-3.22	-3.23	3.99	4.00	0.01	Grey SAND.	Holocene - Lower Alluvium / Sutton Sand

Table 26 Deposit log for AOC53056_WS5

Intervention		Easting	Northing	Elevation		
AOC53056_WS5		487080.14	413899.97	1.395873		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.40	0.80	0.00	0.60	0.60	Topsoil.	Topsoil
0.80	0.70	0.60	0.70	0.10	Dark blue grey and orange mottled silty CLAY. Firm. Friable. Dry. Gradual boundary.	Holocene - Upper Alluvium / Warp / Sutton Sand
0.70	-0.60	0.70	2.00	1.30	Dry to moist. Firm to soft, friable. Humified PEAT. Reddish brown to very dark brown. 1-2m taken for OSL.	Holocene - Organic Deposits
-0.60	-0.89	2.00	2.29	0.29	Wet to saturated. Woody, humified PEAT.	
-0.89	-2.60	2.29	4.00	1.71	Mid grey turning light grey SAND (fine to coarse). Root 2.62-2.71m. Saturated. 3-4m taken for OSL.	Holocene - Lower Alluvium / Sutton Sand

Table 27 Deposit log for AOC53056_WS6

Intervention	Easting	Northing	Elevation	
AOC53056_WS6	487152.25	413899.98	1.714448	

Top elevation (m OD)	Base elevation (m OD)	Top depth (m bgl)	Base depth (m bgl)	Thickness (m)	Description	Interpretation
1.71	1.08	0.00	0.63	0.63	Topsoil. Gradual boundary.	Topsoil
1.08	0.71	0.63	1.00	0.37	Dry friable humified PEAT.	Holocene - Organic Deposits
0.71	-0.69	1.00	2.40	1.40	1-2m Taken for OSL. Saturated mid to light grey brown SAND (fine to coarse). Dark speckles at base.	Holocene - Lower Alluvium / Sutton Sand
-0.69	-1.29	2.40	3.00	0.60	Light grey wet to saturated SAND (fine to coarse). Very occasional wood fragments (c. 10mm).	
-1.29	-3.29	3.00	5.00	2.00	3-4m Taken for OSL. Light grey wet to saturated SAND (fine to coarse). Mid grey clay lens 4.01m. Dark grey lend 4.8m.	

Table 28 Deposit log for AOC53056_WS7

Intervention		Easting	Northing	Elevation		
AOC53056_WS7		486560.83	413269.78	0.819435		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.82	0.42	0.00	0.40	0.40	Topsoil / ploughsoil. MADE GROUND, topsoil. Dark Greyish Brown (2.5Y 4/2). firm, friable. homogenous. dry. gradual. Stone: none Rootlets: occasional Rooting: occasional	Topsoil
0.42	0.32	0.40	0.50	0.10	Weathered alluvium. SILT, clayey. Light Grey (10R 7/1). firm. blocky. dry. sharp. Stone: none Rootlets: occasional Rooting: none	Holocene - Upper Alluvium / Warp / Sutton Sand
0.32	-0.56	0.50	1.38	0.88	Peat. PEAT, humified. Very Dark Brown (10YR 2/2). firm, friable. bedded. dry. sharp. Woody, reedy Stone: none Rootlets: none Rooting: none	Holocene - Organic Deposits
-0.56	-1.63	1.38	2.45	1.07	SAND, silty. Dark Brown (7.5YR 3/2). soft. homogenous. saturated. diffuse. Reedy pieces c. 2.25mbgl Stone: none Rootlets: none Rooting: none	Holocene - Lower Alluvium / Sutton Sand
-1.63	-3.78	2.45	4.60	2.15	SAND. Light Grey (10R 7/1). firm. homogenous. wet. undefined. Stone: none Rootlets: none Rooting: none	
-3.78	-4.98	4.60	5.80	1.20	CLAY, silty. Light Brownish Grey (10YR 6/2). firm. undefined. moist. very sharp. Stone: none Rootlets: none Rooting: none	

-4.98	-5.18	5.80	6.00	0.20	SAND, silty. Reddish Brown (2.5YR 4/3). stiff. bedded. moist. undefined. Stone: none Rootlets: none Rooting: none	

Table 29 Deposit log for AOC53056_WS8

Intervention		Easting	Northing	Elevation		
AOC53056_WS8		486636.95	413287.48	1.06439		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.06	0.66	0.00	0.40	0.40	MADE GROUND, topsoil. Dark Greyish Brown (2.5Y 4/2). firm, friable. homogenous. dry. gradual. Stone: none Rootlets: occasional Rooting: occasional	Topsoil
0.66	0.36	0.40	0.70	0.30	CLAY, silty. Light Grey (10R 7/1). firm. blocky. dry. sharp. Stone: none Rootlets: occasional Rooting: none	Holocene - Upper Alluvium / Warp / Sutton Sand
0.36	-1.24	0.70	2.30	1.60	PEAT, humified. Very Dark Brown (10YR 2/2). firm. undefined. dry. sharp. Wood Stone: none Rootlets: none Rooting: none	Holocene - Organic Deposits
-1.24	-4.24	2.30	5.30	3.00	SAND. Light Grey (10R 7/1). firm. bedded. wet. sharp. Stone: none Rootlets: none Rooting: none	Holocene - Lower Alluvium / Sutton Sand
-4.24	-4.79	5.30	5.85	0.55	CLAY, silty. Brown (10YR 4/3). stiff. homogenous. moist. sharp. Stone: none Rootlets: none Rooting: none	
-4.79	-4.94	5.85	6.00	0.15	SAND, silty. Reddish Brown (2.5YR 5/3). stiff. bedded. wet. undefined. Stone: none Rootlets: none Rooting: none	

Table 30 Deposit log for AOC53056_WS9

Intervention		Easting	Northing	Elevation		
AOC53056_WS9		486716.87	413300.03	1.439985		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.44	1.04	0.00	0.40	0.40	MADE GROUND, topsoil. Greyish Brown (10YR 5/2). firm, friable. undefined. dry. gradual. Stone: none Rootlets: none Rooting: none	Topsoil
1.04	0.64	0.40	0.80	0.40	CLAY, sandy. Dark Brown (7.5YR 3/2). firm. undefined. dry. sharp. Stone: none Rootlets: occasional Rooting: none	Holocene - Upper Alluvium / Warp / Sutton Sand

0.64	0.24	0.80	1.20	0.40	PEAT, sandy. Dark Brown (10YR 3/3). soft. undefined. moist. undefined. Stone: none Rootlets: none Rooting: none	Holocene - Organic Deposits
0.24	0.04	1.20	1.40	0.20	SAND, clayey. Dark Brown (10YR 3/3). firm. undefined. moist. undefined. Stone: none Rootlets: none Rooting: none	Holocene - Lower Alluvium / Sutton Sand
0.04	-3.56	1.40	5.00	3.60	SAND. Light Brownish Grey (10YR 6/2). firm. undefined. saturated. undefined. Stone: none Rootlets: none Rooting: none	

Table 31 Deposit log for AOC53056_WS10

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_WS10		486792.47	413299.67	1.077281		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
1.08	0.80	0.00	0.28	0.28	MADE GROUND, topsoil. Greyish Brown (10YR 5/2). firm, friable. undefined. dry. gradual. Stone: none Rootlets: none Rooting: none	Topsoil
0.80	0.20	0.28	0.88	0.60	SILT, clayey. Brown (10YR 4/3). stiff. undefined. dry. very sharp. Charcoal, ceramic Stone: none Rootlets: none Rooting: none	Holocene - Upper Alluvium / Warp / Sutton Sand
0.20	-1.38	0.88	2.46	1.58	PEAT, humified. Very Dark Brown (10YR 2/2). firm, friable. undefined. wet. gradual. Stone: none Rootlets: none Rooting: none	Holocene - Organic Deposits
-1.38	-3.85	2.46	4.93	2.47	SAND. Light Grey (10R 7/1). firm. homogenous. saturated. gradual. Stone: none Rootlets: none Rooting: none	Holocene - Lower Alluvium / Sutton Sand
-3.85	-4.58	4.93	5.66	0.73	CLAY, silty. Bluish Grey (10B 5/1). firm. undefined. moist. very sharp. Stone: none Rootlets: none Rooting: none	
-4.58	-4.92	5.66	6.00	0.34	SAND, silty. Reddish Brown (2.5YR 4/3). firm. bedded. saturated. undefined. Stone: none Rootlets: none Rooting: none	

Table 32 Deposit log for AOC53056_WS11

Intervention		Easting	Northing	Elevation		
AOC53056_WS11		486975.11	413335.23	0.303925		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.30	-0.28	0.00	0.58	0.58	Topsoil. Gradual boundary.	Topsoil
-0.28	-2.15	0.58	2.45	1.87	Dark brown humified PEAT. Bands of clayey peat. Woody. Large wood at 2-2.3m.	Holocene - Organic Deposits
-2.15	-2.23	2.45	2.53	0.08	Dark grey clay band. Peaty CLAY.	
-2.23	-3.04	2.53	3.34	0.81	Woody humified PEAT. Wet. Soft. Gradual boundary.	
-3.04	-4.70	3.34	5.00	1.66	Dark grey into like grey at 3.51. Upper part peaty SAND. Then SAND (fine to coarse) from 3.51m. Saturated. Hard/firm.	Holocene - Lower Alluvium / Sutton Sand

Table 33 Deposit log for AOC53056_WS12

Intervention		Easting	Northing	Elevation		
AOC53056_WS12		487059.72	413359.19	0.410388		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.41	-0.32	0.00	0.73	0.73	Topsoil. Sharp lower boundary.	Topsoil
-0.32	-1.09	0.73	1.50	0.77	Humified PEAT. Moderate rootlets. Friable. Very dark to dark brown. Areas of firmer peat with bedding. Dry. Void 1-1.5m.	Holocene - Organic Deposits
-1.09	-1.42	1.50	1.83	0.33	Very dark brown humified PEAT. Very sharp lower boundary. Compact and bedded from 1.77-1.83m.	
-1.42	-2.37	1.83	2.78	0.95	Mid blue-grey slightly silty SAND. Wet. Light grey lens near top (fine to medium) with some (coarse). Becomes yellow brown at c. 1.95m, and more equally fine to coarse (coarser). Sharp lower boundary. Wet. Saturated from 2.10m.	Holocene - Lower Alluvium / Sutton Sand
-2.37	-3.99	2.78	4.40	1.62	Firm. Wet. Light grey-brown, slightly silty SAND (fine to medium) with irregular black, organic-ish staining from the upper boundary. Black patches 3.6-3.7m. Drier 3.77-4m. Very gradual lower boundary.	
-3.99	-4.59	4.40	5.00	0.60	Stiff, wet. Blue-grey and red brown mottled silty CLAY. Small sandy patches and lenses.	

Table 34 Deposit log for AOC53056_WS13

Intervention		**Easting**	**Northing**	**Elevation**		
AOC53056_WS13		487176.15	413381.15	0.919248		
Top elevation (m OD)	**Base elevation (m OD)**	**Top depth (m bgl)**	**Base depth (m bgl)**	**Thickness (m)**	**Description**	**Interpretation**
0.92	-0.06	0.00	0.98	0.98	Topsoil (void to 0.5)	Topsoil
-0.06	-0.53	0.98	1.45	0.47	Very dark brown with moderate charcoal flecks and very occasional ceramic fragments. Occasional rootlets. Friable. Stiff. Dry. Mid to dark orange mottling. Humified PEAT. Moist patches at 1.35-1.43m	Holocene - Organic Deposits
-0.53	-0.66	1.45	1.58	0.13	Stiff mid brown and dark grey clayey SILT.	Holocene - Lower Alluvium / Sutton Sand
-0.66	-0.67	1.58	1.59	0.01	Organic SILT lens. Sandy (fine to coarse).	
-0.67	-3.08	1.59	4.00	2.41	Light grey with dark grey lenses becoming mid brown at 1.70m. Silty SAND (fine to coarse). Saturated from 1.70m. Becomes brownish grey gradually at c. 2.5m. Wet.	

Radiocarbon Dates

11.1 Viable material was sought from the assessed sequence for radiocarbon dating. Dates were sought in order to judge the sequences age in relation to associated archaeology and other deposit sequences in the vicinity of the site. Samples were sent to SUERC for AMS dating of, preferably, identifiable plant macrofossils. The resulting δ 13C confirms the samples are from terrestrial and not aquatic plants. Terrestrial trees and plants preferentially uptake lighter isotopes of carbon (resulting in a ratio of approximately -25‰ or -26‰) while relative enrichment of 12C takes place in freshwater and marine plants resulting in less negative values (-16‰ and -15‰ respectively). When dating terrestrial plant material, samples are corrected if the δ 13C deviates from *c*. -25‰The lab will make this correction.

11.2 The radiocarbon dating methods are fully detailed in the laboratory reports (Appendix B – Radiocarbon Dating Specialist Report). The results are summarised in Table 35 below.

Table 35 Summary of the results of radiocarbon dating

Sample/ material depth (m bgl)		Sample/ material elevation (m OD)		Sample / context	Lab code	Material / pre-treatment	$\delta^{13}C$ ratio (relative to VPDB)	Radiocarbon conventional age (BP)	Calendar calibration (95.4% probability)	Associated Period
Top	Base	Top	Base							
5.8	5.85	-2.89	-2.94	AOC53056_BH1	Beta - 655329	Ash round wood / acid-alkali-acid	-27.6	3330 +/- 30	1688 - 1517 cal BC (3637 - 3466 cal BP), 1729 - 1723 cal BC (3678 - 3672 cal BP)	Early Bronze Age
11.4	11.5	-8.49	-8.59	AOC53056_BH1	SUERC-108441 (GU63229)	Alder round wood / acid-alkali-acid	-30.0	6979 +/- 23	5977 - 5948 cal BC, 5919 - 5778 cal BC	Late Mesolithic
1.2	1.3	-0.29	-0.39	AOC53056_BH6	Beta - 655330	Alder round wood / acid-alkali-acid	-27.2	2850 +/- 30	1114 - 924 cal BC (3063 - 2873 cal BP)	Late Bronze Age
7.74	7.94	-6.83	-7.03	AOC53056_BH6	SUERC-108442 (GU63230)	Alder round wood / acid-alkali-acid	-29.3	6789 +/- 25	5725 - 5635 cal BC	Late Mesolithic
1.2	1.4	0.33	0.13	AOC53056_BH8	Beta - 650161	Willow Roundwood / acid-alkali-acid	-28.8	2460 +/- 30	671 - 452 cal BC (2620 - 2401 cal BP), 757 - 679 cal BC (2706 - 2628 cal BP), 446 - 416 cal BC (2395 - 2365 cal BP)	Early Iron Age

12 DEPOSIT MODEL

12.1 10 stratigraphic units have been identified across the site. These units are summarised in Table 36 below and listed in stratigraphic order from the oldest to the most recent. The vertical deposit succession is illustrated on the transect(s) drawn across the site (Figures 6-10). The major stratigraphic units are also represented by surface and/or thickness plots (Figure 11-37).

Table 36 Summary of identified stratigraphic units (subdivision of the Holocene based Walker et al., 2012)

Stratigraphic unit (facies)	Lithology/Description	Chronology	Environment of deposition
Mercia Mudstone Group	Mercia Mudstone is described by the BGS as predominantly red, less commonly green-grey, mudstones and subordinate siltstones, with presence of sandstones.	Triassic Period (approximately 201 to 252 million years ago)	Hot desert environments.
Pleistocene Glaciofluvial / Glaciolacustrine Deposits	Mostly sand and gravel with some finer-grained layers. Laminated clay, silt, and sand, with rare dropstones. Unfossiliferous. Resting directly on bedrock or underlain by basal glaciofluvial deposits.	Devensian (Late Pleistocene, *c.* 33,000 to 12,000 years ago)	Ice Age conditions. Meltwater stream deposits or Glacial lakes or ponds
Pleistocene Head	Clay, silt, sand, and gravel. Poorly sorted, poorly stratified.	Devensian (Late Pleistocene, *c.* 33,000 to 12,000 years ago)	Cold climatic stages. Subaerial slopes.
Sutton Sands	Predominantly sand. Medium to fine grained materials forming lenses, beds, and (locally) dunes.	Devensian (Late Pleistocene, *c.* 33,000 to 12,000 years ago)	Environment dominated by wind-blown (aeolian) deposits.
Lower alluvium	Clays, silts, sands, gravels, peats. Bedded.	Holocene (up to *c.*12,000 years ago)	Low lying fluvial and estuarine -temperate floodplain deposits.
Holocene organic deposits	Peat and organic clays, silts, and sands. Often interbedded with alluvium. Accumulated organic material forming beds and lenses.	Mid Holocene / Northgrippian (c 8,276 – 4,200 BP/ 6,326 – 2,250 BC) to Late Holocene / Meghalayan (c 4200 BP/2250 BC onwards)	Temperate wetland development within a floodplain environment.
Upper alluvium	Grey and yellow, sand/silt/clay, occasional gravel.	Late Holocene / Meghalayan (c 4,200 BP/ 2,250 BC onwards)	Representative of floodplain and intertidal mudflats, with additions from possible reworking of shingle or sand bank material.
Holocene Warp	Difficult to distinguish from alluvium – anthropogenic flood deposit.	Victorian to modern (up to *c.* 200 years ago)	Temperate floodplain deposits – anthropogenic – reclamation.
Possible Holocene Windblown Sands	Light brown to yellow silt and fine sand overlying the lower Holocene stratigraphy. Thin, inconsistent deposits.	Late Holocene / Meghalayan (c 4,200 BP/ 2,250 BC onwards)	Temperate environment dominated by wind-blow (aeolian) deposits

Made Ground	Mixed material, often containing modern construction materials and anthropogenic waste. Concrete often included. Sometimes includes redeposited material.	Victorian to modern (up to *c.* 200 years ago)	Anthropogenic - reclamation / agriculture.
Topsoil	Modern topsoil horizon, sealing the beneath stratigraphy.	Victorian to modern (up to *c.* 200 years ago)	Temperate terrestrial environment.

Mercia Mudstone Formation

12.2 Mercia Mudstone is the underlying bedrock within the investigation area. It was not encountered within the interventions from this phase of borehole evaluation. The unit is described as very stiff, dominantly red, less commonly green-grey mudstones and siltstones. It was not encountered in all parts of the study area due to the thickness of superficial deposits, thus the majority of the data is from 50 historic borehole logs and GI data.

12.3 Bedrock surface (Figure 14) was recorded between approximately -16 and -2m OD, with these upper values generally located toward the east and southeast of the study area (Zones 2 and 3). Within the northwest of the site, and within A1, mudstone is record at c. -16.5m OD (e.g. SOLAR21_IFABH5 and DS20-1405.01_CP102, Figure 7). There is an anomalous area of high mudstone recorded at BGS record SE81SE70 towards the centre of the study area but outside the western site boundary (Zone 2), which places the bedrock surface at approximately -4m OD, compared with -14.5m OD at SE81SE80 and c. -13.5m OD at SE81SE26 in the same vicinity. Bedrock was not encountered within the two nearest interventions to the east (SE81SE79 and SE81SE34) in order to compare, though these records extend to a greater depth without record of mudstone. This may indicate that either the data is erroneous, or that there is an isolated area of raised bedrock within the floodplain zone potentially indicating an area of high ground between eroded river channel paths.

12.4 There is no data representing the mudstone in the majority of the site (A2-4, and 6). There is a *c*. 0.5 to 1m thick band of stiff silty clay to clay recorded within the superficial lower alluvium/ Sutton Sand unit. This band is illustrated in Transect D (Figure 12), between deposits of sand. It extends across the floodplain within both Zone 1 and Zone 2, reaching into the south of A2 and the north of A3. The surface of this band is encountered at *c*. -6.5m OD in the west (AOC53056_BH7, Figure 9) and *c*. -4m OD in the east (AOC53056_WS12, Figure 9). This may represent the mudstone, but the clay is sandwiched between thick sand deposits of very similar lithology so confident identification is difficult especially considering the variation in elevation of the unit in the historic records to the west of the site and more recent records in A1. During the first phase of boreholes (AOC, 2022b) BH3 identified a similar unit from -5.79m OD as mudstone. OSL dating of the unit IN BH7 and WS10 is still forthcoming.

12.5 The clay band lies below what is interpreted as the surface of the mudstone bedrock through ERT investigations carried out on the site by Wessex Archaeology (2023b). Transect D (Figure 12) is situated approximately 120m to the north of ERT Transect 4 (Figure 44), entering the south of A2 and north of A3 in the west, and extending through Zone 1 and Zone 2. The surface of the mudstone is interpreted between approximately -1 and -3m OD, which is of greater correlation with the surface of the lower alluvium or Sutton Sands deposits than the stiff clay band.

Pleistocene Glaciofluvial / Glaciolacustrine Deposits

12.6 Identified among 8 records within the investigation (Zones 1, 2, and 3), the Pleistocene glaciofluvial / glaciolacustrine deposits comprise bedded sand, silt, and clay of varying coarseness. These were confined to northeastern part of the site (A4, with thickness (Figure 15) of up to approximately 3.5m at AOC_24864_MW8 (Zone 3). Archaeological evaluation trenching (Wessex Archaeology, 2023a) identified these deposits on the slopes and higher ground within the northern and eastern portions of A4, confirming their prominence in the north of Zone 2 and Zone 3.

12.7 The glaciofluvial / glaciolacustrine deposits represent periglacial meltwater streams, lakes, and ponds which were active as glaciers melted toward the end of the Pleistocene epoch. The identification of these deposits in A4 suggests one of these streams ran downhill from the higher elevations of the northeast of the site pooling here or running toward the main river channel. The presence of these deposits on the northeastern hill and its slopes is illustrated in Transects A and B (Figure 9, Figure 10). Transect A shows how the deposits have accumulated on the slope toward the southwest, with a surface elevation between approximately 4-4.3m OD. Elevation is similar in Transect B, in the direction of the modern river channel, with glaciofluvial deposits recorded at just over 4m OD on the slope.

12.8 Archaeological features have been recorded cut into the surface of this unit within A4, including 3 ditches (Trenches 11 and 14; Wessex Archaeology, 2023a), and a pit infilled with deposits of animal bone and silty sand (Trench 37; Wessex Archaeology, 2023a). These features are undated and sealed by 0.46m of topsoil.

Pleistocene Head

12.9 Head results from the downslope movement of waterlogged sediment initiated by meltwater (BGS, 2022), thus likely represents the reduction and eventual cessation of water transport within the meltwater streams with instead saturated ground losing stability.

12.10 Pleistocene head was identified across 8 locations within the northeastern part of the study area (Zones 1, 2, and 3), and overlay the glaciofluvial / glaciolacustrine deposits, with a thickness (Figure 16) of up to approximately 4.5m (SE81SE40). It is recorded as comprising poorly sorted gravel, sand, silt, clay, primarily orange-brown and reddish-brown in colour. These deposits were encountered within the northeastern-most extent of A4 during archaeological evaluation trenching (Wessex Archaeology, 2023a), corresponding with the steep slopes within Zone 2 and Zone 3. The work records cut features of a Post Medieval date on the surface of this unit (Trench 24).

12.11

12.12 The surface of the head and older deposits is represented in Figure 17, illustrating the possible land surface at c. 12,000 BP, though this will not be representative for the full area as the presence or extent of Sutton Sand / Mudstone has not been determined prior to the return of OSL dates. At present, the surface is identified between -17 to 12m OD, the highest of these values represented in the northeast where glaciofluvial and head deposits have been recorded. Much of the study area is represented by the lower values, particularly at the base of the northeastern slope, and to the east of the modern channel in the centre of the site. These lower areas likely represent regions of past active channel incision, and possibly a relict route further east in the central area.

12.13 Higher areas such as that in the southeast where the surface is recorded between approximately -

9 and -3.5m OD may indicate areas of dry land during the early Holocene, which would have provided access to riparian and wetland resources. The highest area in the northeast (*c*.10-12m OD) likely represents a stable dry land environment adjacent to the river, which may have been suited for more consistent human activity and settlement into the late prehistoric and onward. The extent of the slope is illustrated in Transects A and B (Figure 9, Figure 10), showing a steep decline from the northeast toward the floodplain and channel.

Sutton Sand / Lower Alluvium

12.14 Pending return of OSL sates to support interpretation, the deposits of sand, silt, and clay underlying Holocene organic deposits are presently represented as the single stratigraphic unit, 'Lower Alluvium / Sutton Sand'. The unit is described as generally grey to brownish grey and homogenous sand, silt, and clay, with some gradual colour variation with depth.

12.15 The deposits were identified across 135 of the locations, though the full depth was not reached across all of these. The recorded thickness of this deposit across the site is represented in Figure 18, and illustrates that it is generally thickest across the central area, and in the southeast, although this may be skewed by the depth reached among the interventions.

12.16 Figure 19 shows a higher resolution thickness plot focused on the northern part of the site, in the area of Transects A and B. The thickness is greatest closer to the current channel, reaching up to approximately 12m (Zone 1). This may suggest the deposit to be more likely alluvial (or involved alluvial reworking), although aeolian sediments may also have been dropped in the sheltered area at the base of the slope.

12.17 Toward the centre, within the broader floodplain, there is greater thickness illustrated (Figure 20) toward the southeast and south. The majority of these interventions did not reach through the deposits, however, which is likely reflected in the model.

12.18 A band of stiff, silty clay was present within this unit, represented in Transect D (Figure 12) from roughly -6.5 and -4m OD. The elevation of this band generally increased from west to east. This corresponds with the modelled mudstone bedrock elevation from the ERT survey carried out within this part of the site (Wessex Archaeology, 2023b; Figure 42 and Figure 43), suggesting this may be the deposit which resulted in this signal. Underlying this clay band, however, were deposits of grey sand akin to those overlying it, thus it has not been recorded as mudstone within the borehole investigation.

12.19 Results of OSL dating will aid in distinguishing these lower deposits in respective of the presence of Holocene alluvium, pre-Holocene Sutton Sand, and mudstone bedrock. OSL dates have been sought from the stiff clay in AOC53056_BH8 at *c*. -5m OD and/or AOC53056_WS10 at *c*. -4m OD, and the surface of the silty sand in AOC53056_BH7 at *c*. -5m or OD AOC53056_BH3 at c. -0.8m OD, and AOC53056_WS5 at *c*. -1.6m OD. These provided dates of XX

12.20 A topographic plot has been generated for this unit (Figure 21). It illustrates a surface elevation of between approximately -12 and 20m OD and may represent the landscape at the end of the Pleistocene (pending OSL dates). Depending on the outcome of the OSL dating Figure 14 or Figure 18 may represent the most accurate representation of the early Holocene topography. A roughly north-south aligned low region to the east of the modern channel (*c*. 1km beyond the south west of the site boundary) might represent a relict late Pleistocene or very early Holocene route of the river, with areas of higher surface to the east and an isolated area in the central west (SE81SW91) where elevation reaches up to *c*. 4m OD compared with between approximately -6 and -4m OD within the adjacent low area. The lower area, which may represent a relict channel, is located within Zone 1 and is outside the site boundary and any Development Area.

12.21 Figure 22 illustrates the surface in the northern part of the site (A1 and 4), in the area of Transects A and B. It illustrates at a higher resolution the steep slope between the northeast and the land adjacent to the modern river channel, as well as the shallower slope from the hill to the wider floodplain area to the southeast. In the far southwest (SE81SE21) the surface falls as low as *c*. -13.5m OD, though to the north adjacent to the channel this value is between approximately -7.5 and -6.5m OD. The broader floodplain is represented at a smaller scale in Figure 23 (A2 and northern part of A3), showing generally lower variation over this area. The highest elevations in this area are between approximately 1-1.5m OD, with much of the area recorded between *c*. -0.5 and -1.5m OD. Closer to the modern channel this value falls as low as *c*. -8m OD, following the trend of the below stratigraphy.

12.22 In Transects C and D (Figure 11 and Figure 12), the surface appears to undulate across the area, particularly in Transect D. This appears likely to represent the surface of the Sutton Sand deposit, which can present as dunes (BGS, 2022), though the pending OSL dates will confirm whether or not this is the case. Transect E (Figure 13) also illustrates some undulation in the southern part of the site, with the surface ranging between approximately -1 and 1.5m OD.

12.23 Three evaluation trenches (Trench 58, 118, and 124; Wessex Archaeology, 2023a) encountered archaeological remains on the surface of this unit, sealed by peat. Trench 118 (A3) records a Post-Medieval ditch feature 1.2m below ground level, however the thick (0.82m) overlying peat suggests the date to be earlier. The feature is dated as such due to its alignment with a mapped field boundary, however its situation beneath the thick peat would suggest the mapped field boundary to have potentially aligned with a ditch of possible ealier date. Further south within A3, Trench 124 records a large linear ditch also cut into the lower alluvium or Sutton Sand deposits, although the feature lies beneath deposits of peat and alluvium or Sutton Sand at a depth of 1.2m bgl. This ditch is presently undated. Trench 58 to the northeast within A6 records two features cut into the surface of the lower alluvium or Sutton Sand, at a depth of 1m bgl beneath peat. These features are undated.

Holocene Organic Deposits

12.24 Holocene organic deposits were identified at 126 locations across the study area. These deposits consisted primarily of humified, reedy, or woody peat, with some units of organic clay, sand, or silt. Minerogenic lenses were identified within some of the peat deposits, indicating periods of water influx.

12.25 A thickness plot for these deposits has been generated to show variation across the site (Figure 24). It illustrates that organic deposits are encountered with a greater thickness to the east of the modern channel, outside of A3 to the west. The distribution of these deposits follows a general north-south alignment.. This may reflect the distribution of the interventions, with fewer located to the west of the river, though directly east of the channel in the central area interventions recorded only up to approximately 0.5m of organics (SE81SW72, SE81SW26, SE81SW31). The thickest deposits are adjacent to the channel in the south (SE81SW34), where they reach up to approximately 11m in thickness.

12.26 The northern part of the site (A1 and 4) is illustrated in Figure 25, showing that here the thickest deposits are up to approximately 6.5m and also adjacent to the river channel. There is an abrupt reduction in thickness on the steep slope of the valley side, showing the extent of the historic wetland. This is further illustrated in Transect B (Figure 10).

12.27 Figure 26 shows the thickness of Holocene organics across the floodplain in the central area of the site (A2 and north of A3) and shows there is a significant difference between the north and south in this area. This is further evident in Transects C and D (Figure 11 and Figure 12), which illustrate that these deposits are present throughout the area, but thicker on Transect C, with generally between *c*. 2-5m and reaching up to *c*. 6.5m in the centre (AOC53056_BH6). This thick accumulation of organic deposits reflects a long period of vegetated wetland in this area. As such, it is suggestive of a stable source for wetland resources in the landscape which indicates a greater potential for archaeological remains associated with wetland exploitation (e.g. timber trackways and platforms) to be preserved within the deposits. This deep Holocene sequence is possibly represented in the ERT Transect 3b (Wessex Archaeology, 2023b; Figure 42) which is situated approximately 92m to the southeast. This indicates a possible creek feature running northwest to southeast through the north of A2. ERT Transect 3c (Wessex Archaeology, 2023b; Figure 43) indicates an area of thicker alluvium further towards the east, which is not reflected in Transect C (Figure 11). The discontinuous nature of such features may be indicative of a mosaic of wetland pools infilling lower surfaces beneath.

12.28 Across Transect D, the values are lower, more frequently recorded between 1-2.5m in thickness. These deposits within A2 and A3 have been encountered during excavation of trenches (Wessex Archaeology, 2023a), directly beneath the topsoil. Its thickness is approximately 0.1m. At the eastern extent of the floodplain at A6, the rising and thinning peat deposits illustrated by Transect C (Figure 11) were also encountered among archaeological evaluation trenches (Wessex Archaeology, 2023a). They directly underlie the topsoil and subsoil units, with an approximate thickness of 0.25m.

12.29 The southern part of A3 presents Holocene organic deposits of lesser thickness, generally only reaching up to approximately 1m (Figure 27). Transect E (Figure 13) also shows the thinner organic unit across the area. Up to 0.31m of peat was recorded in this area during archaeological evaluation trenching (Wessex Archaeology, 2023a).

12.30 A topographic plot of the organic deposits across the site has been generated (Figure 28). It shows that the surface was encountered between approximately -7.5 and 20m OD, the lowest elevations generally situated within close proximity of the river channel. Figure 29 shows this plot in the north (A1 and 4), illustrating a general levelling of the lower area with surface elevation generally between *c*. -1.5 and -0.5m OD, with the exception of the southwestern most point (SE81SE21) where the surface falls to *c*. -7m OD.

12.31 In the wider floodplain (Figure 30, A2 and north of A3) around Transects C and D, the surface of the organic deposits is generally recorded between approximately 0-2m OD, with the exception of the northwest where the surface falls as low as *c*. -6m OD (AOC53056_BH5). This is likely caused by proximity to the river channel, and the topography of the underlying geology. This, as well as the general levelling of the land surface, is illustrated in Transects C and D (Figure 11, Figure 12). Figure 31 illustrates the surface of this unit in the south of A3, which in conjunction with Transect E (Figure 13) shows it to range between approximately -1 and 2.5m OD.

12.32 Two C14 dates were obtained during previous works (WYAS, 2021) from this unit at intervention WYAS21_Tr12, suggesting a long period of peat formation in the south of A3. The earliest date, taken from humic material at 0.27m OD returned a late Mesolithic date range of 5670-5605 Cal BC (BETA592207). At 0.97m OD, a sample of *Maloideae* roundwood yielded a Neolithic date range of 2632-2469 Cal BC (BETA592205). These dates may translate to other nearby peat deposits and suggest the wetland to have been forming between the Late Mesolithic to Early Bronze Age periods. Plant and insect remains from the peat were found to be poorly preserved, though evidenced sedges and willow, indicative of waterside vegetation, and areas of heathland. Heathland was likely present upon the higher ground. The pollen assemblage indicated an environment dominated by trees and shrubs, primarily birch and pine. These features signify a marginal wetland setting, with seasonally fluctuating water levels.

12.33 Radiocarbon dates have been obtained from the peat deposits from A1 (AOC53056_BH1, -2.89 to -2.94m OD and -8.49 to -8.59m OD), A2 (AOC53056_BH6, -0.29 to -0.39m OD and -6.83 to -7.03m OD), and north of A3 (AOC503056_BH8, 0.13 to 0.33m OD).

12.34 Material sampled from the organic sequence within A1 (AOC53056_BH1) suggest a prolonged period of Holocene wetland conditions in the area. The lowermost sample (-8.49 to -8.59m OD) yielded dates suggestive of Late Mesolithic peat formation (SUERC-108441 (GU63229), 5977-5778 cal BC, Table 35). Material taken from the upper organic sequence (-2.94 to -2.89m OD) indicate an Early Bronze Age formation date (Beta – 655329, 1729-1517 cal BC, Table 35).

12.35 Within A2 (AOC53056_BH6), two samples were taken from upper and lower organic sequence. Toward the base (-6.83 to -7.03 m OD), radiocarbon results indicate deposition to have taken place within the Late Mesolithic period (SUERC-108442 (GU63230), 5725-5635 cal BC, Table 35). Radiocarbon dating carried out on a sample from the upper organic sequence returned a date range within the Late Bronze Age period (Beta – 655330, 1114-924 cal BC, Table 35).

12.36 The latest dates obtained came from the sample taken to the north of A3 (AOC53056_BH8, 0.33 to 0.13m OD), between Lysaght's Drain and Ferry Road West, which indicates a depositional phase within the Early Iron Age period (757-416 cal BC, 2460+/-30 cal BP, Table 35).

12.37 Overall, the radiocarbon dates indicate a long-standing period of wetland environment across the site in A1-3, which lasted throughout the majority of the late prehistoric period from the Late Mesolithic to the Early Iron Age.

12.38 A continuing rise in relative sea level (RSL) then resulted in inundation, signified by the minerogenic deposits sealing the peats.

12.39 During the Mesolithic, much of the area is likely to have been a floodplain to wetland environment, either characterised by the development of vegetated wetland (i.e. organic deposits) or by seasonal overbank flooding (i.e. the clay alluvium). The presence, incidence, and longevity of either vegetated wetland or overbank deposits appears to have been relatively changeable across the area, and dependant on local hydrology / topography. Therefore, Mesolithic peats appear nearer to the modern river and may or may not have formed in other parts of the landscape. Likewise, later prehistoric organic deposits appear to have formed at higher elevations near to the modern river as well as slightly further from it, again dependant on variations in local hydrology and topography. Any areas where early prehistoric or late prehistoric organic deposits are not recorded instead likely indicates the dominance of overbank flooding. There is a slight possibility that these organic deposits have been eroded by higher energy processes, however there is little evidence of high energy fluvial activity to explain such erosion.

12.40

Upper Alluvium / Warp

12.41 Overlying the Holocene organic unit are deposits of clay, silt, and sand. As it is difficult to distinguish between naturally accumulating alluvium and anthropogenically instigated flood deposits of warp, the unit is modelled as one under 'Upper Alluvium / Warp'.

12.42 The thickness of these deposits across the study area is illustrated in Figure 32. The deposits are shown to be thickest in the north, west, and east, with lesser deposits generally where the surface of the organics beneath are higher. The thickest deposits recorded are of approximately 10.5m in the A2 (SE81SE21), and 9.5m beyond the western site boundary (SE81SW26). Both are adjacent to the modern channel.

12.43 Figure 33 shows the thickness of these deposits in A1 and 4. It illustrates the accumulation of alluvium or warp adjacent to the river channel, and the reduction in thickness toward the valley slope at the northeast. It is also evident that there is an area of thicker alluvium or warp to the southeast of the slope. This area is highlighted in Transect A (Figure 9) and may represent a low-lying area which was more consistently waterlogged than the adjacent areas within which peat formed, most likely a pool forming part of the wetland mosaic landscape. Two of the locations (SE81SE43, SE81SE45) record pockets of peat within the clayey sand units, which is likely accumulation from the adjacent peat deposits where it has fallen into these wetter areas. The site boundary encompasses SE81SE44 and SE81SE45. Another such pool is indicated on ERT Transect 3c (Wessex Archaeology, 2023b; Figure 43). This may represent a similar feature to the west of A6.

12.44 Upper alluvium or warp thickness for the wider floodplain (A2 and north of 3) in Transects C and D is shown in Figure 34. Across the majority of the area thickness is of up to 1m, with the exception of the west, closer to the channel, where it reaches 8m (AOC53056_BH5, A2) and an area in the east where thickness is approximately 4.5m. Transects C and D (Figure 11, Figure 12) show that although the unit is generally quite thin in this area, there is an overall decrease from west to east following change in the underlying surface. Interventions furthest east in transects C and D did not record any of these deposits overlying the organics, beyond A2 and the north of A3 and in the vicinity of A6.

12.45 The trend of thicker alluvium to the west is not illustrated in ERT Transect 3a (Wessex Archaeology, 2023b; Figure 42 and 43) to the same extent as the borehole survey Transect C (Figure 11). However, the ERT results suggest a more gradual thinning of alluvium towards the east, indicating that the lower alluvium or Sutton Sand recorded underlying peat is more likely to be alluvium. The nature of this deposit will be confirmed upon return of OSL dating results.

12.46 Toward the south of A3, thickness ranges from approximately 0-4m (Figure 35), thicker where it overlies lower organic surfaces as illustrated by Transect E (Figure 13). Generally, the thickness of the deposits within the site is approximately 1-2m.

12.47 A topographic plot for this unit is represented in Figure 36. The surface elevation is shown to range between approximately -2 to 20m OD, the highest of these values being in the northeast (A4), as with the underlying units. Across much of the study area recorded surface elevations are between *c*. 0-3m OD.

12.48 In the northern area (Figure 37, A4) the surface was encountered generally between approximately 2.5 and 4m OD, though in the southeastern area this fell to *c*. 1-2m OD on average. A small area of reduced elevation was recorded close to the river channel (AOC_25864_TP26, TLP_25864_BH5, A1) to the west, where this unit was encountered at *c*. 1.5-2m OD. This is likely representative of modern truncation, due to the difference from the adjacent records.

12.49 In A2 and the north of 3, little variation is seen in the topographic plot (Figure 38). The surface is mapped mostly between *c*. 0-2m OD, with isolated areas in which it was encountered higher at up to approximately 3m OD.

12.50 In the south of A3 (Figure 39) elevation of this unit was recorded between *c*. 1-2.5m OD, with lower values generally to the southwest.

12.51 Archaeological evaluation trenching carried out by Wessex Archaeology (2023a) excavated to this upper alluvium surface in the northwestern part of A4, concurrent with the modelled deposits for this area of Zone 1. Within A2 and the northern part of A3 across the boundary between Zones 1 and 2, the evaluation trenches revealed variable deposits including an alluvial unit of light grey-brown silty clays and coarser deposits of light yellow-brown silty sand. Trenches in the south of A3 recorded thinner alluvial deposits underlying the topsoil, as expected within the Zone 2.

12.52 The majority of archaeological features identified during evaluation trenching were recorded cut into this unit (Wessex Archaeology, 2023a). This includes a Post Medieval furrow and hedgerow, as well as an undated gully and pit, recorded in Trench 155 (A3) towards the centre of the site within Zone 2. Undated features were also recorded at the surface of this unit in A4 (Trench 7), A2 (Trench 209), and elsewhere within A3 (Trenches 101, 102, 103, 115, 116, 153, 154).

12.53 At the upper facie of this unit, directly beneath the topsoil, among some locations a thin deposit of fine, generally yellow to brown, clayey to sandy silt. It is probable that this deposit represents Holocene aeolian sediments, however due to its sparsity they are combined with the upper alluvium and warp unit for modelling. The majority of these deposits were recorded at the base of the escarpment, within Zone 2.

Topsoil and Made Ground

12.54 Topsoil and made ground sealed the alluvial, organic, and Pleistocene deposits across the Site. Made ground was primary identified adjacent to the river outside of the site to the west, south, and within the Flixborough Estate (A1) in the north. Thickness of these deposits reached up to 3.5m (Figure 40), though was recorded generally below 1.5m within the site boundary.

12.55 Topsoil was often described as ploughsoil from ongoing agricultural practices. Among many of the interventions the ploughsoil was underlain with a thin subsoil, suggesting ploughing to not have disturbed the underlying sequence to a significant degree. This was the case particularly in the area of Transects C and D.

12.56 The greater thickness of the made ground deposits in the north (A1) suggest it is likely there has been significant post-medieval make up and modern truncation in this area.

Deposit Model Reliability and Limitations

12.57 182 borehole records were included to generate the deposit models, covering the majority of the area. They are sufficiently spaced and detailed enough to produce high resolution transects across different parts of the site, and to contribute to reliable topographic and thickness plots for each unit. Some areas, particularly adjacent to the A1077 road through the centre of the site boundary, were not as well covered. These areas however showed little variation in the models produced, so are likely to be accurate regardless.

12.58 The lower stratigraphy, such as the mudstone bedrock, may not have been reached in all interventions. However, for the purposes of the investigation depth was sufficient for producing models of stratigraphic units with archaeological and palaeoenvironmental potential.

12.59 Overall, the models can be regarded with a high degree of confidence for interpretation of potential across the site.

13 ARCHAEOLOGICAL AND PALAEOENVIRONMENTAL POTENTIAL

Wider context

13.1 The breadth of the area across which the models extend provides significant insight into how the landscape may have changed over time in this part of the lower Trent Valley. Samples from the site have potential to enhance the understanding of the development of wetlands and the patterns of human activity and occupation.

13.2 Dating (radiocarbon and OSL) and palaeoenvironmental assessment will help to build on previous work in the area, which includes radiocarbon dating and pollen assessment from the southern part of the site at Brumby Common (Zone 2).

13.3 Work in the area (see section 6 Geoarchaeological and Palaeoenvironmental Background) has revealed extensive sequences of alluvial and organic sediments. Investigations at Flixborough Grange, to the north of the site (Smith and Lillie 2008, Lillie and Bunting 2016), recorded organic deposits on the eastern margins of the floodplain, similar to that recorded in A2 and A3 but in proximity to that recorded in A1, they were interpreted as either channel abandonment and infilling, or floodplain margin deposits (mire) but paleoenvironmental investigation (diatom and pollen) could not determine the precise nature of their formation.

13.4 Local to Flixborough Stather in the northern part of the NLGEP site (A1), GI boreholes carried out by Ian Farmer Associates (2018) identified alternating peat and fine grained organic to minerogenic sediments to a depth of 11.70 to 12.30mbgl. Geoarchaeological boreholes in the area obtained samples and radiocarbon dates, acquired from samples of AOC53056_BH1 (Table 35), within the northern part of the NLGEP site (A1), and identified a period of organic accumulation spanning from the Late Mesolithic to the Early Bronze Age between 11.5mbgl (-8.59m OD) and 5.8m bgl (-2,89m OD). It is likely that the peats on the NLGEP site recorded in A1 and Zone 2/3 represent contemporary environments to that recorded in the north at Flixborough Grange and could provide a more informative sequence for palaeoenvironmental assessment than the latter formally produced. In addition, the long chronological and physical deposit sequence (*c*. 10-20m) in this location could provide a much-needed paleoenvironmental record to compare and link up with other notable records from the region. For example, the palynological and entomological record at Bole Ings, which tracked the changing components of Alnus (Alder) and Corylus (Hazel) as waterlogging altered (Brayshay and Dinnin 1999, 119); Also recorded in the region are alternating marine and freshwater deposits as far upstream as Gainsborough, with Neolithic woodland stabilisation (Knight and Howard 2004, 31; Lillie and Neumann 1998); It may also provide additional context for the wider findings of the Humber Wetlands Project (Lillie 1998).

13.5 Toward the southern end of the site and within A3, archaeological evaluation trenching at Brumby Common (WYAS, 2021) identified peat deposits which upon sampling indicated that preservation of pollen was of generally good quality but low diversity, which is likely to be similar across the NLGEP samples in this area. Plant macrofossil remains were abundant to frequent from all samples, and indicative of a wet environment. Assessment of insect remains revealed low quality and low to moderate frequency in their preservation. Palaeoenvironmental remains elsewhere within this part of the NLGEP site, A3 (AOC53056_BH4), are likely to be of similar quality and preservation, and yield similar results.

13.6 The dates returned for the peat samples at Brumby Common indicated an earlier period of peat development, within the Early Mesolithic Period (7194-7226 cal BC, WYAS 2021:10). The youngest peat deposits were found to have formed within the Early Bronze Age period (2201-1983 cal BC, WYAS 2021:11), which also predates the most recent peat horizons identified within the NLGEP site with an Early Iron Age date (Table 35). The investigation indicated that peat formed at different times in different places, perhaps suggesting a variable topography and hydrological environment in the landscape. Due to the overlapping site boundary and similarity in radiocarbon dates obtained, it is likely that comparable results would be shown from palaeoenvironmental assessment. There is potential for assessment of upper units to extend the narrative of prehistoric environmental development, and to compare the development further north with that identified at Brumby Common.

13.7 It is most likely that varied underlying topography and hydrology throughout the prehistoric periods led to formation of peat in different areas at different times, resulting in organic deposits of different ages in these different areas. Mesolithic organic deposits are most likely to have formed closer to the modern channel, and among lower elevations. Later peat deposits are more likely to be spread more at higher elevations and further from the modern river due to the levelling of the landscape as minerogenic deposits accumulated.

Realisation of the Research Aims

13.8 Drawing on the results presented in section 10, the following is concluded in relation to the evaluation aims, objectives and research questions detailed in section 8:

- RQ1: What does the deposit sequence on the site reveal about the landscape evolution of the site and the River Trent, especially in relation to previous investigations?
  - The sequence confirms that remains relating to a possible periglacial lake feature survive in A4, overlain by the downslope transport of waterlogged material under gravity and causing an accumulation of head.
  - Models of the lower stratigraphy also suggest a Pleistocene to early Holocene N-S channel to have been located *c*. 1km beyond the southeast of the site boundary (Zone 3) during the Pleistocene to Holocene transition, due to the distribution of lower alluvium / Sutton Sand deposits. This could also explain the areas of lower Holocene organic and alluvium surfaces beyond the east of the site boundary, specifically the south of A3, with the development of vegetated wetland and pools of water in the low

lying region of the relict channel upon cessation of flow. These deposits lie to the east of peat deposits sampled in previous investigations (WYAS, 2021), perhaps indicating a significant eastward extension of the same vegetated wetland environment.

- There is evidence of significant wetland across the lower-lying land adjacent to the river, in the form of thick peat and other organic deposits (*c*. -2 to -9m OD), particularly to the east of the modern channel (A1). Dates from previous work (WYAS, 2021) suggest those in the south of A3 (Transect E) to be Late Mesolithic to Early Bronze Age in date. These peat deposits were slightly further from the modern river, thinner than those identified further north (A1), and encountered between roughly 0.27-1.5m OD. In the north of the site (A2 and northern part of 3) where core samples have been obtained, peat was identified between *c*. -7.5 and 1.2m OD. Assessment of the samples from A1 and A2 has potential to expand the understanding of these organic accumulations, and as such enhance the interpretation of local and broader environment and climate reconstructions.

- OSL dates are yet to be returned for the lower alluvium / Sutton sand deposits to determine their age and origin.

* RQ2: How do the deposits recorded within the site relate to each other and how do they contribute to our understanding of the landscape evolution of the project area?

  - Tertiary bedrock of Mercia mudstone underlies the site, with a surface between approximately -16 and -2m OD.

  - This unit is overlain by Pleistocene glaciofluvial deposits in the north, and Sutton Sand or lower alluvium across the rest of the lower study area. The glaciofluvial / glaciolacustrine deposits are overlain with Pleistocene head on the hillslopes of the northeast. They suggest the higher elevations to have been impacted most by higher energy periglacial action. If OSL results prove the silty sands to be the pre-Holocene Sutton Sand, this would suggest the floodplain area to have been exposed and dry for a long period, allowing for the accumulation of aeolian sediment. If indicated to be a lower alluvial deposit, it would suggest a floodplain of a wide, shallow, and potentially braided river channel with relatively high velocity existed prior to the discontinuation of fluvial activity and subsequent development of wetland.

  - The lower alluvium / Sutton Sand deposits are overlain with Holocene organics, primarily peat. The peat infills much of the lower surface of the underlying sands. The organics vary in thickness but are shown to have a relatively level surface. They suggest a long, stable period throughout which the landscape was dominated by wetland environments.

  - In the east, the organics are a times directly overlain with topsoil, though alluvium or warp seals much of the organic unit elsewhere and is generally thickest toward the river. The alluvium or warp is generally of finer fabric than the lower alluvium / Sutton Sand, reflecting a lower energy depositional environment.

  - Topsoil seals the site. Made ground is identified to the north in the Flixborough Industrial Estate and adjacent to the roads throughout, as well as across the southernmost area. It truncates earlier deposits.

* RQ3: How does the character, extent, and scientific dating of organic horizons compare to those located in the vicinity of the site and do any samples retained have further potential for scientific dating (radiocarbon or OSL) and contributing to the project wide chronology?

  - Organic horizons sampled within the borehole interventions have been radiocarbon dated. The dates returned reveal a long period of accumulation ranging between the Late Mesolithic to the Early Iron Age (Table 35). This suggests a significant portion of the later prehistoric period is likely to be represented in the sequence, with potential for palaeoenvironmental remains capturing the environmental conditions and development as well as archaeological remains associated with wetland and riparian environs.

- OSL dating is currently being carried out on coarser grained sediments underlying the organic unit to determine their age and to the sands above and below the stiff clay band represented in Transect D.

• RQ4: Can greater differentiation in the warp/alluvial/windblown deposits be ascertained, by character, date or depositional context?

- Differentiation between lower Holocene alluvial and Pleistocene aeolian (Sutton Sand) deposits is to be achieved through the forthcoming OSL dating, the results of which are pending.

- In terms of lithology, warp is indistinguishable from any other deposits laid down by fluvial or estuarine processes. BGS records suggest warp to have been deposited to the west of the channel, and within the floodplain between the river and Scunthorpe, the northern areas toward Flixborough are mapped as alluvium. There is no clear lithological differentiation between the upper alluvium / warp deposits recorded between these two areas, thus it has not been possible to further distinguish these deposits. Archaeological evidence of man-made warping processes such as warping drains and channels, sluices etc. is thus important alongside the historical records in order to identify these deposits.

• RQ5: Can the palaeoenvironmental sequences sampled provide any further information about past channel routes or wetland onsite?

- Specialist palaeoenvironmental assessment of the Holocene organic deposits sampled during the investigation would contribute to understanding of the vegetation types which were present in the wetland, as well as potential changes to the environment over time. Their thickness and depth present an opportunity for comprehensive palaeoenvironmental assessment to potentially provide significant improvement to the understanding of the local, and broader, landscapes.

- Assessment of proxies such as diatoms and ostracods could reveal detail on the salinity, flow, and depth of any water in this environment, which would reveal short-lived wetland pools, creeks, and the extent of estuarine influx on the wetland. This would likely be applicable only to standing water within the wetland, as no long-lived Holocene palaeochannels have been identified within the site. Although no palaeochannels have been identified within the study area, there is evidence of a series of seemingly disconnected pools infilled with thick alluvium or organic deposits. These may infill low lying regions left in the landscape by a former Pleistocene channel or lake.

• RQ6: Can the ERT data provided any further information about past channel routes or wetland onsite?

- The June 2022 ERT (pers. comm. Wessex Archaeology) data does not show further evidence of channel routes. Most variation shown in the transects is within the upper 1-2m, and likely represents the fluctuating interface between the Holocene organic deposits and lower alluvium / Sutton Sand, and the upper interface between the upper alluvium / warp and the Holocene organic deposits.

- ERT Transect 3b (Wessex Archaeology, 2023b) shows an anomaly within the marked alluvium at c. 192m, which roughly aligns with an area of deep peat recorded in the borehole transect. This is unlikely to represent a significant channel, but more likely a wetland pool or short-lived creek forming part of the wetland landscape. The depth of this anomaly reaches approximately -7m OD, which is close to the *c*. -6.5m OD base of the deep peat recorded 92m to the northeast in AOC53056_BH6. The proximity of these records and their dimensions suggest a possible infilled creek.

Archaeological Potential and Significance

13.9 Based on distribution and character of the deposit sequence, as identified in the deposit model, and illustrated in the figures, areas of archaeological and palaeoenvironmental potential have been mapped for the site. These are shown on Figure 2 and the differing character and potential of each area is outlined in Table 20. The table also details which Development Areas fall within those zones where new works have been undertaken, specifically A1, A2, A3, A4 and A6. The understanding of the deposit distribution and chronostratigraphy has been refined by the radiocarbon dating, with OSL dates still forthcoming, but broadly the information has not changed significantly since the previous deposit model (AOC, 2021) or the interim report (AOC, 2022b).

Table 37 Archaeological and palaeoenvironmental potential of zones within the site (modified from AOC, 2022b)

Zone	Character of area	Archaeological potential	Palaeoenvironmental Potential
1	Applies to the site and to the west (A1, A2, parts of A3 and a small part of A4) Immediately east of the modern channel of the river Trent. Deep Holocene sequences of peat and alluvium. A broad section of the floodplain. A1 lies entirely within Zone 1.	Applies to the site and to the west (A1, A2, parts of A3, and a small part of A4) There is potential for evidence of early prehistoric activity and remains (e.g. flint scatters, wooden boats, remains of fire), buried beneath the thick Holocene sequences and heavily reworked by fluvial processes. Given the dates returned form the Holocene organic deposits in this area, there is potential for the recovery of structures and artefacts associated with wetland activities. These types of remains may include trackways used for navigating wetlands and have been identified in association with Bronze Age activity elsewhere, which has been evidenced to be prevalent in the local landscape. Prior to warping and drainage schemes from the 17th Century onwards, this	Applies to the site and to the west (A1, A2, parts of A3, and a small part of A4) Lower bedrock and Pleistocene deposit surfaces in this zone have resulted in accumulation of thick Holocene alluvial and organic deposits. Lower alluvium / Sutton Sand reaches *c*. 15m here. Organic deposits, generally peat, reach up to *c*. 11m in thickness in this Zone, and have been dated to the Late Mesolithic to Early Iron Age (Table 35). Upper alluvium / warp is also thickest in this zone, reaching up to *c*. 10.5m. Organic deposits may indicate short-term stabilisation and wetland developments and may provide context for human

Zone	Character of area	Archaeological potential	Palaeoenvironmental Potential
	A2 is almost entirely within Zone 1. The northwestern-most part of A3 is within Zone 1. The northwestern part of A4 is within Zone 1. The Landscape area north of A1 is within Zone 1 The Landscape area east of A2/west of Zone 2 is within Zone 1	Zone would have been waterlogged and intermittently flooded throughout the year, rendering it unusable for agricultural practices. It is unlikely that there will be significant occupation remains in this Zone, although medieval and post-medieval riverside activity at Flixborough Stathe (at the site of the ERF plant) is known to have occurred.	activity and landscape evolution. Palaeoenvironmental assessment of proxies including pollen, diatoms, ostracods, from these deposits could reveal the typology of vegetation locally and in the broader region, as well as details on water quality. This information can contribute to an understanding of human activity and occupation locally, identifying signs of agriculture and deforestation. The thickness and dates obtained for the deposits indicate that a number of prehistoric periods may be represented within the sequence, and this may provide a comprehensive chronostratigraphy for reconstructing the palaeoenvironmental conditions on site which could contribute to regional records and reconstructions.
2	Applies to the site and outside to the west and east (A3, A4, part of A5) Extends from Zone 1 in the west to the west-facing slopes of Zone 3 in the east. Within the floodplain but	Applies to the site and outside to the west and east (A3, A4, part of A5) Significant archaeological remains may be found within this zone. This zone covers the edge of the floodplain to the base of the valley slopes, which would likely have been suited to occupation in the Neolithic and Bronze Age periods, and perhaps seasonal occupation during later periods. Cropmark sites have been identified to the west of the Foxhills Industrial Estate, which may be late prehistoric or Roman in date.	Applies to the site and outside to the west and east (A3, A4, part of A5) Palaeoenvironmental potential is high, with evidence of wetland extension into this zone including peat deposits and infilled wetland ponds. Potential is comparable if less significant to Zone 1 and may provide some limited further understanding of the development and spread of the wetland and human landscape through time and on

Zone	Character of area	Archaeological potential	Palaeoenvironmental Potential
	presenting thinner Holocene sequences than in Zone 1. Organic deposits have been recorded. Parts of A4 are within Zone 2 in the north. A3 is almost exclusively within Zone 2, throughout the length of the site. The westernmost extent of A5 is within Zone 2. The Landscape area north of A4 is within Zone 2 The Landscape area between A2/A3 and Zone 3 is within Zone 2	Historically much of this land was uncultivated and unenclosed common land, including Brumby Common at the southern end of the site.	the dryland margin.
3	Applies to the site and outside to the east (A4, A5, A6) Zone 3 encompasses the west-facing slopes to the east of the river	Applies to the site and outside to the east (A4, A5, A6) Significant multi-period remains have been identified on the slopes, including remains of Neolithic, Bronze Age, Iron Age, and Roman date at the sand and gravel quarry at Willow Halt, and the mid-late Anglo-Saxon settlement at Flixborough.	Applies to the site and outside to the east (A4, A5, A6) Only deeper Holocene sequences within this zone, particularly around A4 and A6, may be well preserved and suitable for palaeoenvironmental assessment in a comparable, if less significant way to Zone 1,

Zone	Character of area	Archaeological potential	Palaeoenvironmental Potential
	Trent floodplain. Most of A4 is located within Zone 3. A6 is in Zone 3. Much of A5 is within Zone 3, or extending further east away from the floodplain. The Landscape area northeast of A4 is within Zone 3	Archaeological evaluation trenching (Wessex Archaeology, 2023a) identified post-medieval cut features within this zone (A4).	but may not provide much added benefit to that obtained from Zone 1

14 CONCLUSIONS AND RECOMMENDATIONS

14.1 The following section reviews the significance of the results of the geoarchaeological borehole evaluation in relation to the development and makes recommendations for an appropriate geoarchaeological and palaeoenvironmental mitigation strategy.

14.2 All development areas within the site will require excavations of varying extent and depth. There may be additional impacts from landscaping.

14.3 Although difficult to ascertain with certainty, the nature of the deposits observed suggests any archaeological remains will most likely be identified within Zones 2 and 3 and reflect multi-period occupation in the local area. For Zone 1 the main potential is for Mesolithic to Neolithic activity and remains (e.g. flint scatters, wooden boats, fire), deeply buried and heavily reworked by fluvial processes. Similar remains in Zone 2 are likely to date to the Bronze Age or Iron Age and underlie the thinner upper alluvium / warp (from *c*. 1-2m bgl and 0-2m OD), whereas those in Zone 3 may extend from the same period through to the medieval based on other findings locally and survive at a shallower depth (from 1-2m bgl and 1m OD).

14.4 The impact on these remains could be adequately mitigated by a programme of archaeological evaluation trenching focusing on Zones 2 and 3 where archaeological remains are likely to be nearer to the modern surface and impacted by development works. Trenching is already completed, and reported in a separate document (Wessex Archaeology 2023a). Standard 1.2m evaluation trenches will likely reach these deposits within most of Zones 2 and 3, although stepping may be required in some areas.

14.5 The impact on the palaeoenvironmental potential could be adequately mitigated by a programme of specialist analysis on the cored samples already obtained. The nature of the deposits observed suggests better preservation of paleoenvironmental remains within zone 1, potentially reducing slightly in 2, and reducing further in parts of Zone 3. The latter being comparable in landscape position to previous work in the South of A3, at Brumby Cross (WYAS, 2021). The wetland peat formations of Zones 1 and 2, identified throughout most of the site (Excluding the east of A4), most likely relate to the mosaic environment of vegetated wetland, and short-lived creeks and pools, as evidenced to the north of Flixborough at Flixborough Grange (Smith and Lillie, 2008). These features represent a long period of landscape change through the Holocene, with peat development mirroring changing topography and hydrology. Deeper stratigraphy of creeks and pools, particularly those deposits of well-developed peat and organic sequences, provide potential for long, high resolution records of palaeoenvironmental material suitable for palaeoenvironmental reconstruction and radiocarbon dating. Such a feature may have been recorded in AOC53056_BH2 within Zone 2, and in the eastern part of A2.

14.6 The appropriate mitigation strategy for the site will be discussed and agreed with the Local Authority and their archaeological advisors.

15 UPDATED PROJECT DESIGN

15.1 Preliminary recommended further work on this project (in the absence of the forthcoming OSL dates) includes palaeoenvironmental investigation to improve the understanding of local environmental change and landscape development, and to give archaeological remains a wider context to help to understand the land uses and relationships between people and their environment. As well as placing both in a broader regional context.

15.2 The aims of this further work will be:

- To interpret the interaction and impact between RSL/landscape change and the known prehistoric to Roman occupation of the local area already evidenced, and any further finding from ongoing trenching work
- To identify local and regional vegetation changes throughout the Holocene
- To further the chronological understanding of sediment accumulation and landscape change in the Trent Valley
- To further the chronological understanding of sediment accumulation and landscape change in the broader Humber Wetlands
- To compare the palaeoenvironmental findings from the site to other records from the Trent Valley and wider Humber Wetlands region.
- To look at the potential for the palaeoenvironmental information to enable further analysis and publication, possibly through interactive online media (such as an Esri Story Map) in order to publicise and contextualise the findings for the local community in respect to placing the site within a long running riverine history and to tie into wider national research concerning RSL change and also public issues concerning climate change and climate protection.

15.3 Recommendations for the deposit sequences include palaeoenvironmental assessment of samples from BH01 in A1 (e.g. 12no pollen, ostracod and diatom) and two locations across A2/ the north of Zone 2 (e.g. 8no and 6no pollen, ostracod and diatom from BH06 and WS5) to further understand environmental change during the Holocene.

15.4 The palaeoenvironmental assessment will be undertaken alongside additional radiocarbon dates and possibly OSL dates. Included in this will be seeking further organic sample points and possibly plant macrofossils to provide additional radiocarbon dates for the sequences to be investigated and to more precisely place any findings within the wider chronology for the site and region.

15.5 Further documentary research will be carried out in order to place the site into a more detailed and complete regional context and compare its features and findings with those from other sites. Of particular importance is to compare the sequence with the known archaeological activity already recorded within the site, but also with results from the wide Trent Valley. Map regression will aid in relating the more recent historical riverine and landscape history to the more ancient site and regional context.

15.6 The archive will be transferred to an appropriate local museum. The digital archive will also be lodged with the Archaeological Data Service (ADS). Both the physical and digital archive will be available for public consultation in a project archive repository compatible with other archaeological archives in the county.

15.7 The further work to be undertaken is outlined in the Table of Recommendations (Table 38, below).

Table 38: Table of Recommendations

Task	Description	Resource	Item/Days
General			
1.1	Project Management and editing	Project Manager	3
Assessment			
2.1	Subsampling and liaison with external specialists	Geoarchaeologist	3
2.2	Pollen assessment	External	26
2.3	Diatom assessment	External	26
2.4	Ostracods assessment	External	26
2.5	Plant macro fossil assessment	Environmental Archaeologist	4
2.7	Radiocarbon dating	External	2
Report			
3.1	Map regression	Geoarchaeologist	2
3.2	Palaeoenvironmental research	Geoarchaeologist	2
3.3	Integration of specialist data	Geoarchaeologist	1.5
3.4	Report / contribution / updated deposit model text	Geoarchaeologist	2
3.5	Figure preparation	Geoarchaeologist	1
3.6	Data archiving, excel, and layer package	Geoarchaeologist	1
3.7	ADS deposition	External	1

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Figure 1: Site Location Map

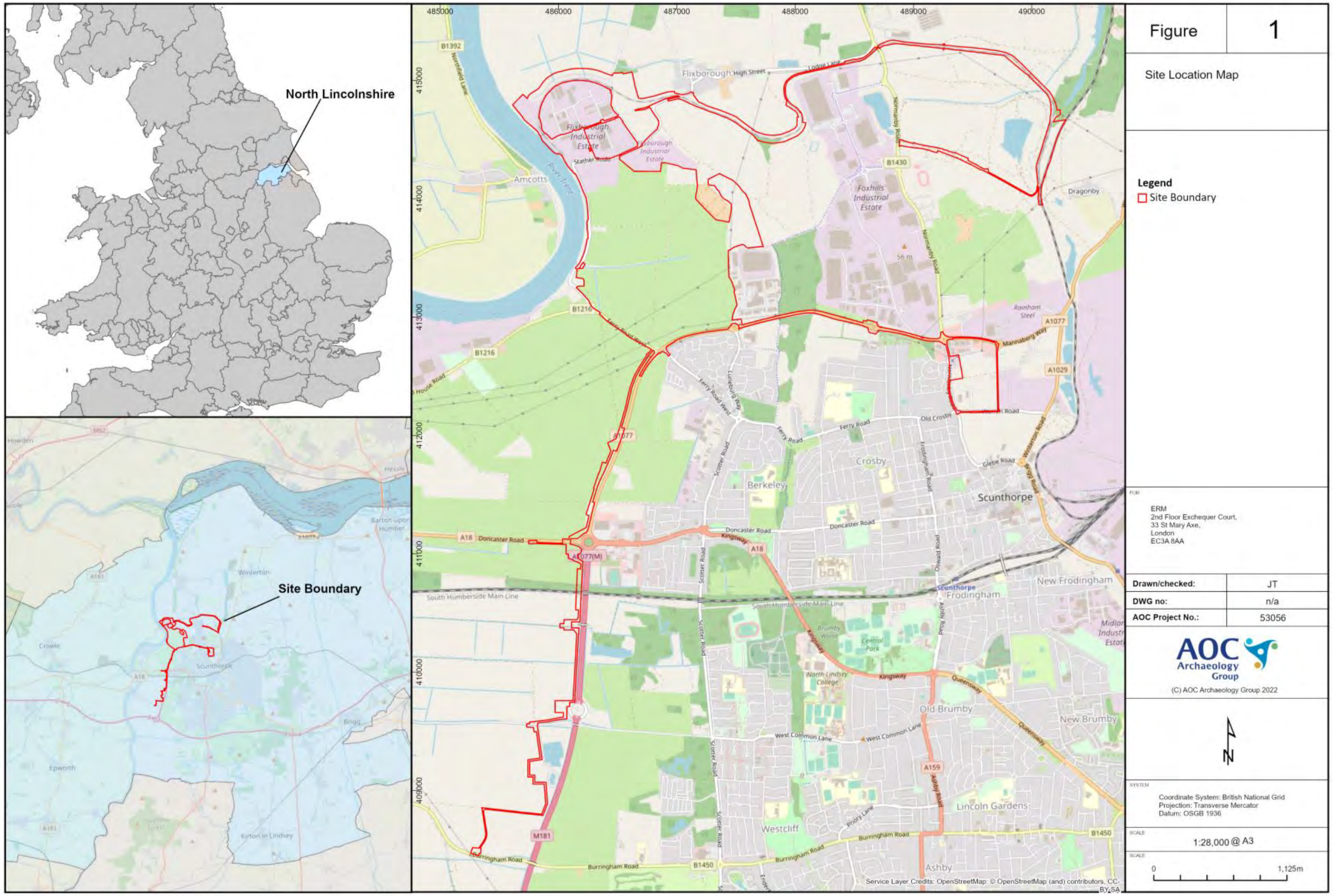


Figure 2: Archaeological Zones and Development Areas

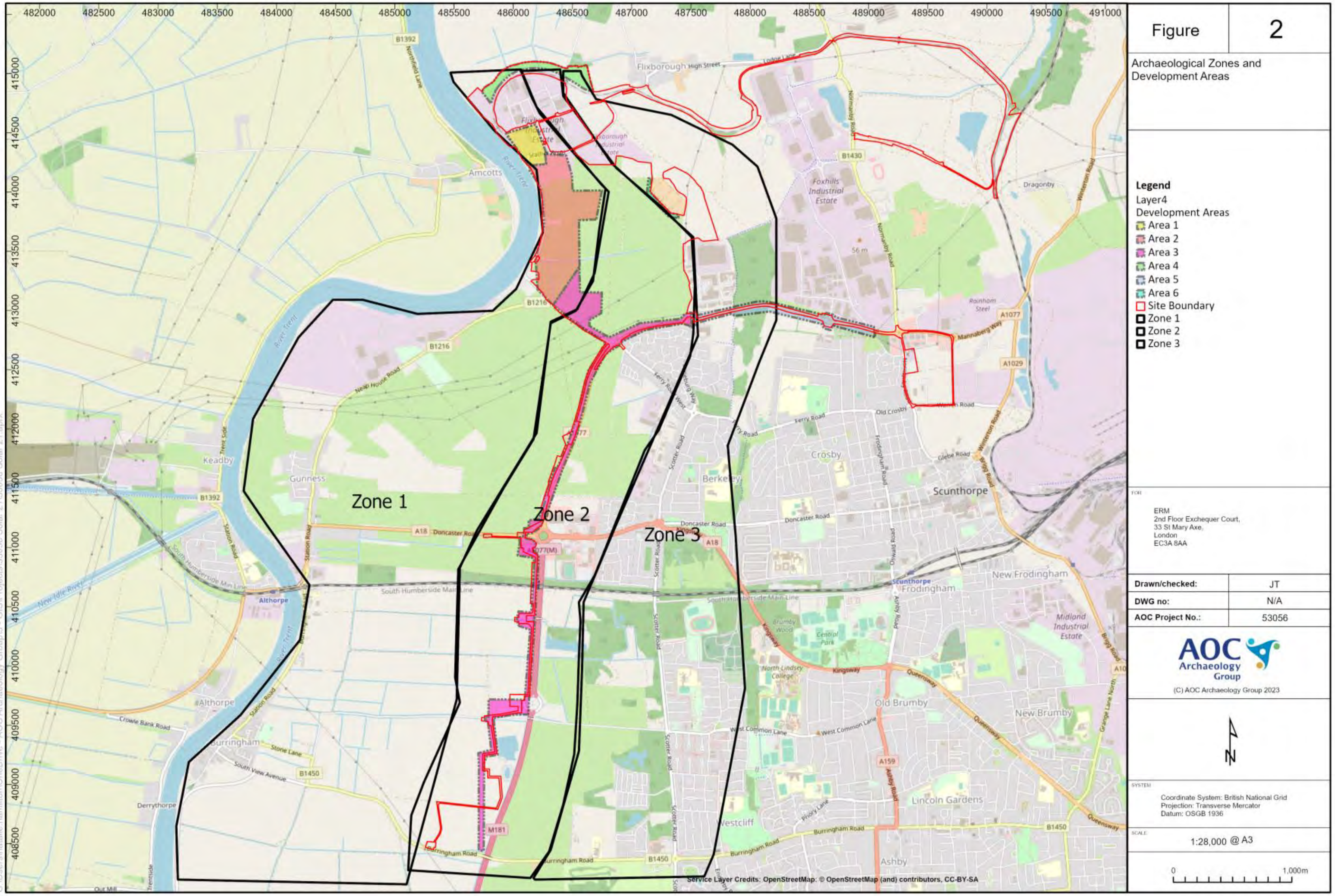


Figure 3: AOC datapoints within Area 1 (north)

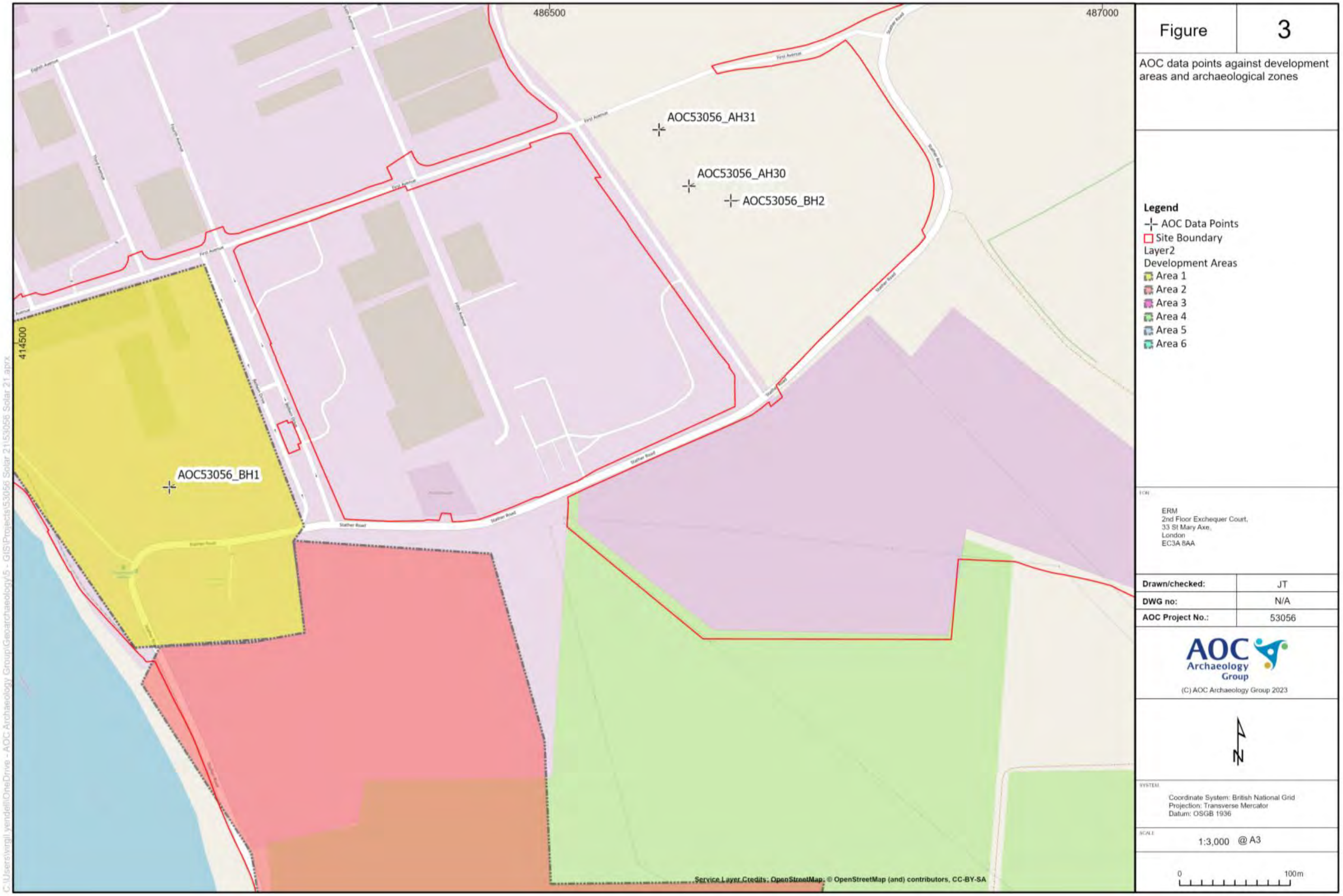


Figure 4: AOC datapoints within Areas 2, 3, and 6 (central)

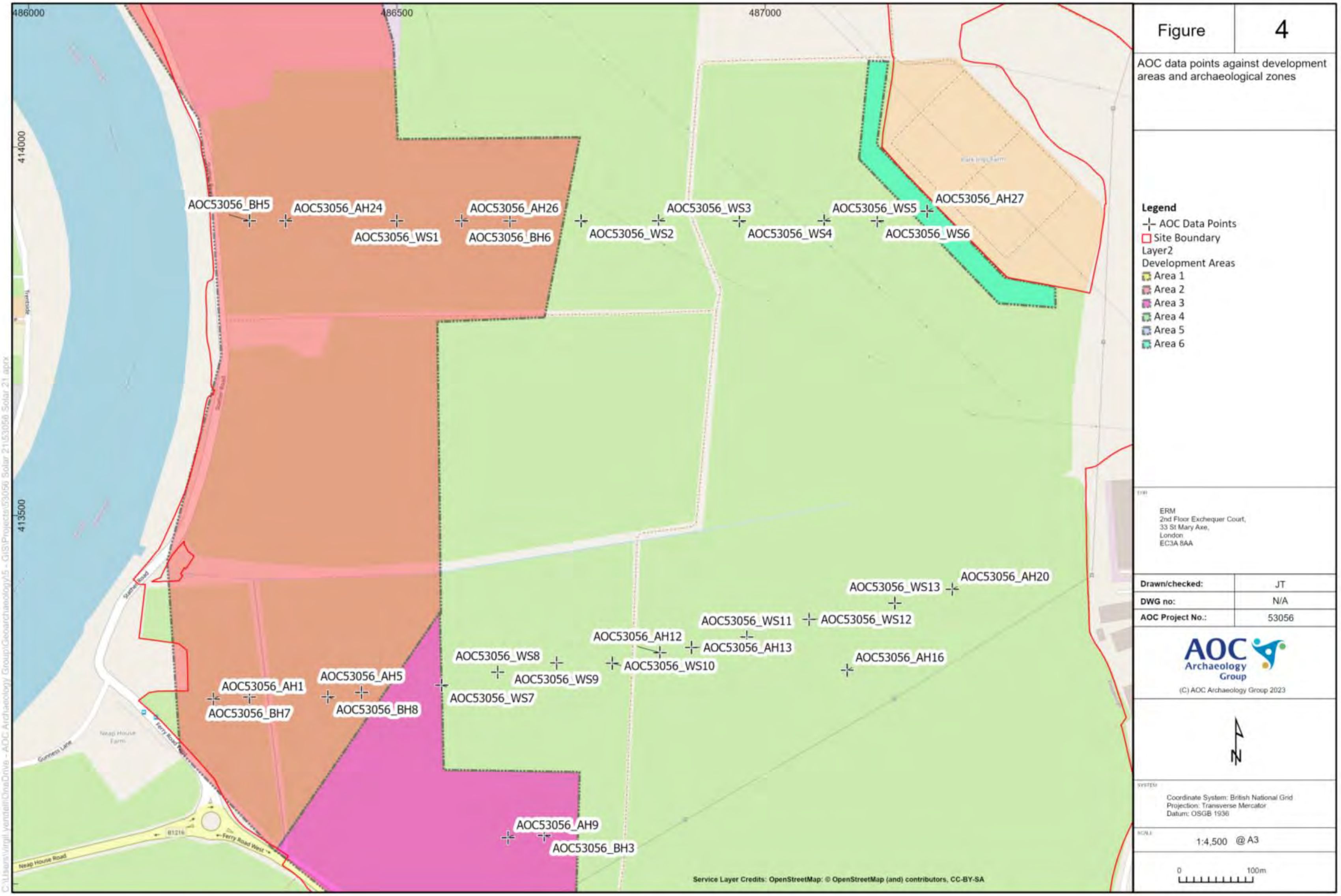


Figure 5: AOC datapoints within Area 3 (south)

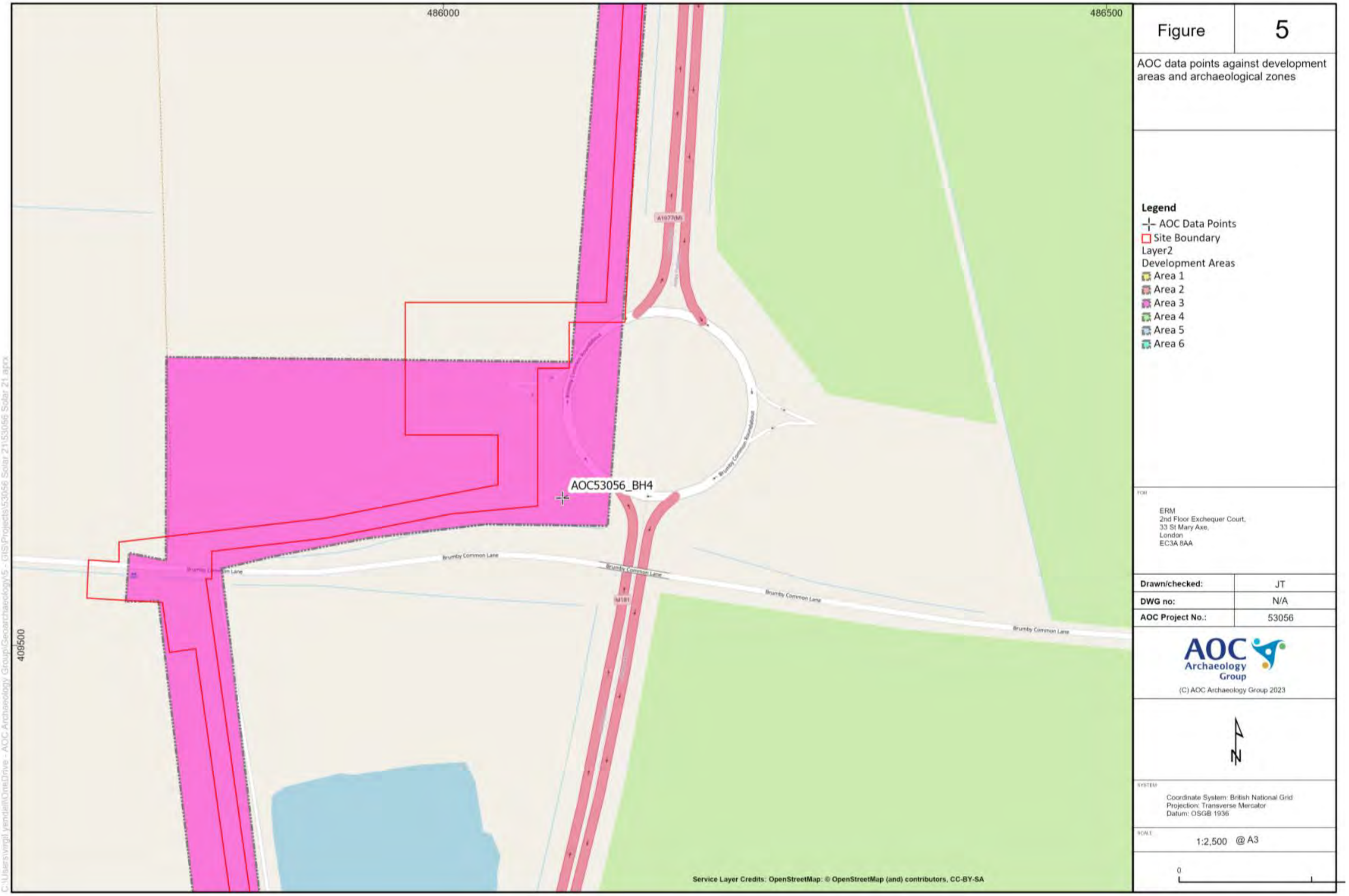


Figure 6: Data points and locations of transects A and B against development areas and archaeological zones

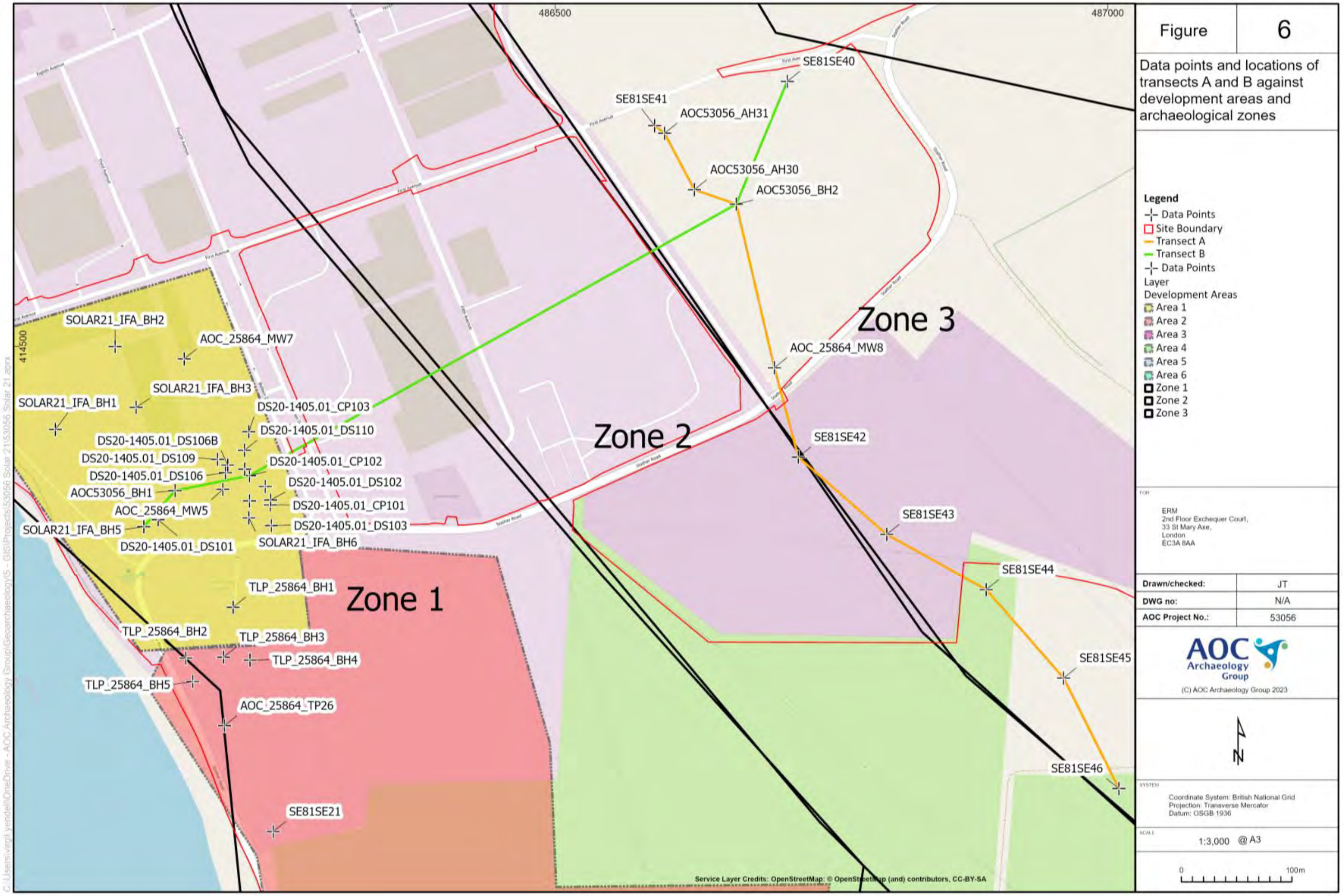


Figure 7: Data points and locations of transects C and D against development areas and archaeological zones

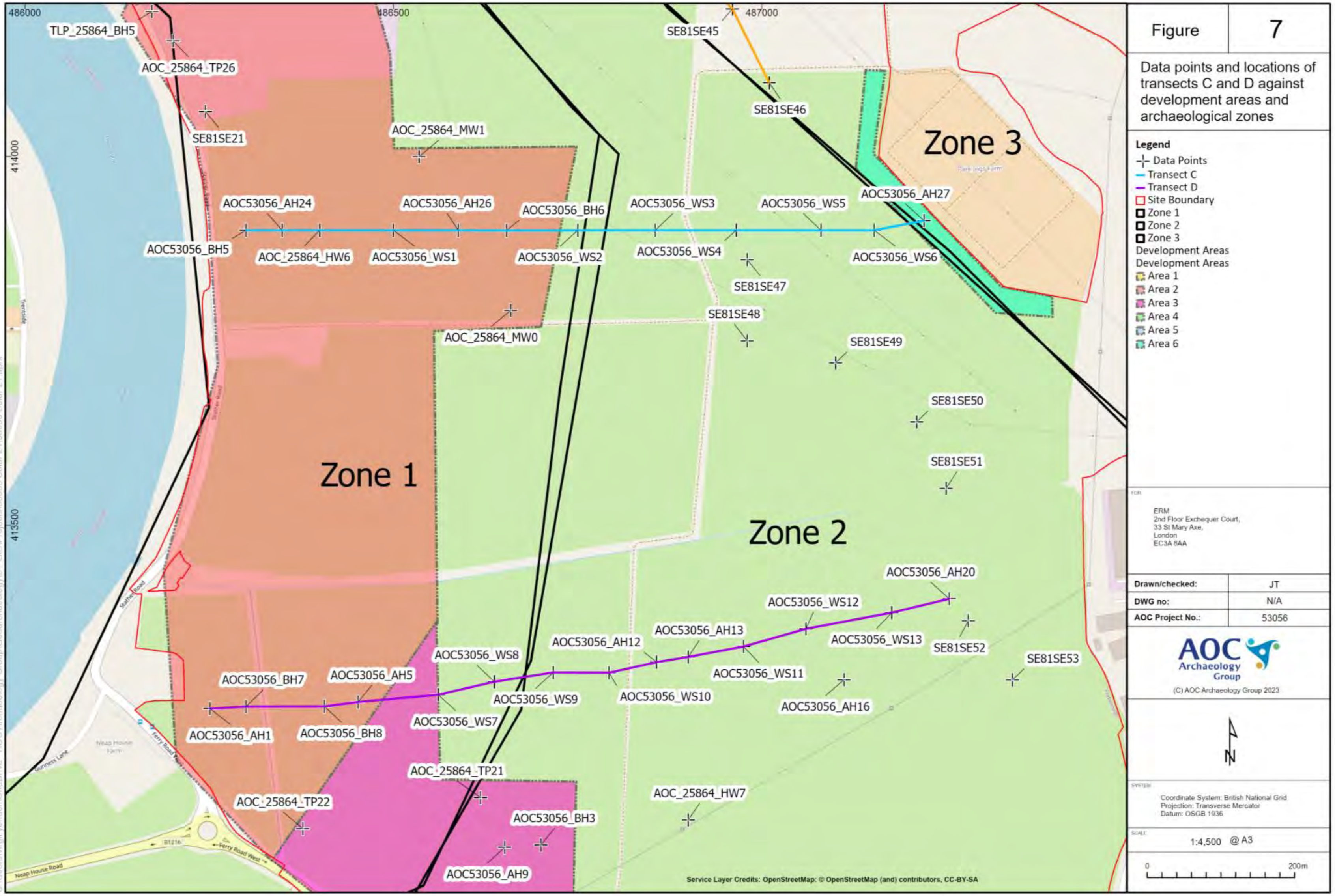


Figure 8: Data points and locations of transect E against development areas and archaeological zones

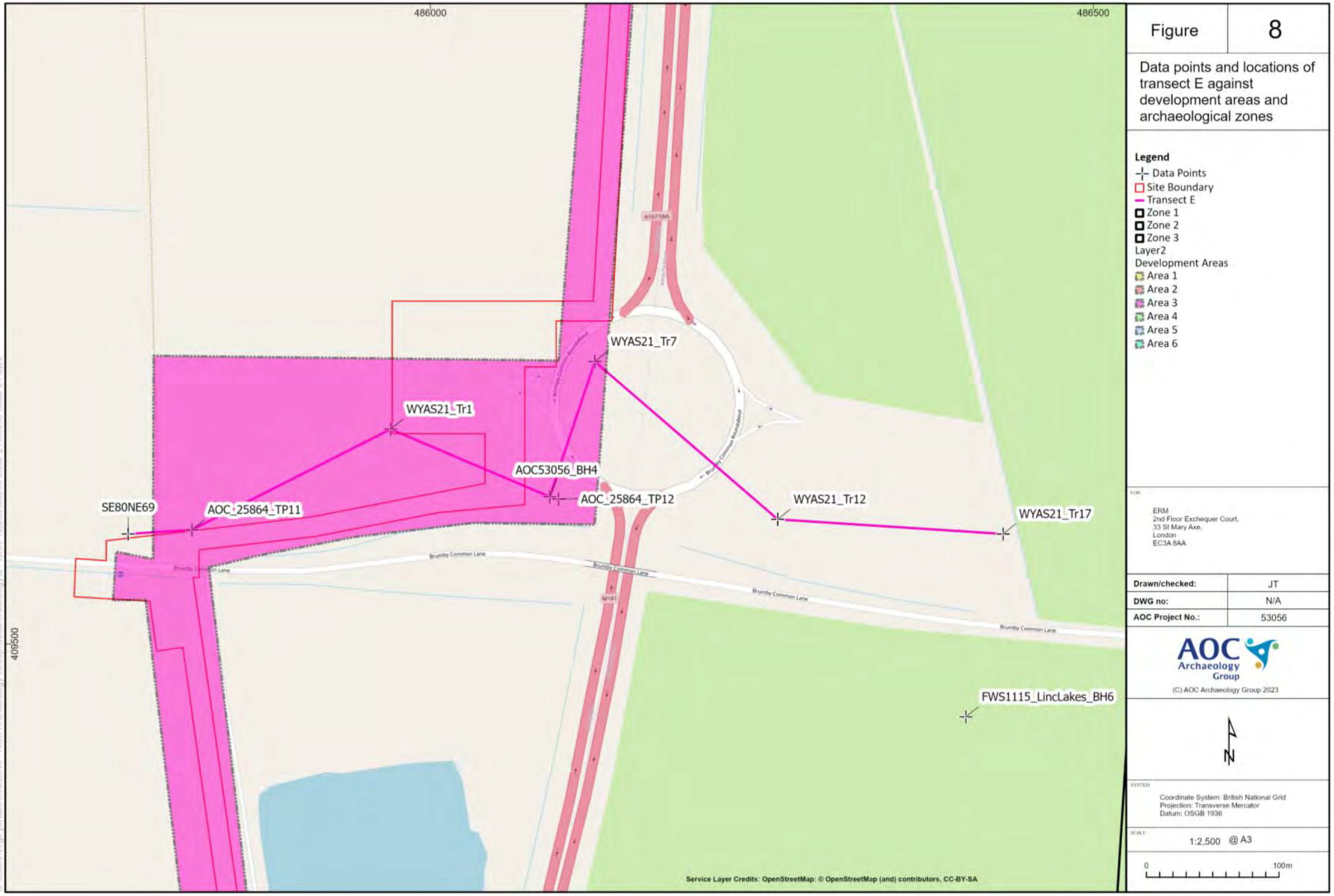


Figure 9: Transect A, northwest to southeast across the site showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

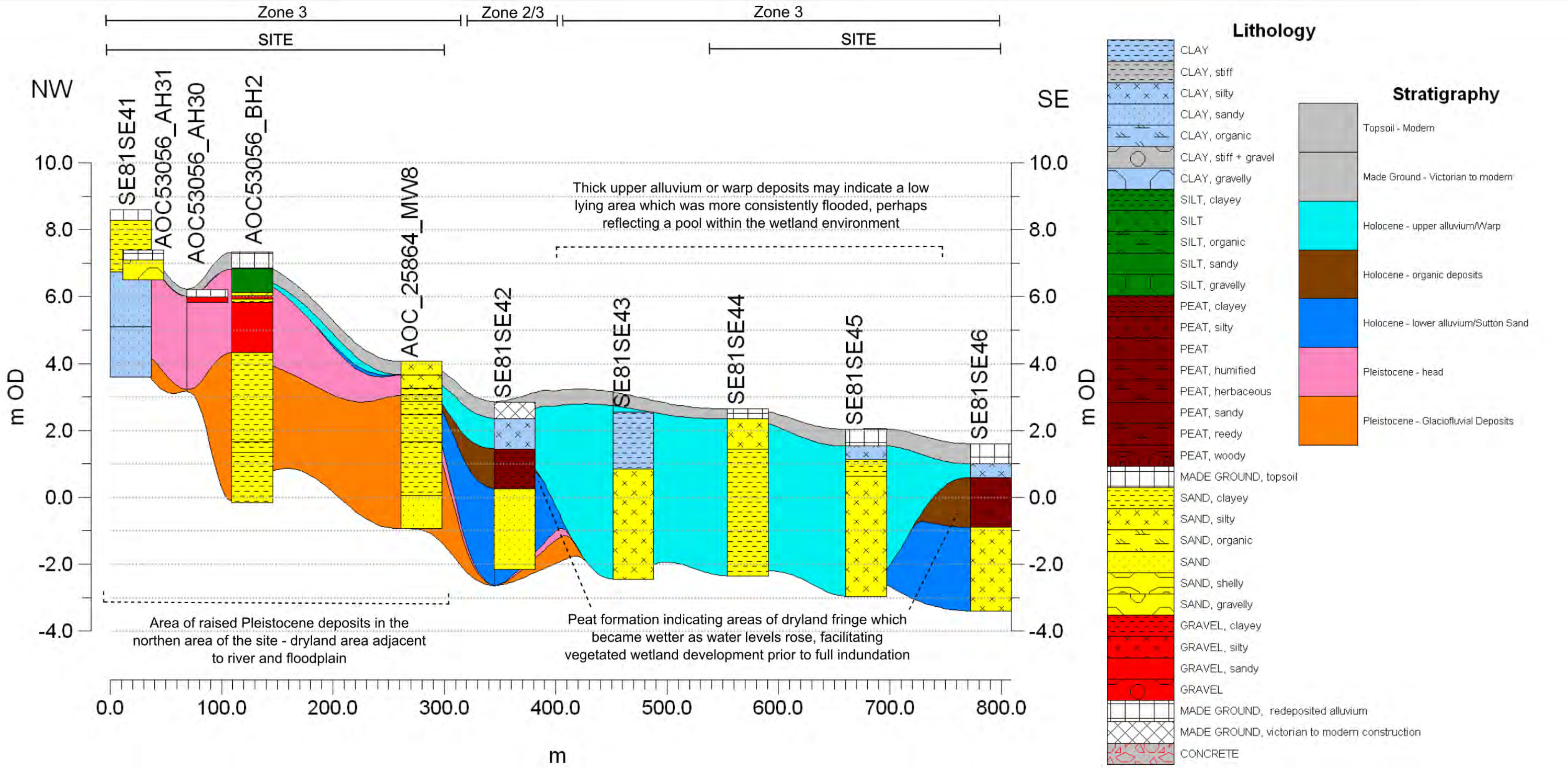


Figure 10: Transect B, southwest to northeast across the site showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

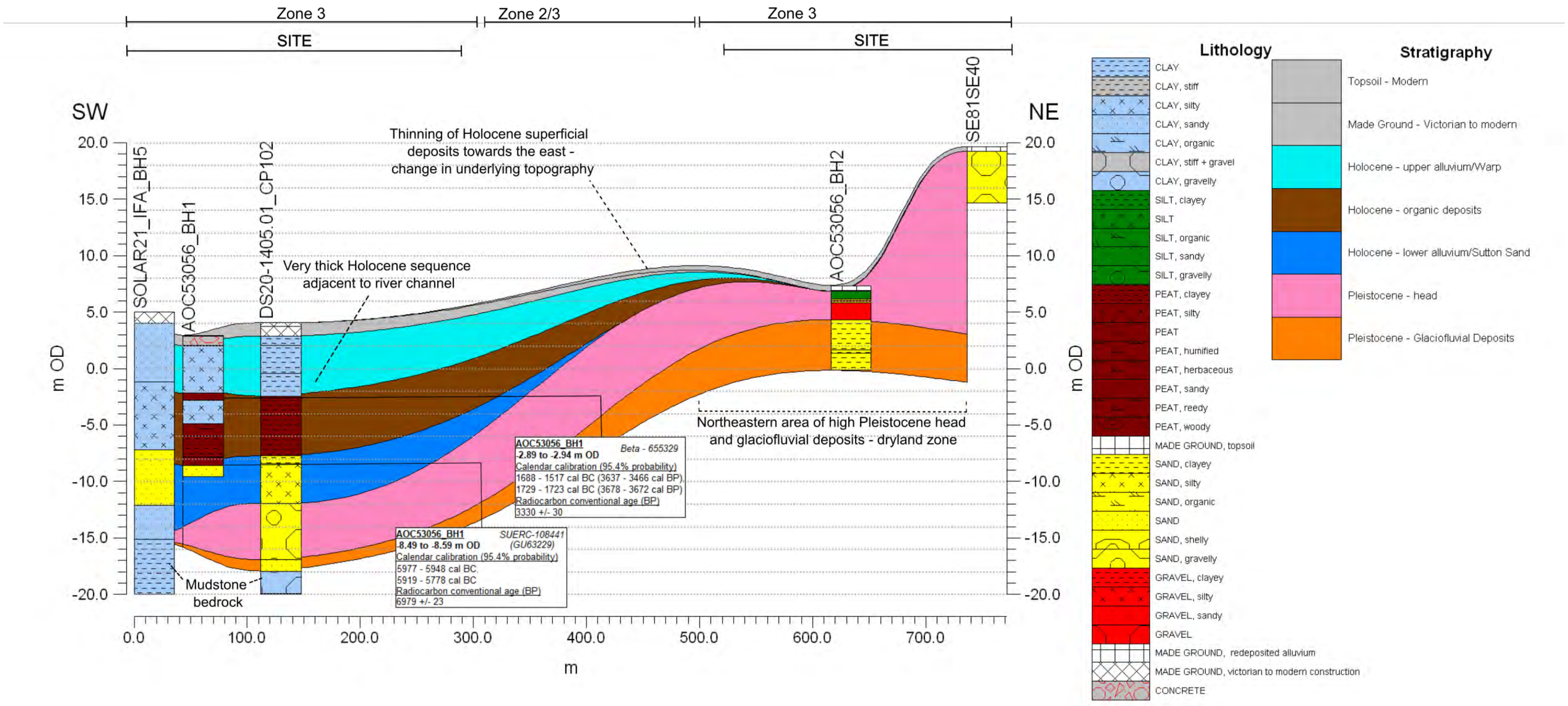


Figure 11: Transect C, west to east across the site showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

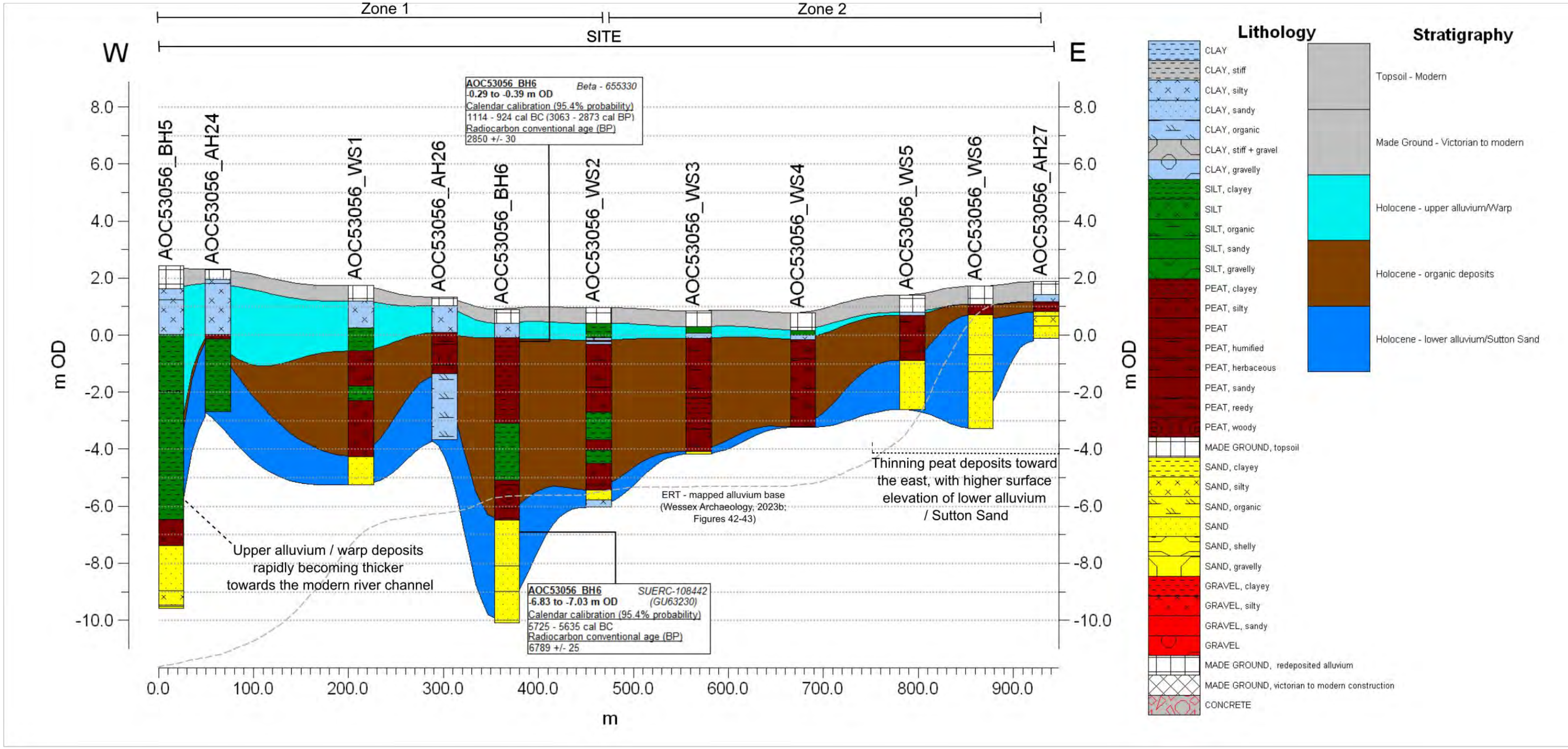


Figure 12: Transect D, west to east across the site showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

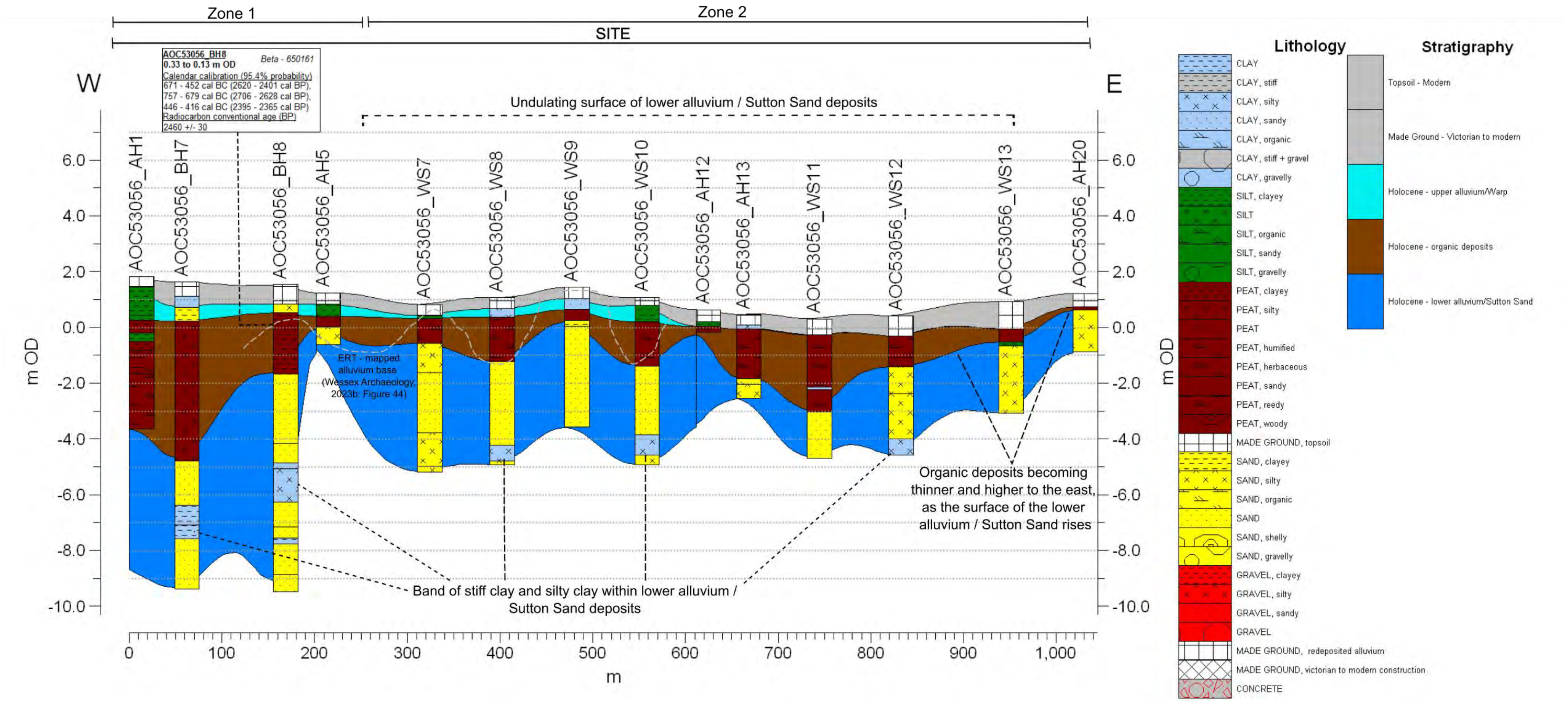


Figure 13: Transect E, west to east across the site showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

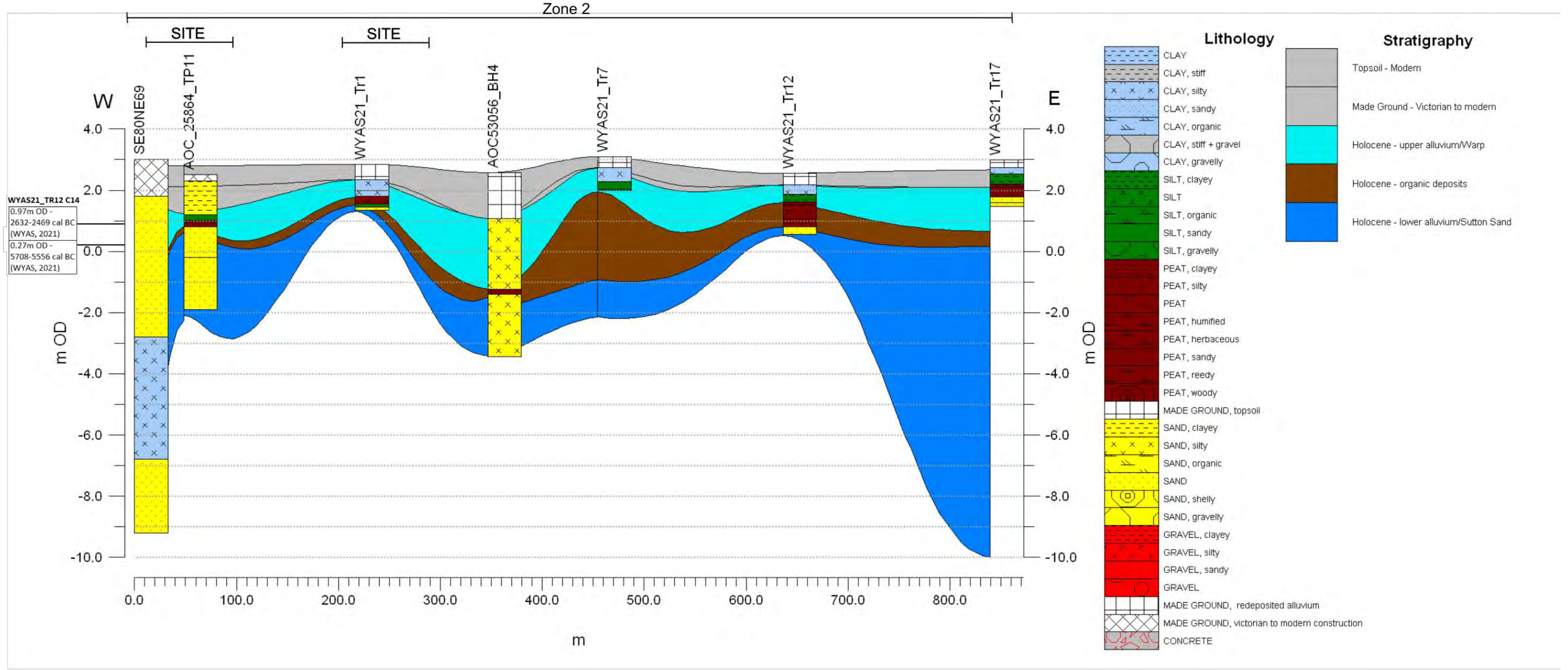


Figure 14: Topographic plot of the surface of the below ground tertiary bedrock (extrapolated from deposit records)

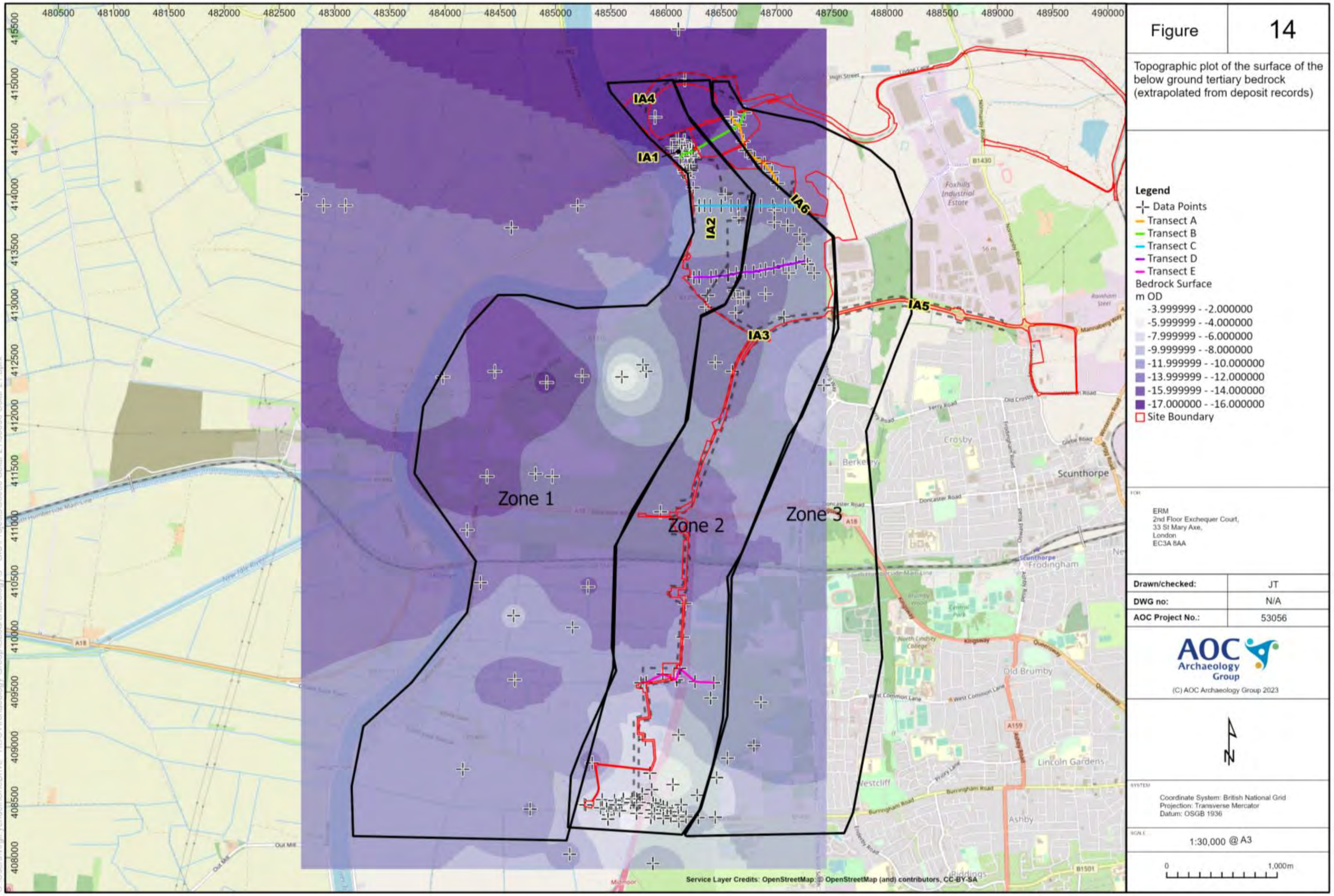


Figure 15: Thickness plot of the below ground Pleistocene glaciofluvial deposits (extrapolated from deposit records), representing deposit survival

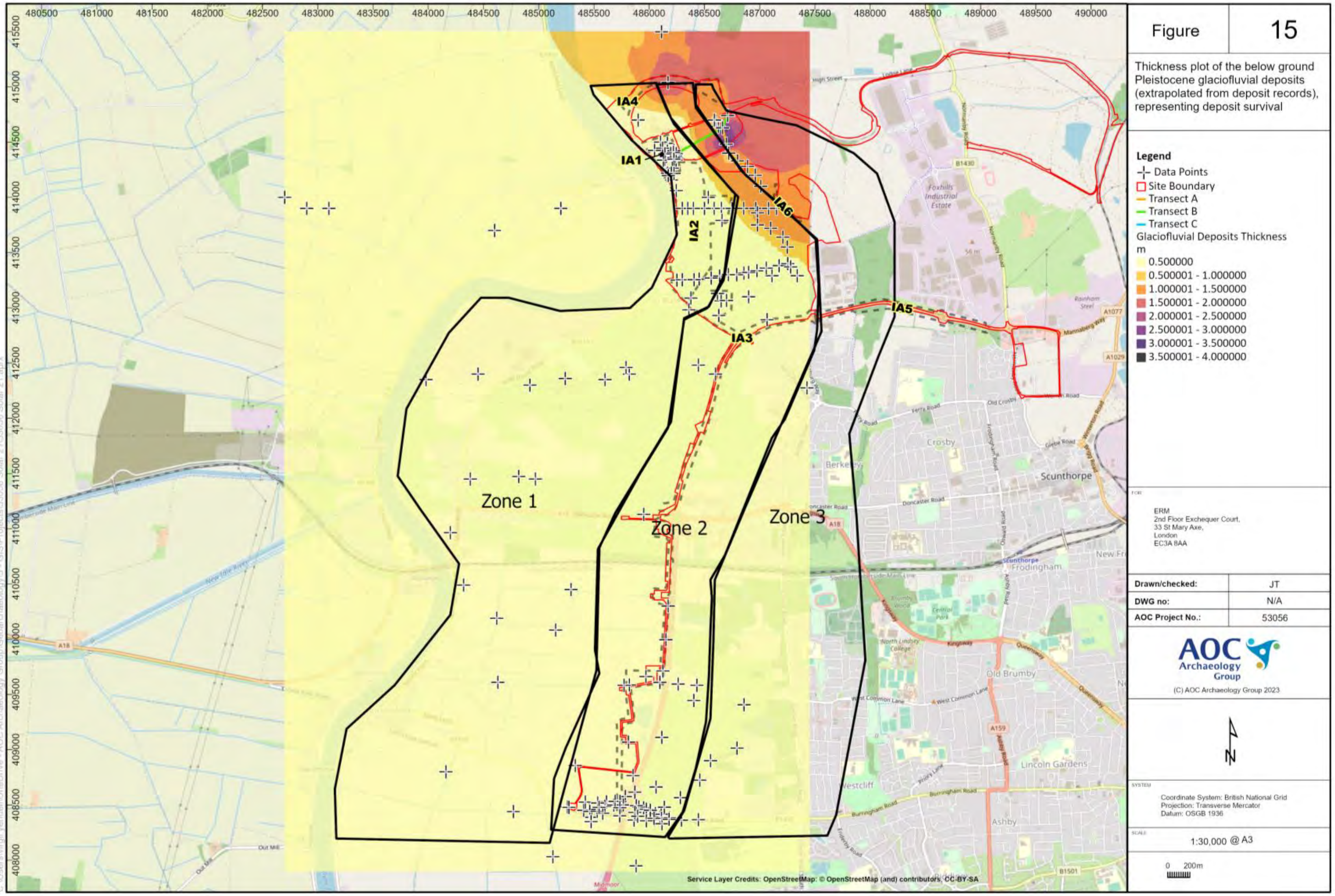


Figure 16: Thickness plot of the below ground Pleistocene head deposits (extrapolated from deposit records), representing deposit survival

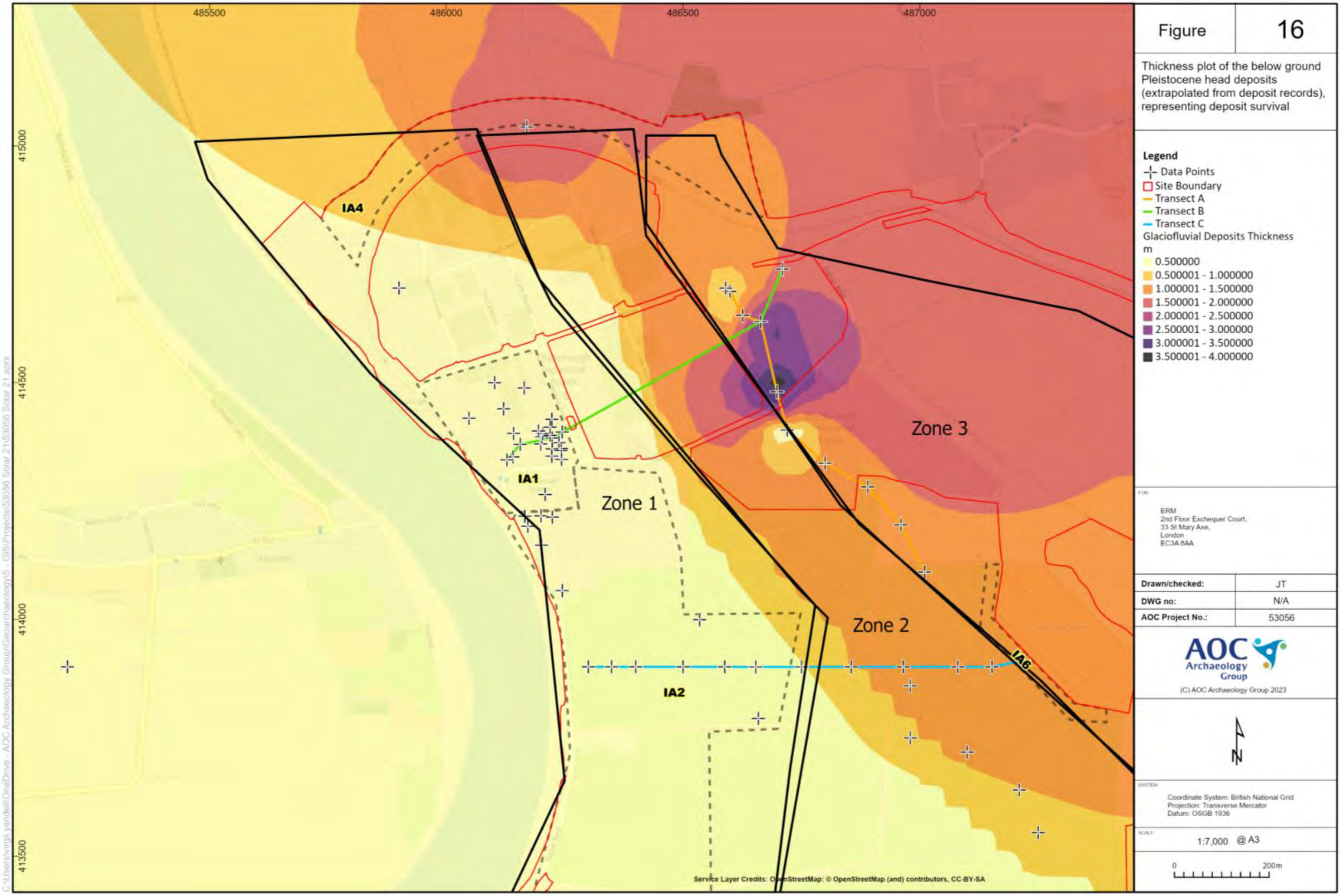


Figure 17: Topographic plot of the surface of the below ground Pleistocene (head and glaciofluvial) and earlier deposits (extrapolated from deposit records), suggesting the form of the ancient land surface at *c*. 10,000 BC

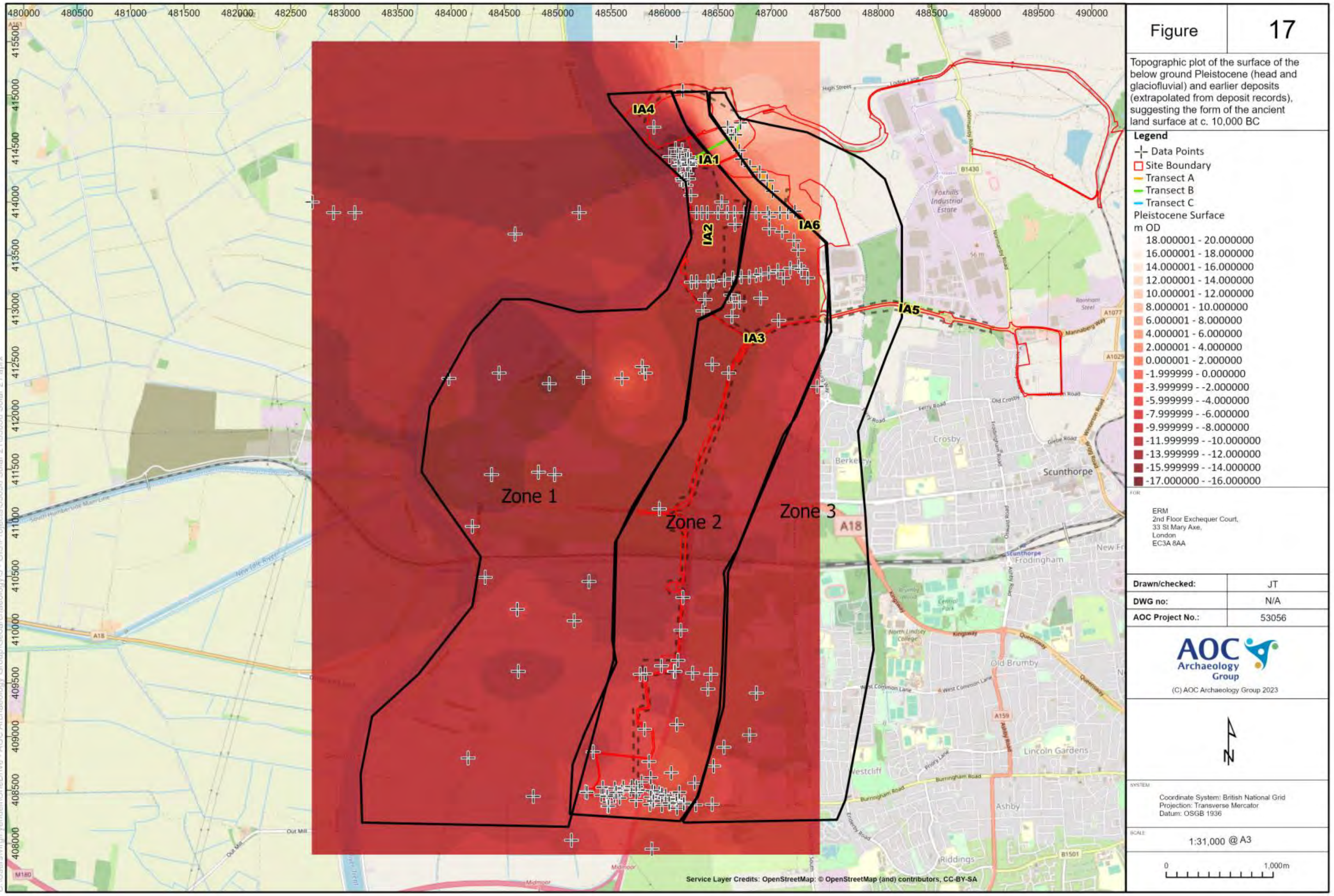


Figure 18: Thickness plot of the lower alluvium or Sutton Sand deposits (extrapolated from deposit records), representing deposit survival

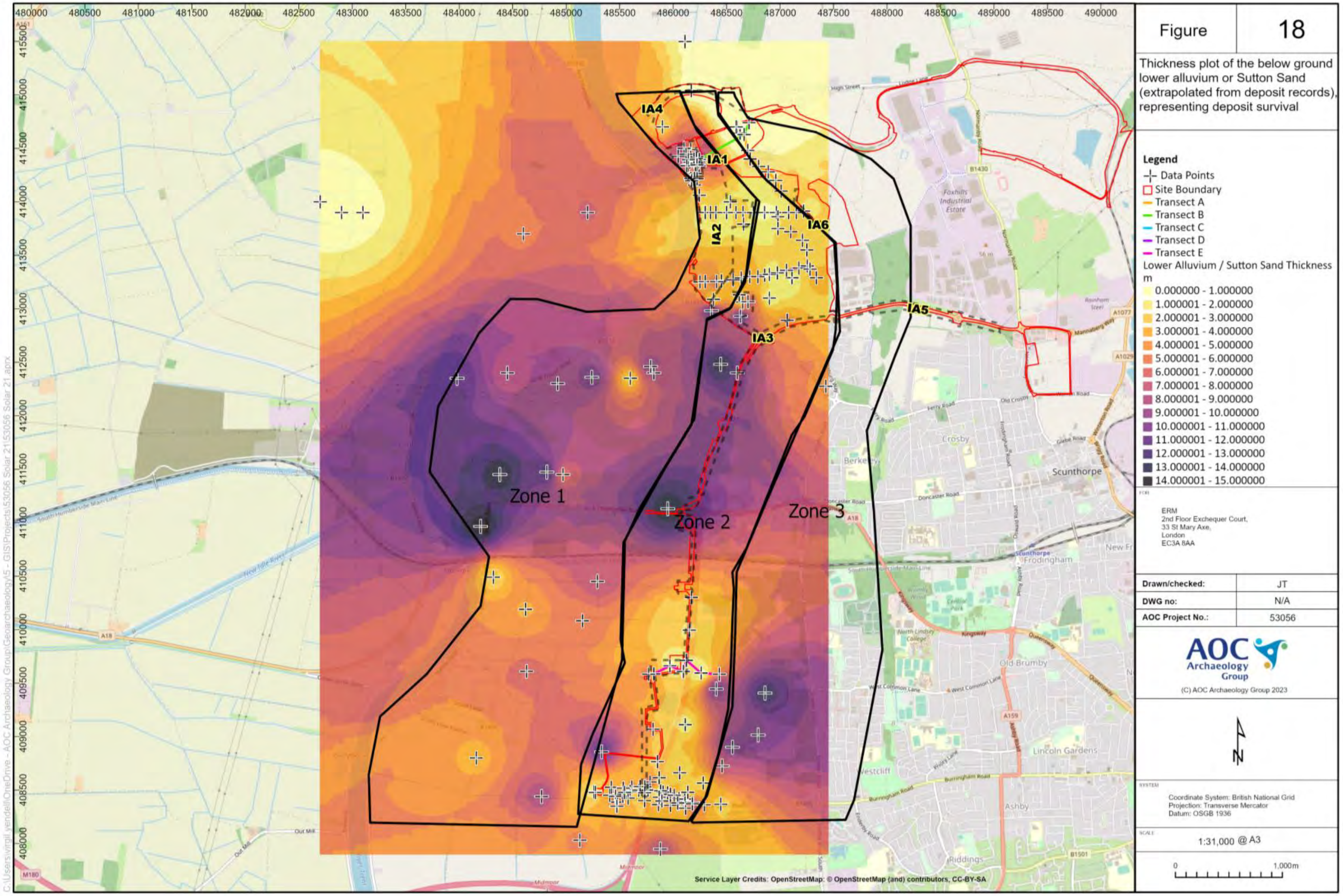


Figure 19: Thickness plot of the lower alluvium or Sutton Sand deposits (extrapolated from deposit records), representing deposit survival (Transects A and B)

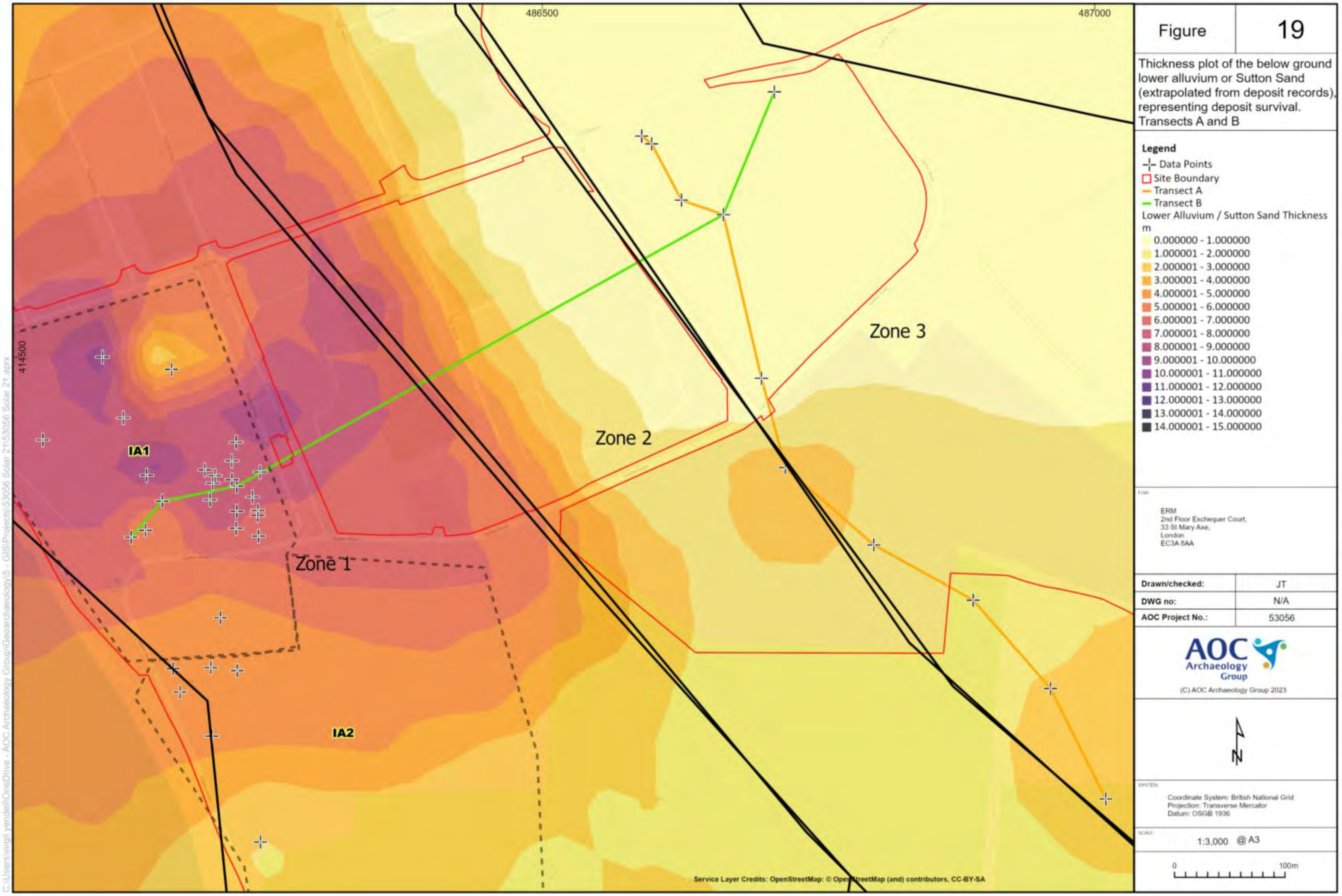


Figure 20: Thickness plot of the lower alluvium or Sutton Sand deposits (extrapolated from deposit records), representing deposit survival (Transects C and D)

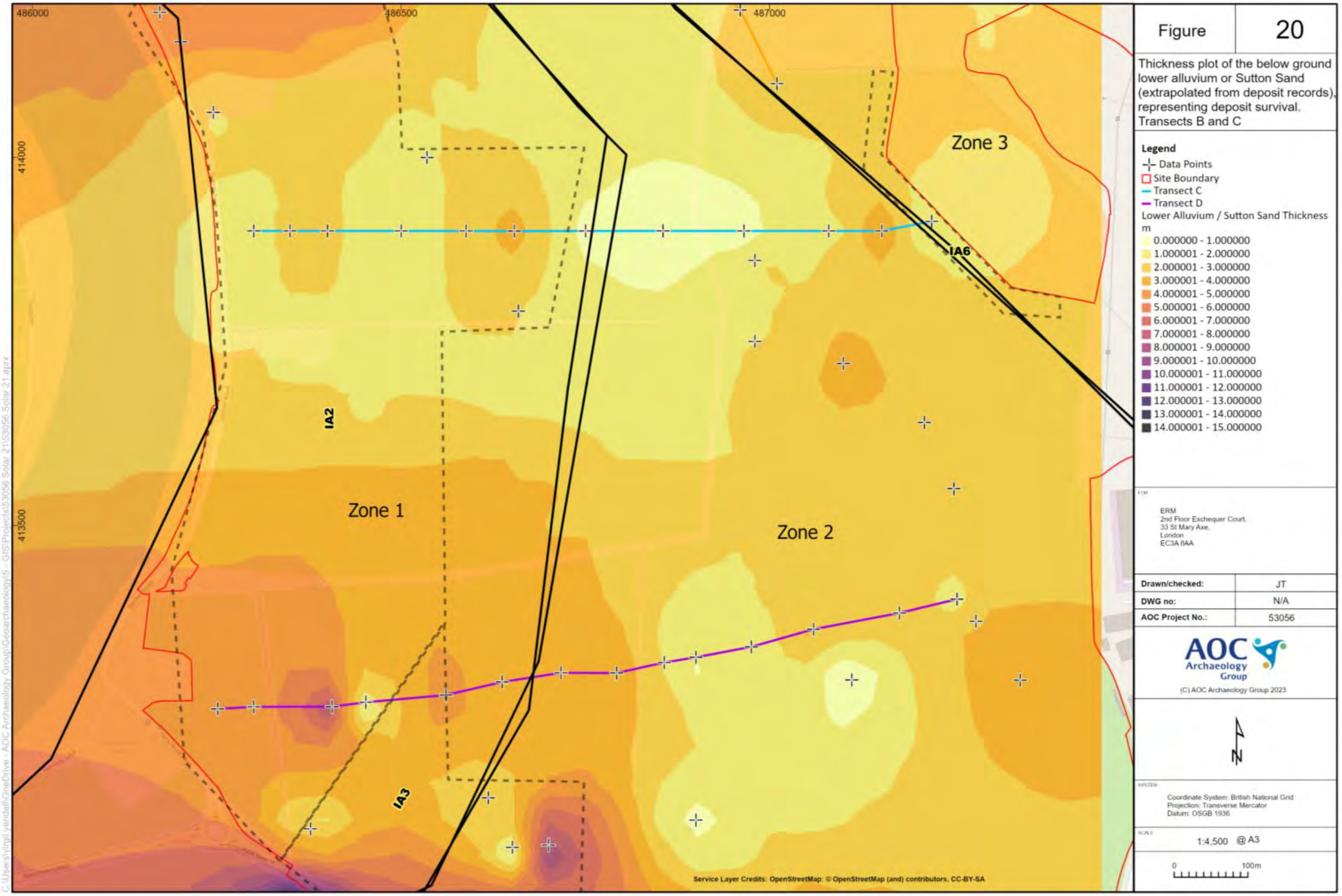


Figure 21: Topographic plot of the surface of the below ground lower alluvium / Sutton Sand deposits (extrapolated from deposit records)

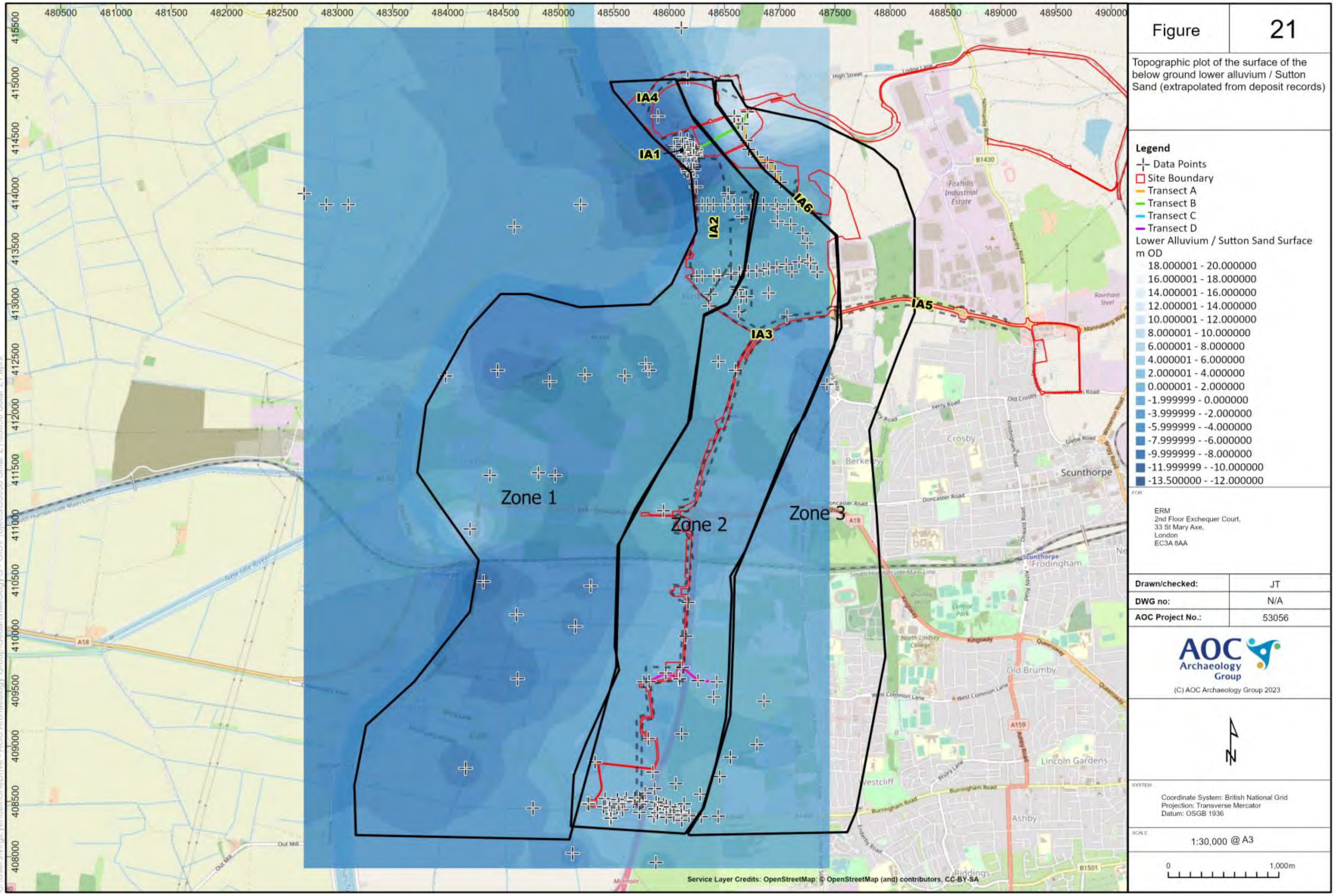


Figure 22: Topographic plot of the surface of the below ground lower alluvium / Sutton Sand deposits (extrapolated from deposit records) (Transects A and B)

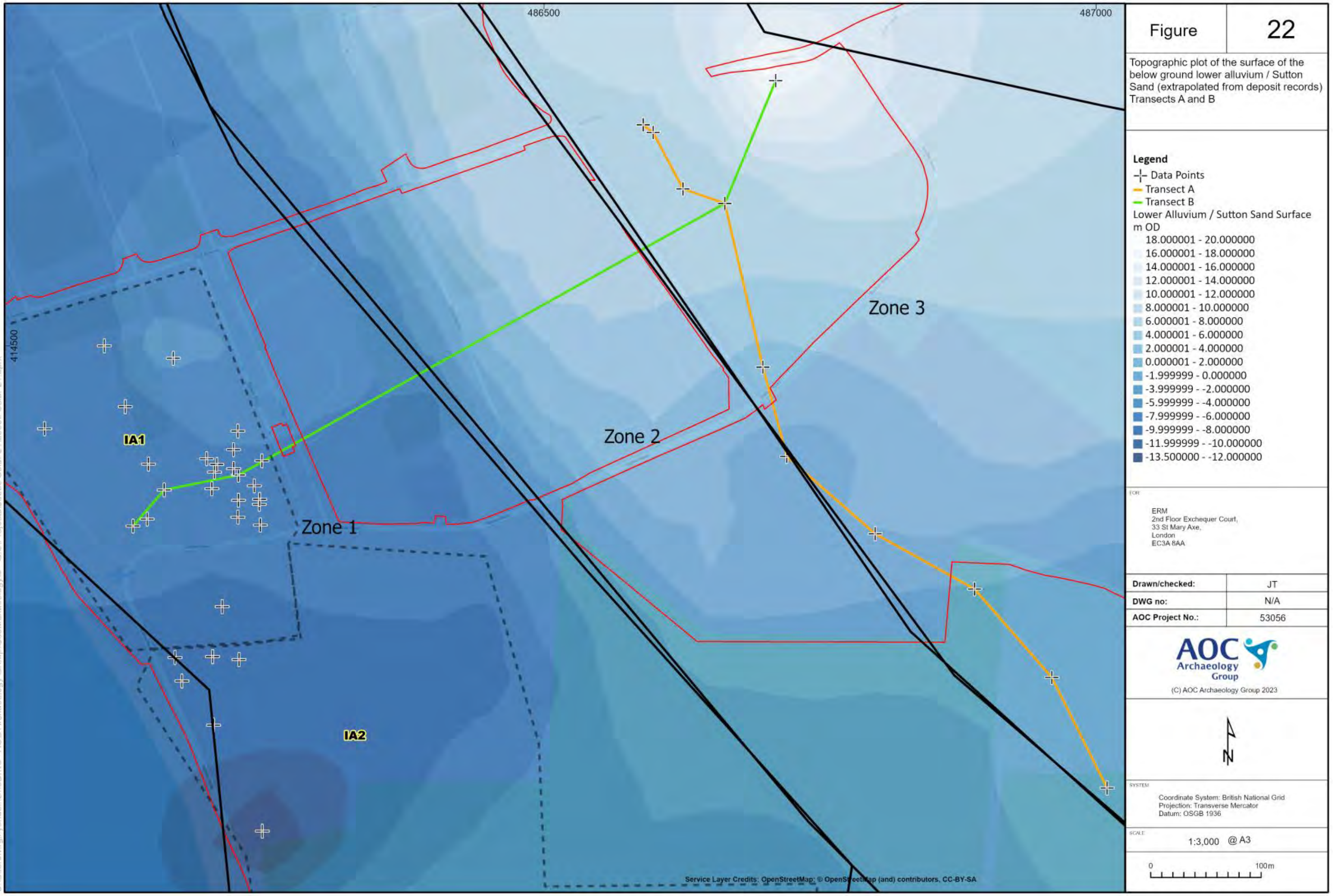


Figure 23: Topographic plot of the surface of the below ground lower alluvium / Sutton Sand deposits (extrapolated from deposit records) (Transects C and D)

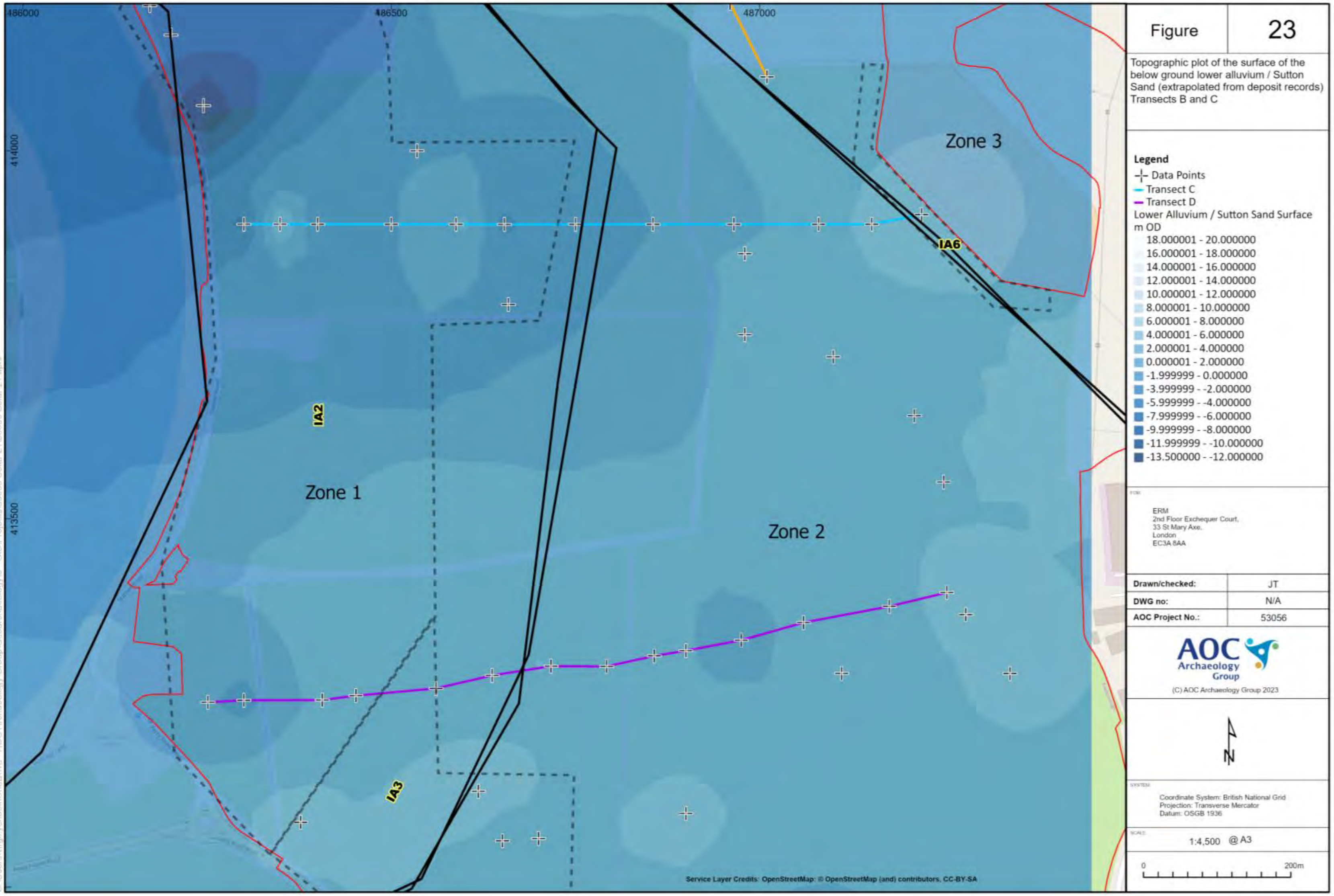


Figure 24: Thickness plot of the below ground Holocene organic deposits (extrapolated from deposit records), representing deposit survival

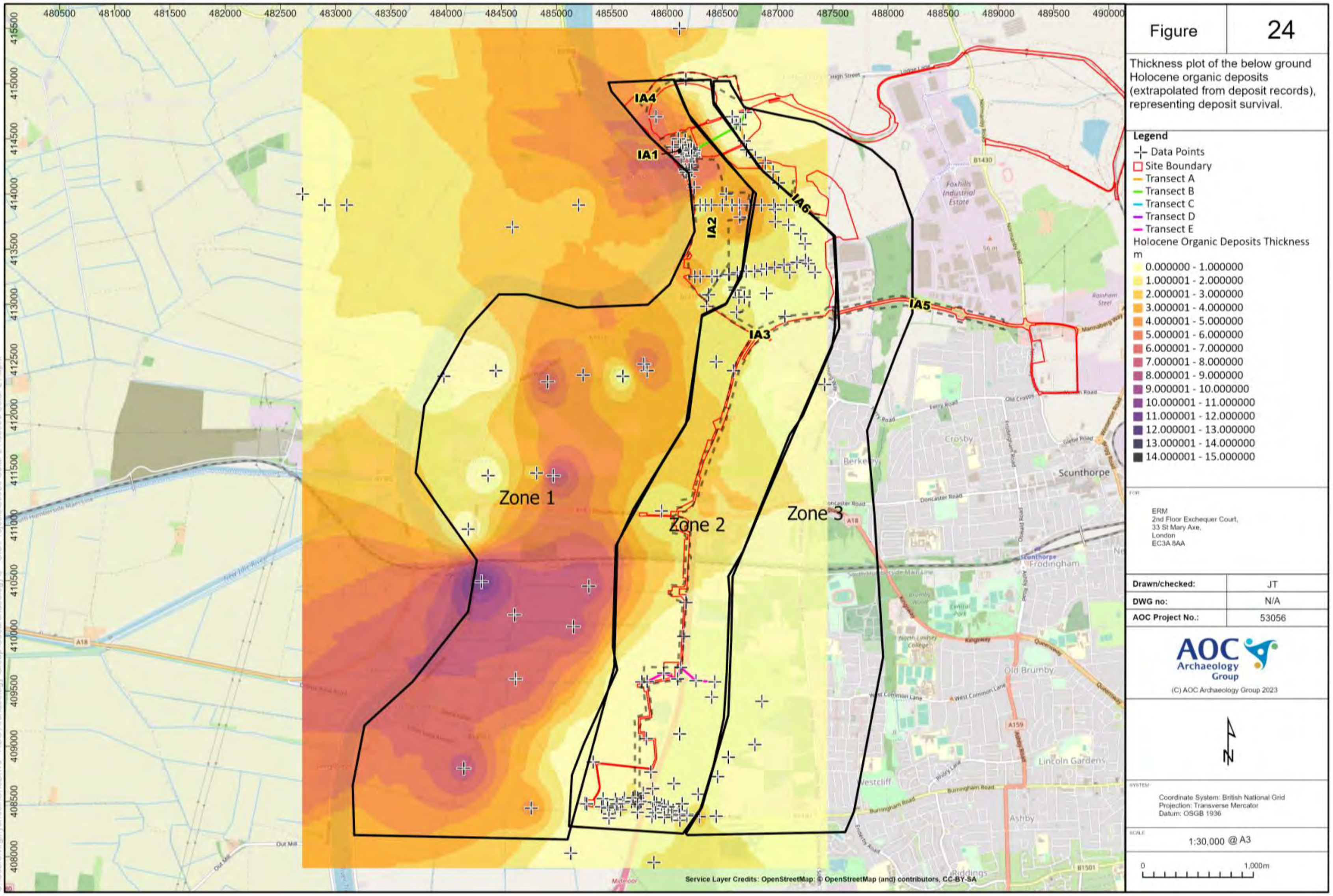


Figure 25: Thickness plot of the below ground Holocene organic deposits (extrapolated from deposit records), representing deposit survival. Transects A and B

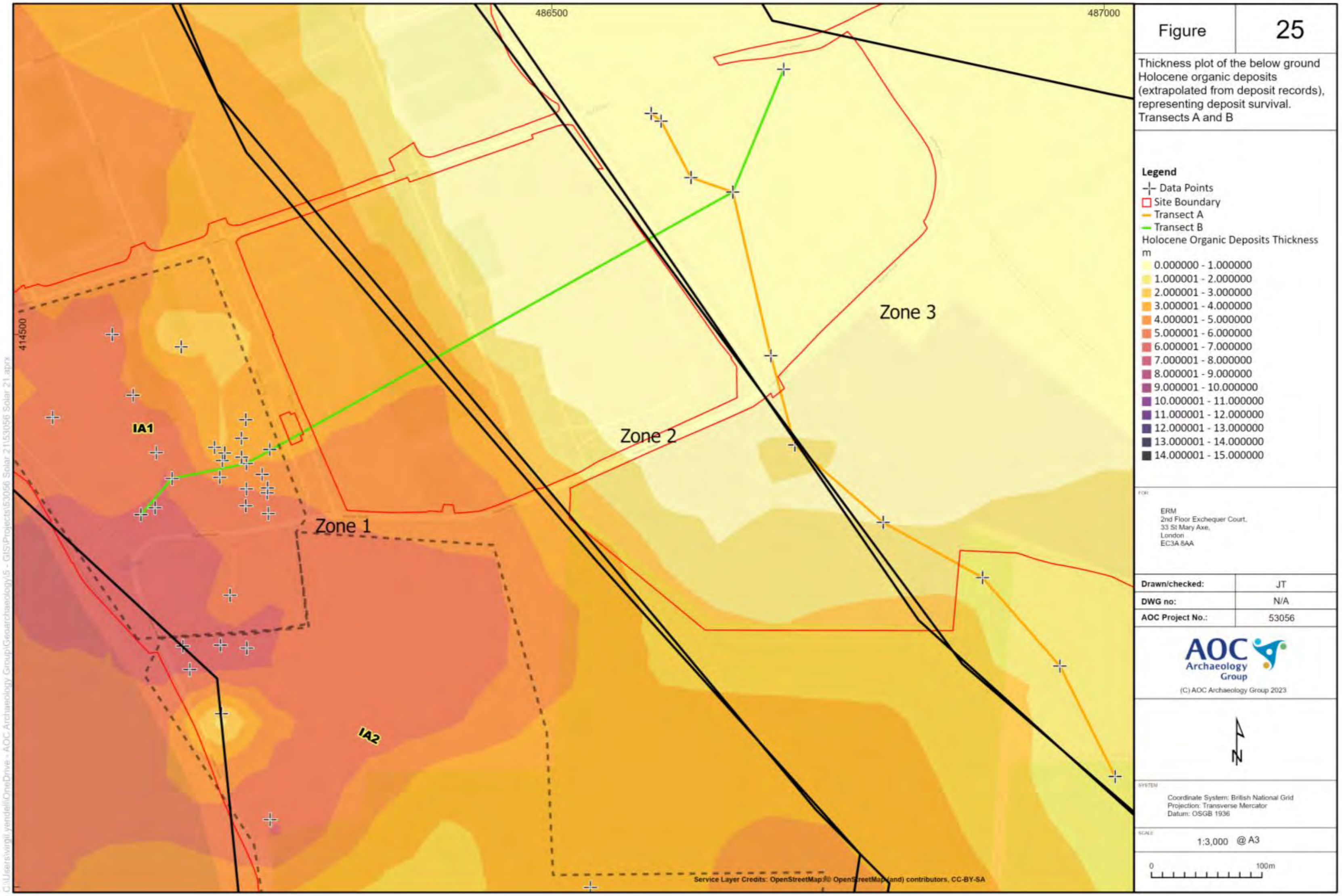


Figure 26: Thickness plot of the below ground Holocene organic deposits (extrapolated from deposit records), representing deposit survival. Transects C and D

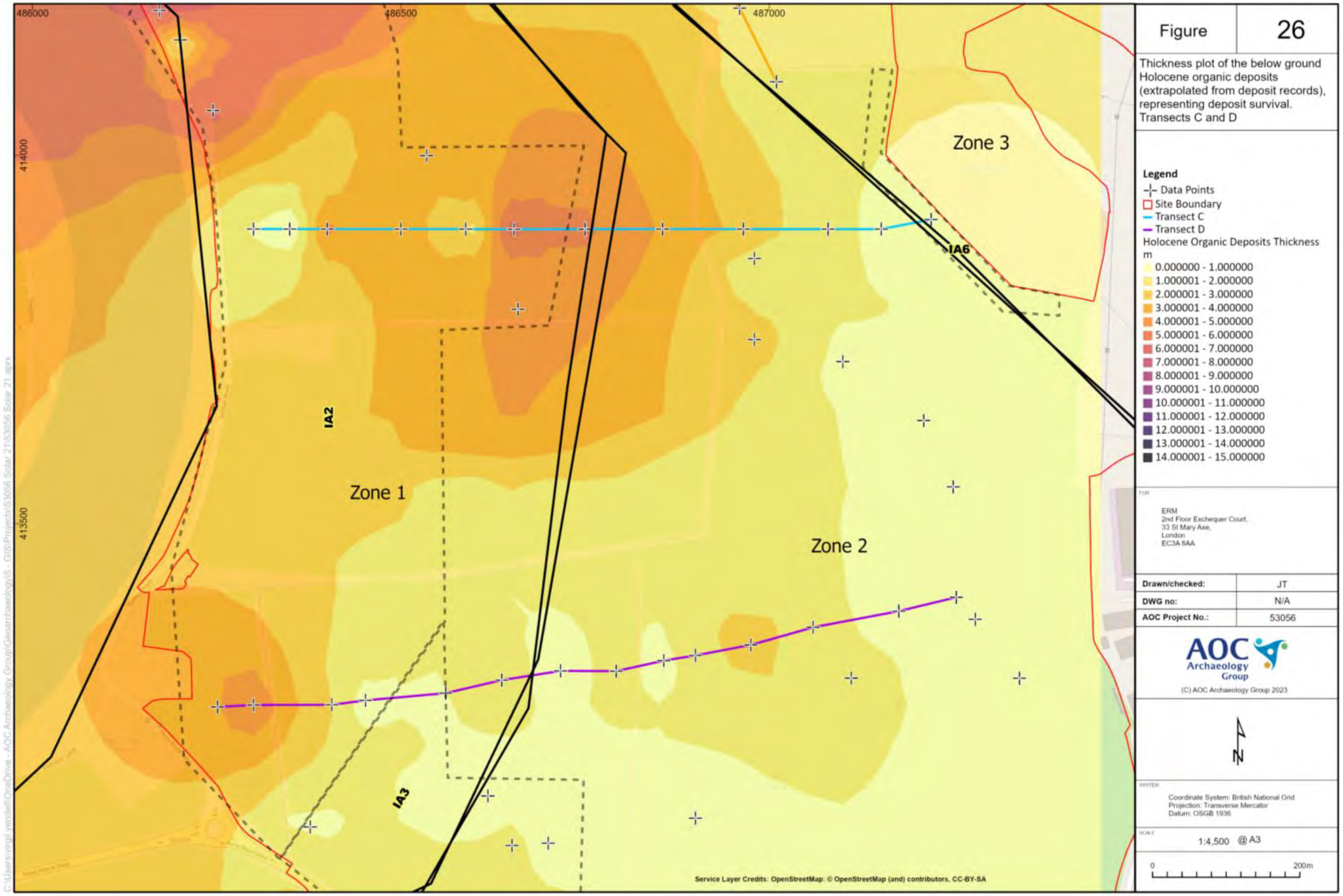


Figure 27: Thickness plot of the below ground Holocene organic deposits (extrapolated from deposit records), representing deposit survival. Transect E

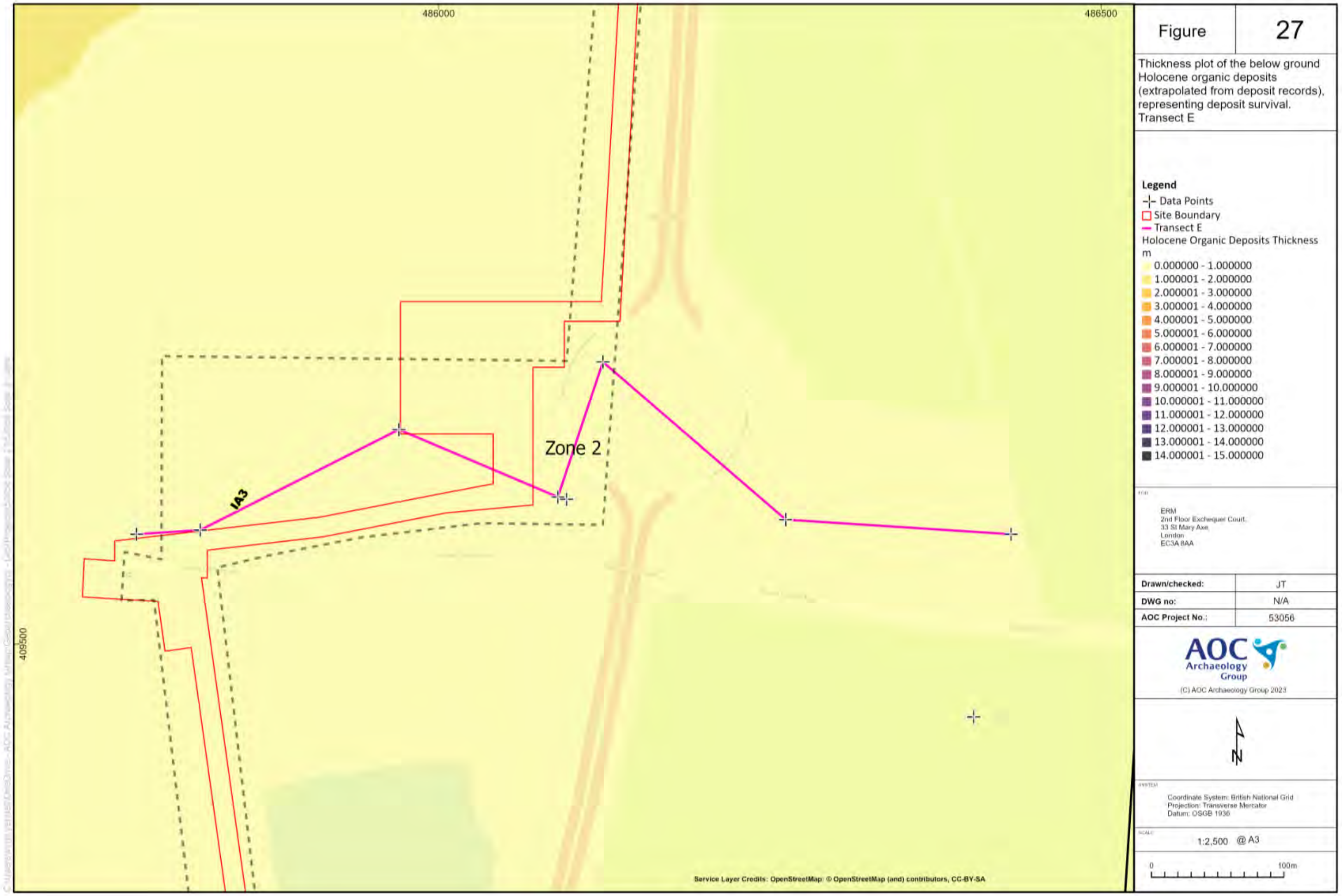


Figure 28: Topographic plot of the surface of the below ground Holocene organic deposits (extrapolated from deposit records)

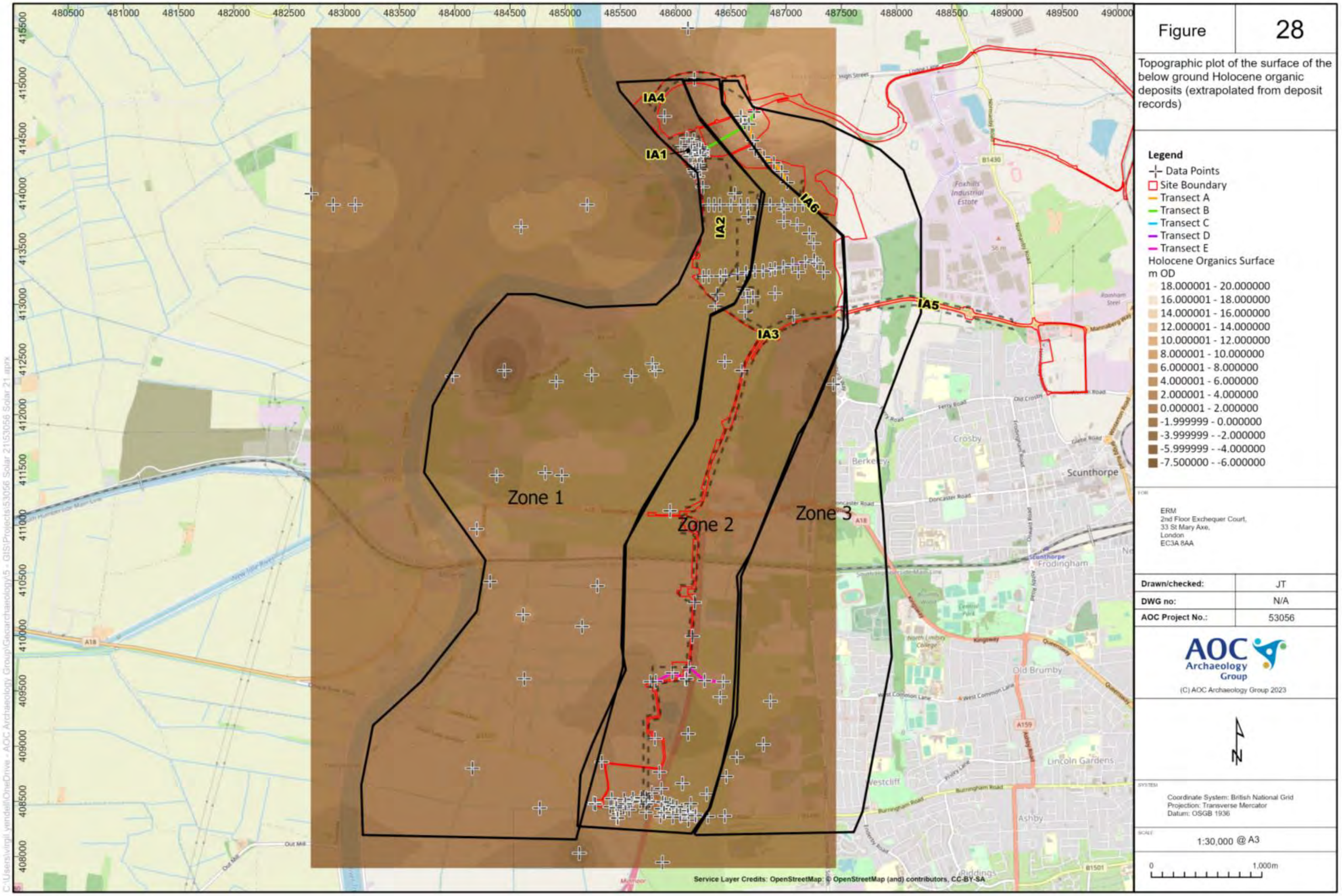


Figure 29: Topographic plot of the surface of the below ground Holocene organic deposits (extrapolated from deposit records). Transects A and B

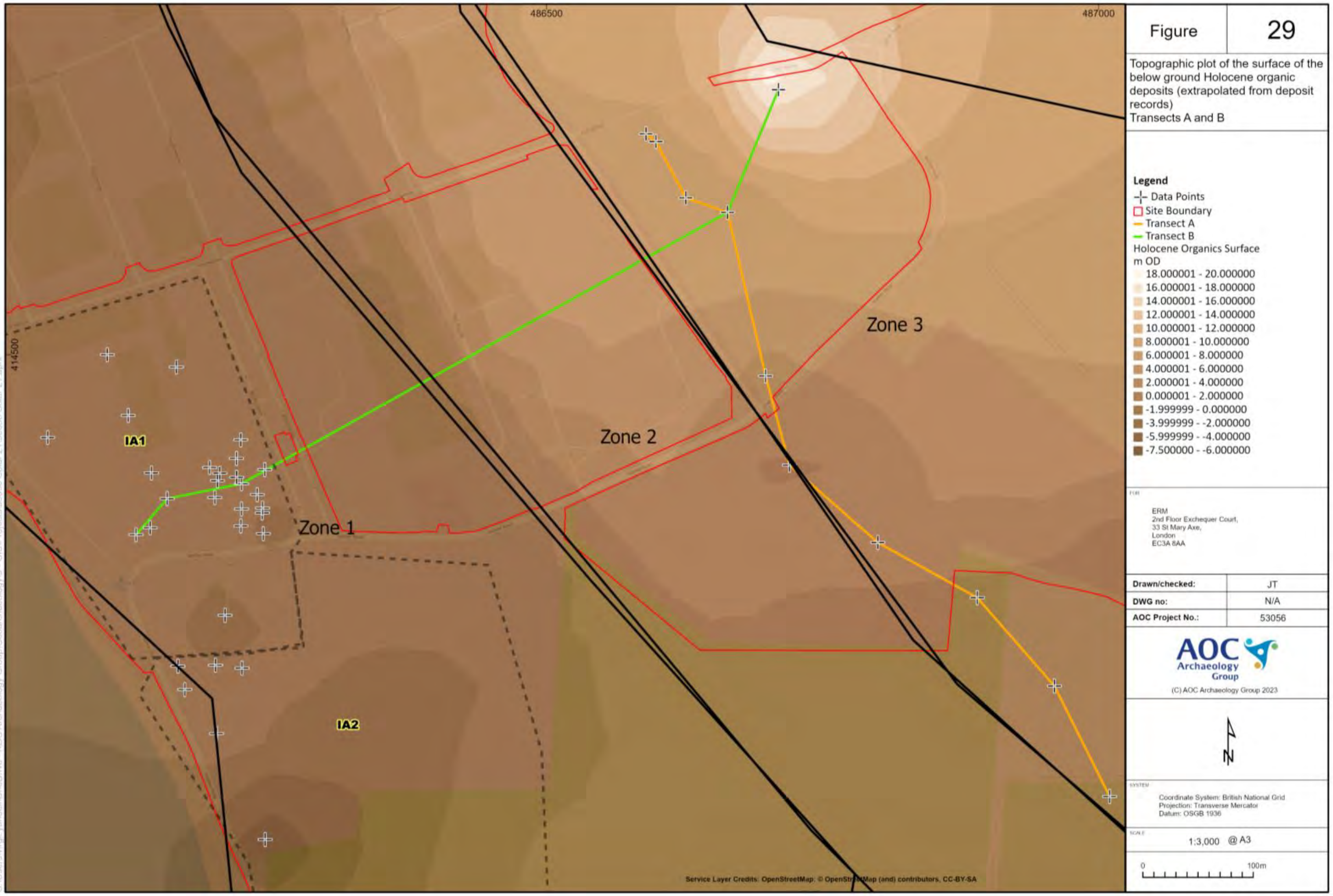


Figure 30: Topographic plot of the surface of the below ground Holocene organic deposits (extrapolated from deposit records). Transects C and D

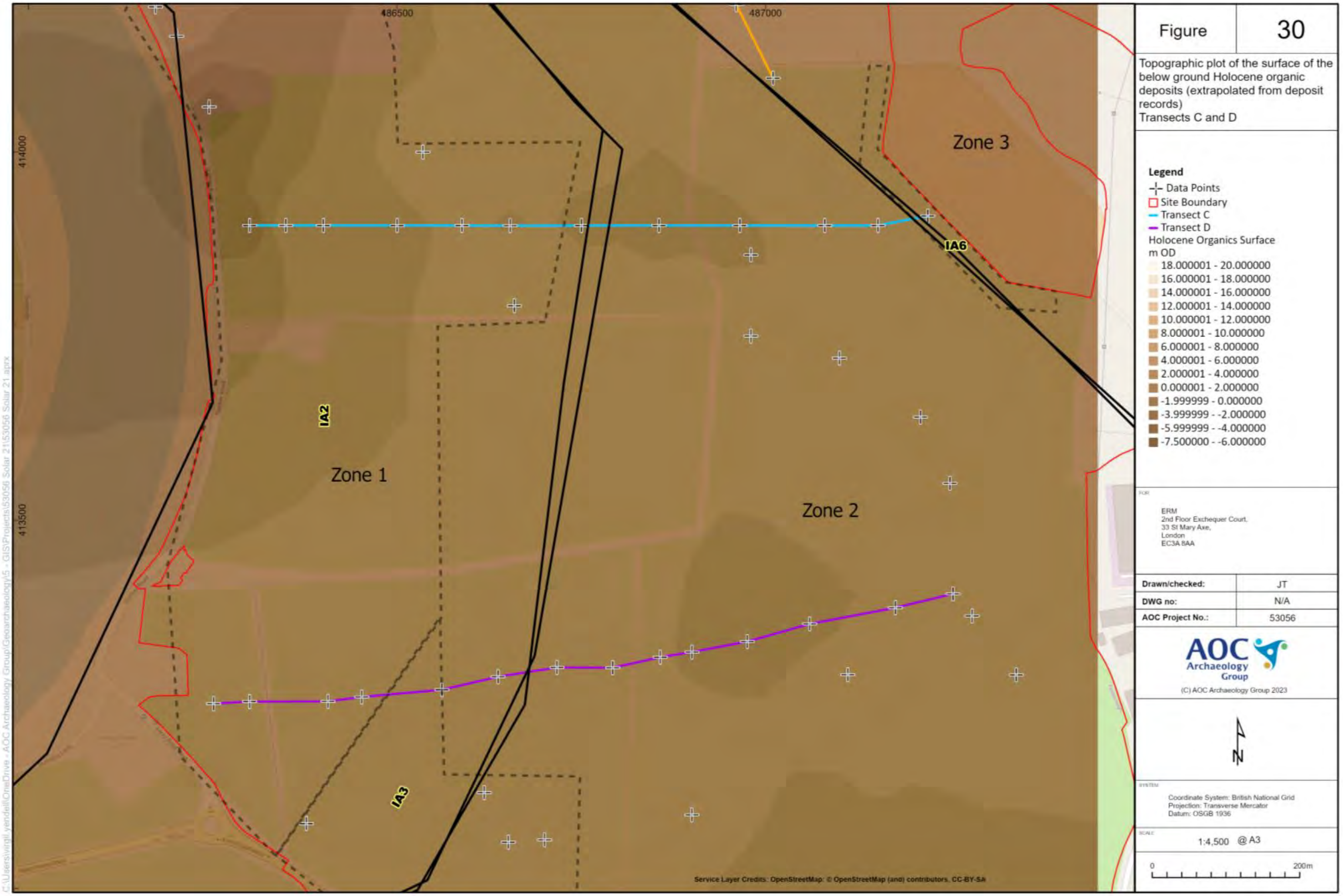


Figure 31: Topographic plot of the surface of the below ground Holocene organic deposits (extrapolated from deposit records). Transect E

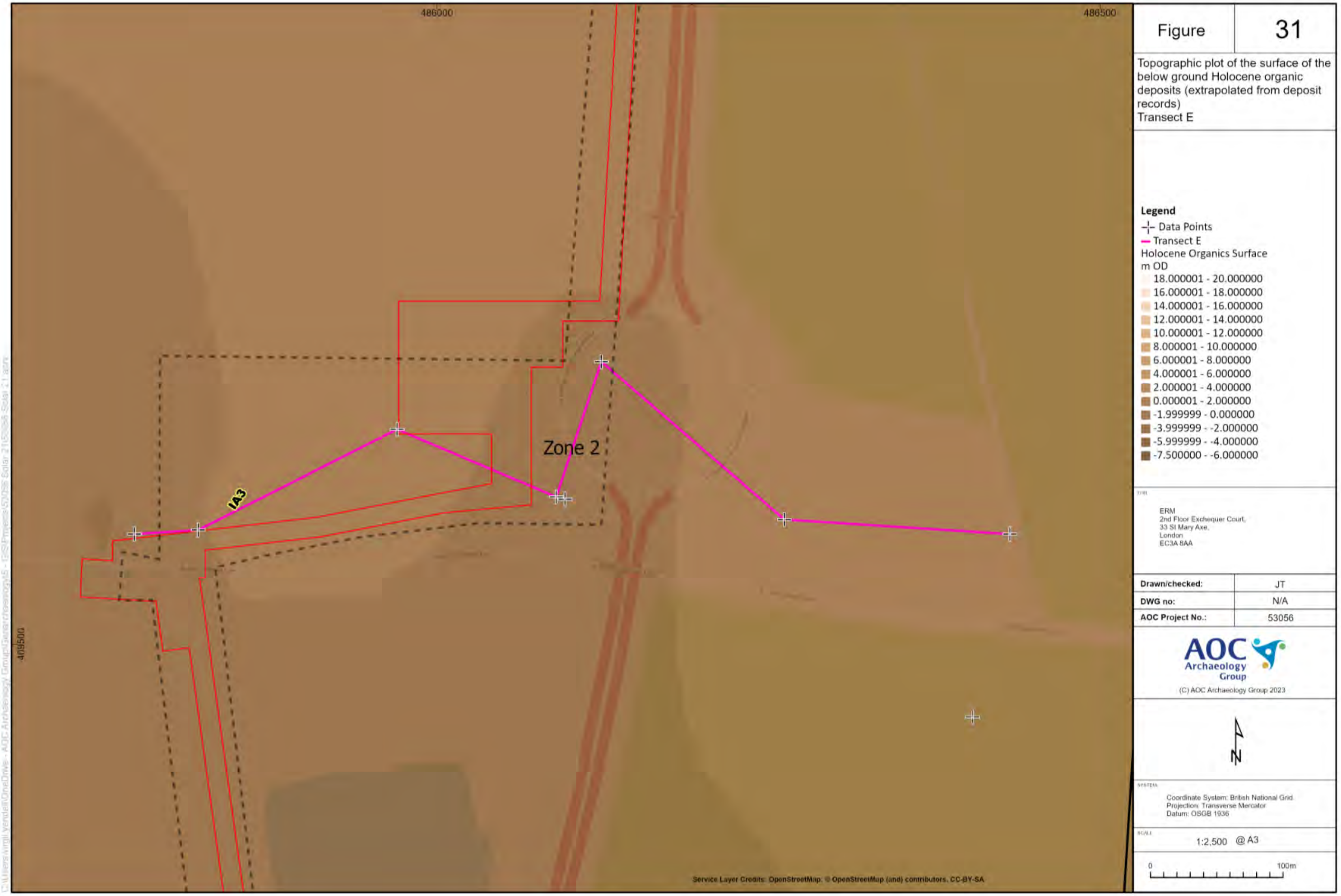


Figure 32: Thickness plot of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records), suggesting deposit survival

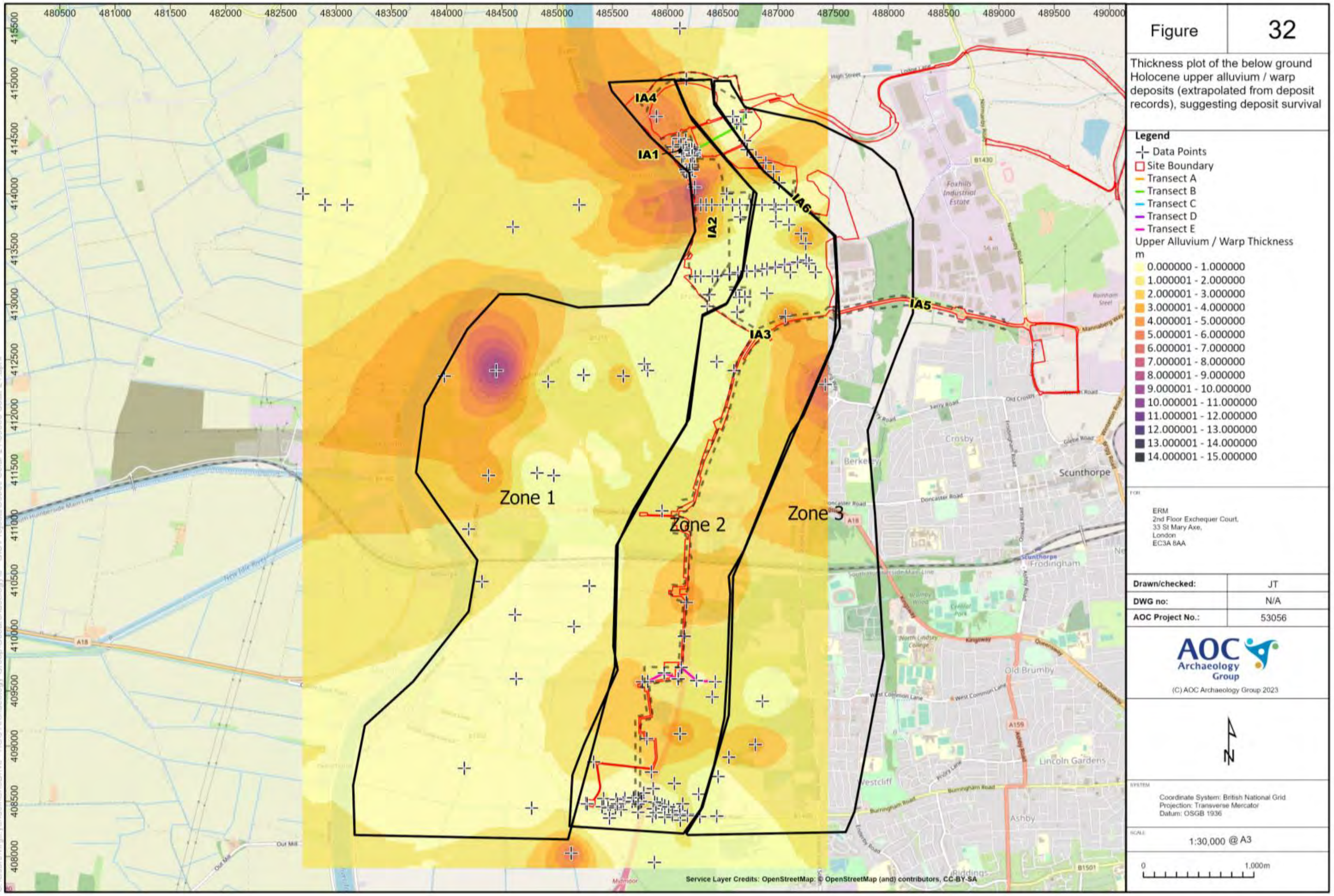


Figure 33: Thickness plot of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records), suggesting deposit survival. Transects A and B

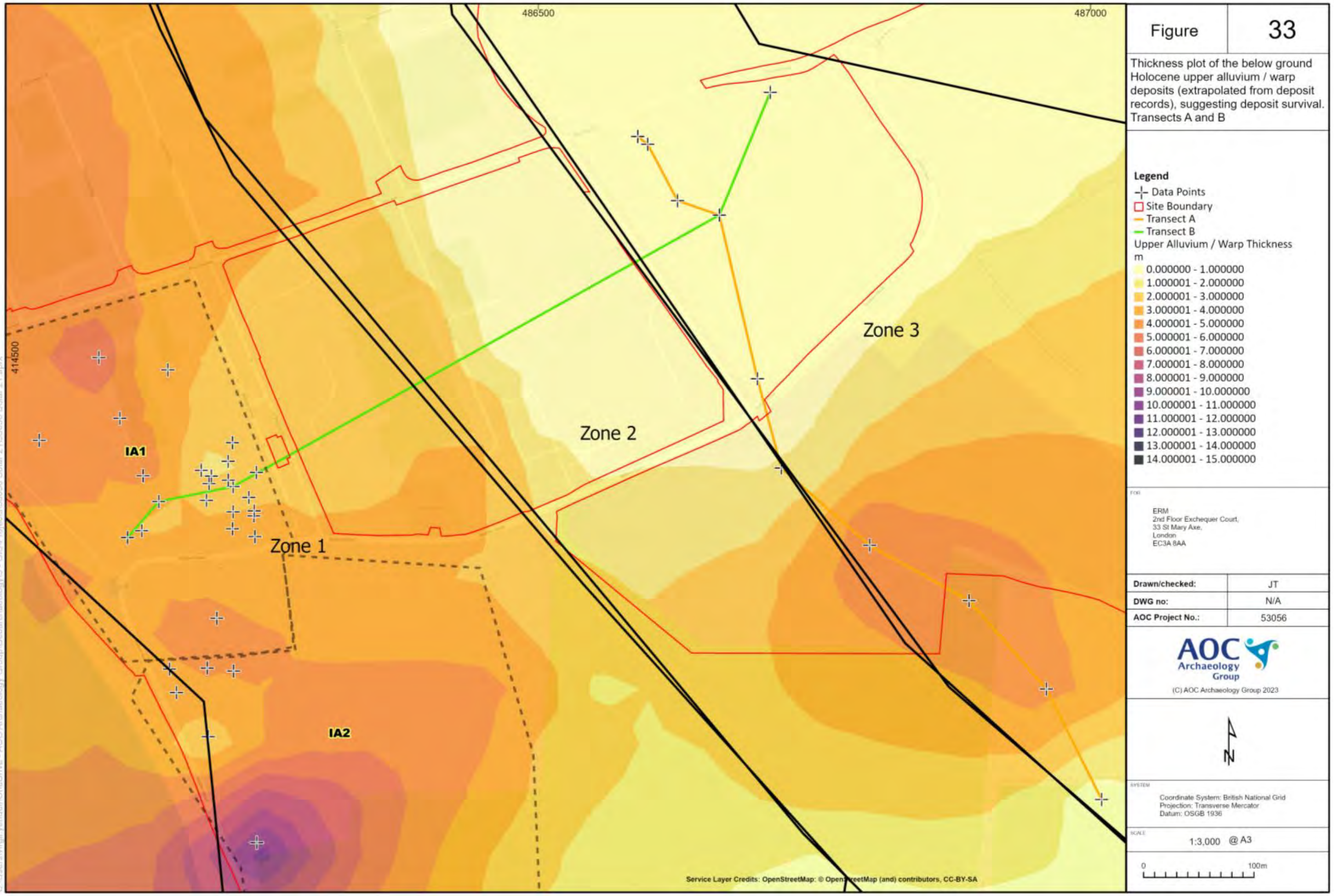


Figure 34: Thickness plot of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records), suggesting deposit survival. Transects C and D

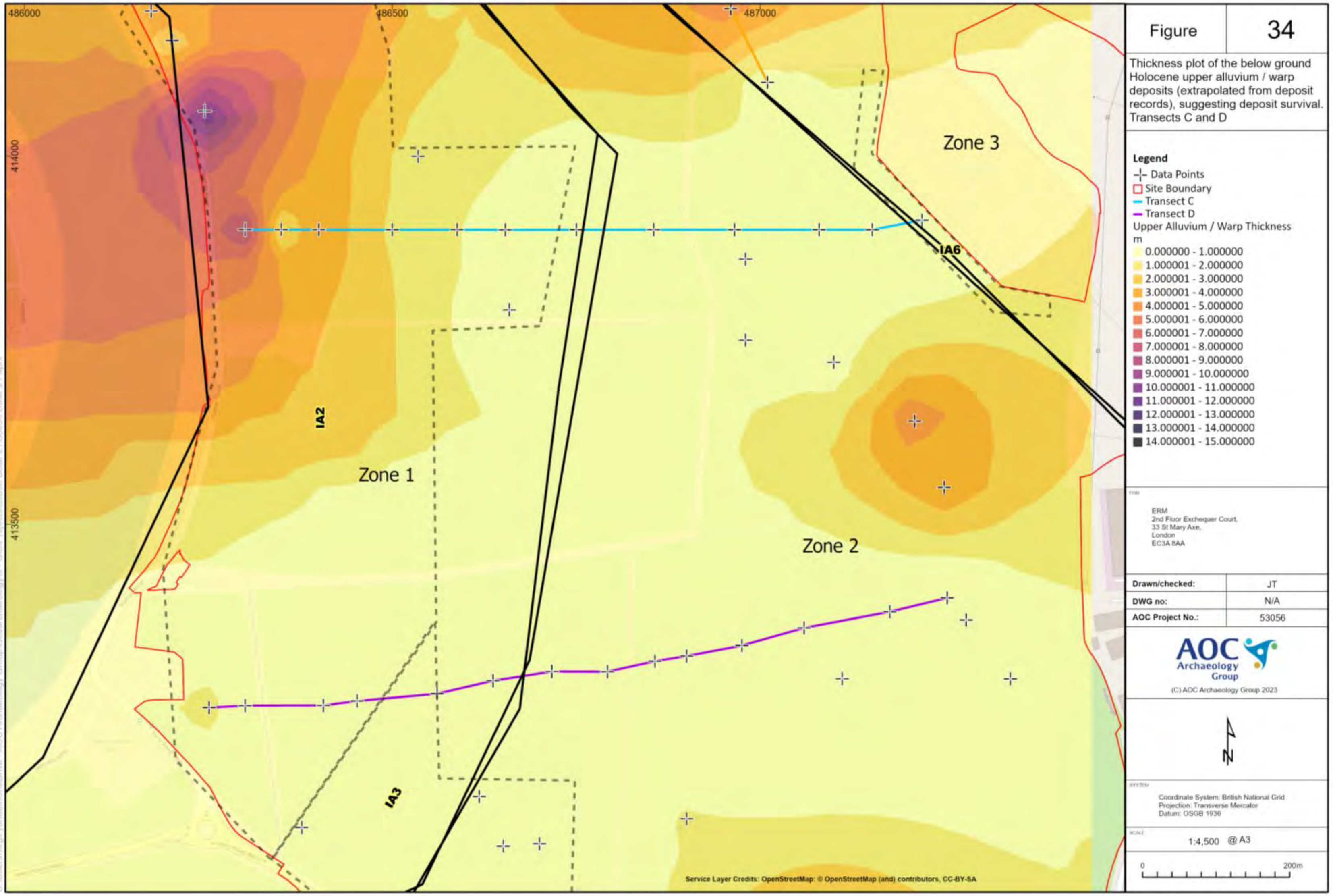


Figure 35: Thickness plot of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records), suggesting deposit survival. Transect E

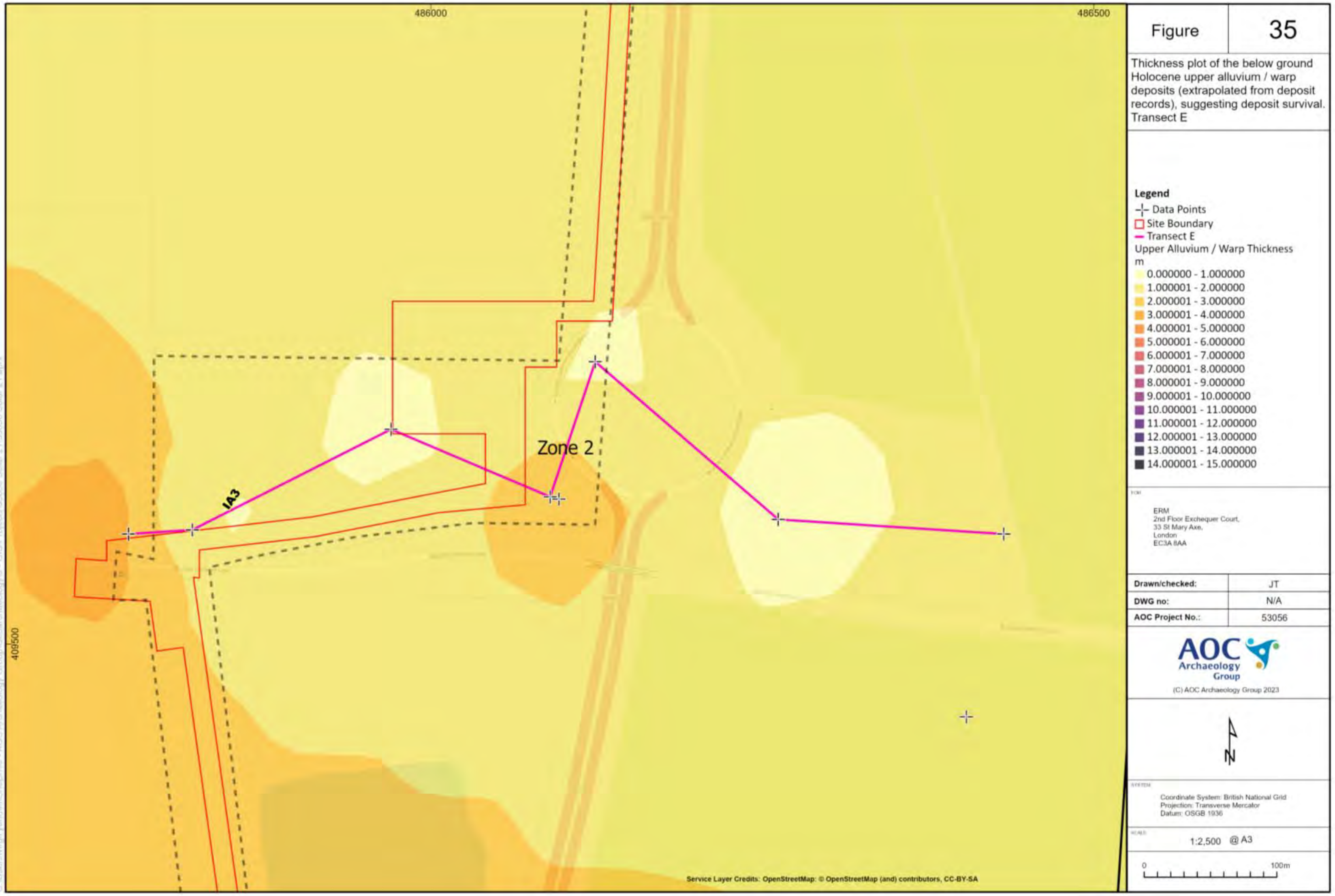


Figure 36: Topographic plot of the surface of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records)

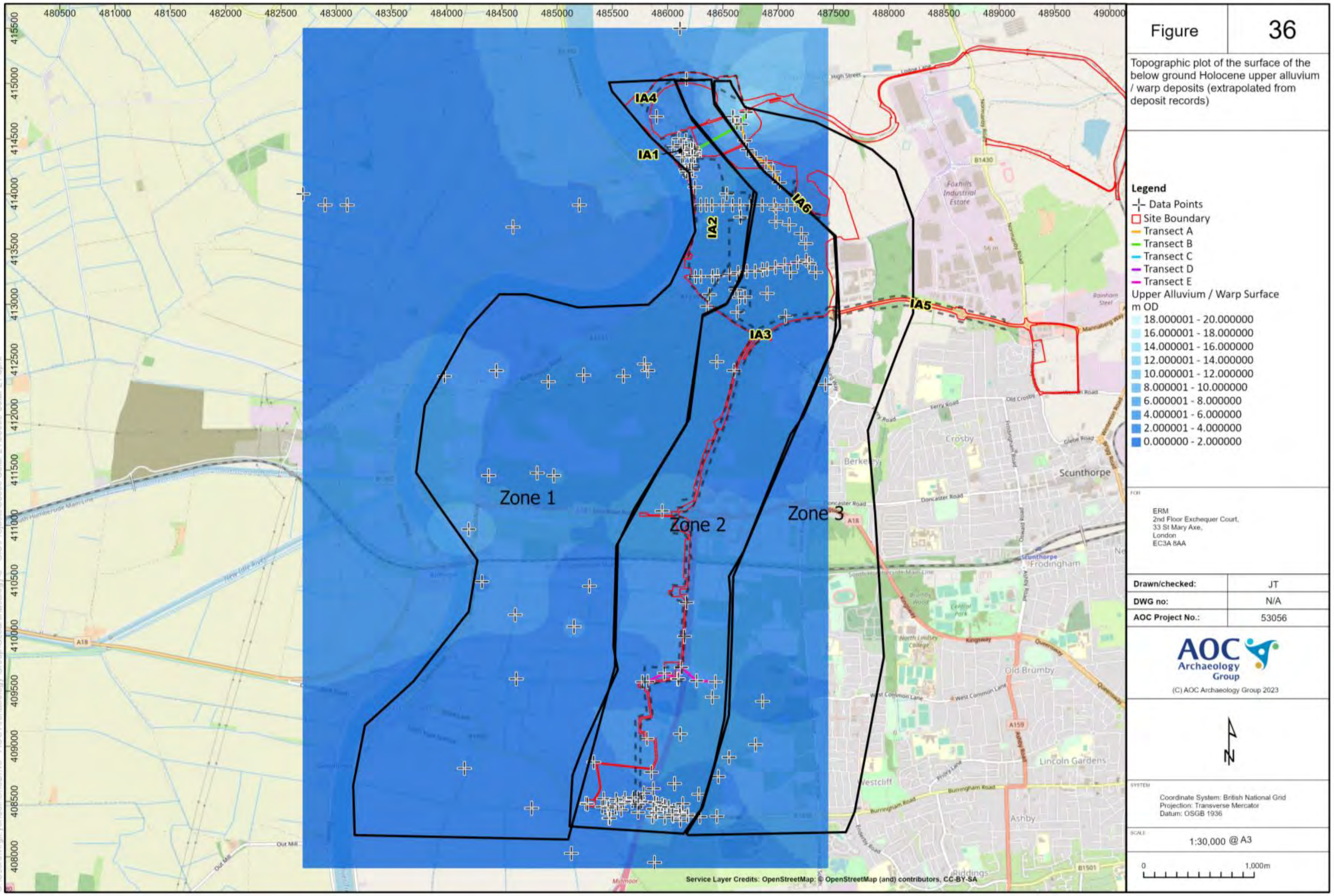


Figure 37: Topographic plot of the surface of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records). Transects A and B

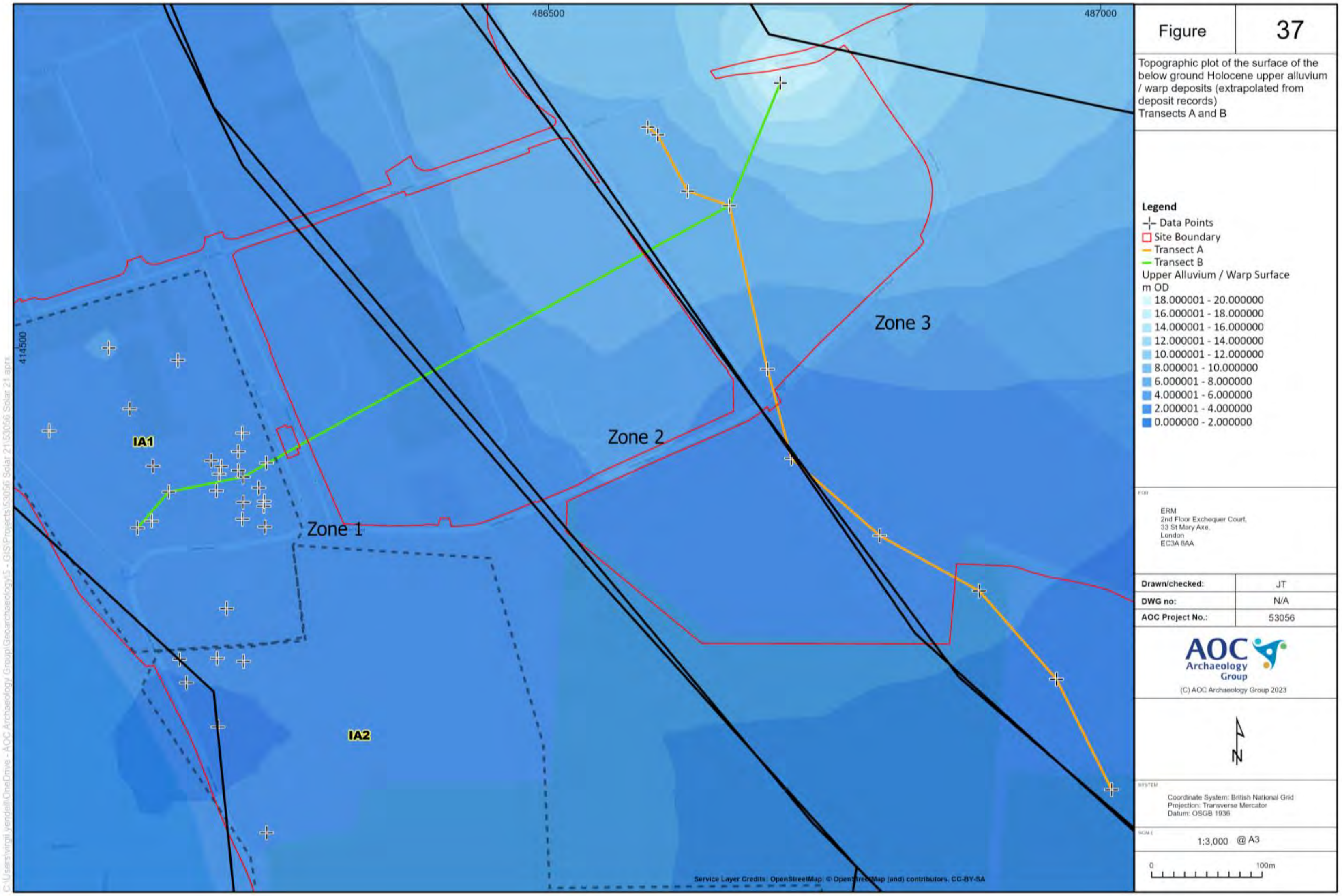


Figure 38: Topographic plot of the surface of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records). Transects C and D

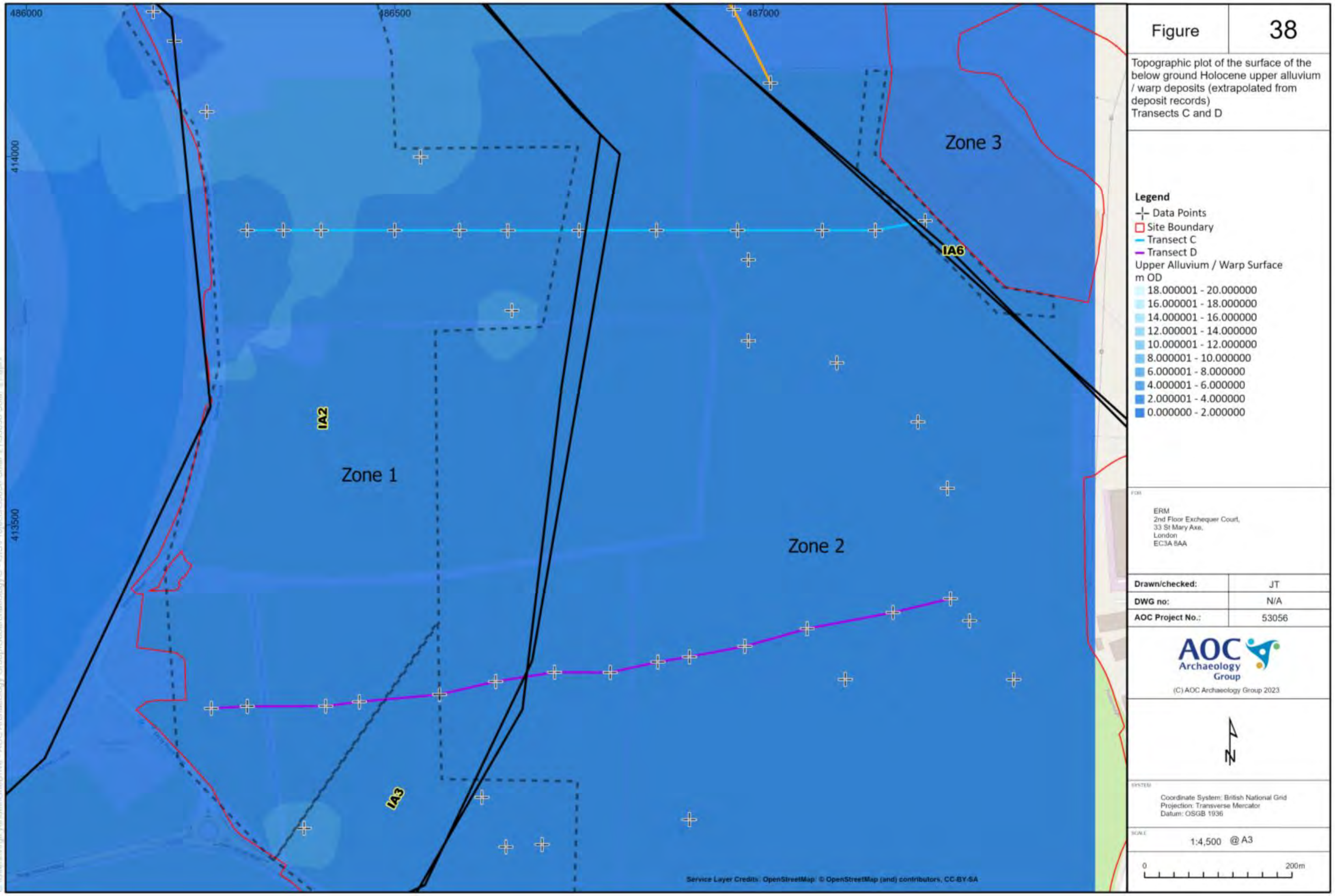


Figure 39: Topographic plot of the surface of the below ground Holocene upper alluvium / warp deposits (extrapolated from deposit records). Transect E

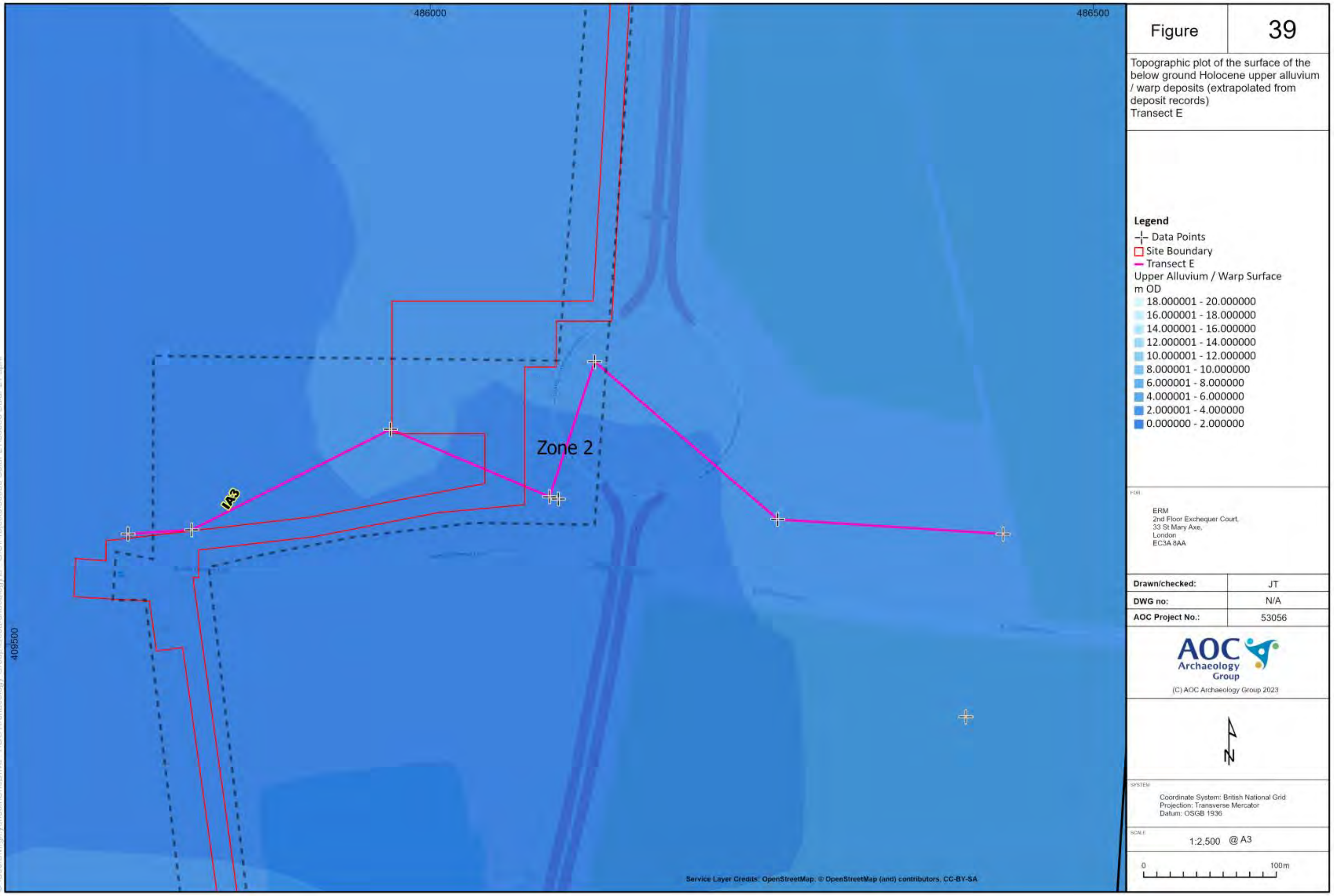
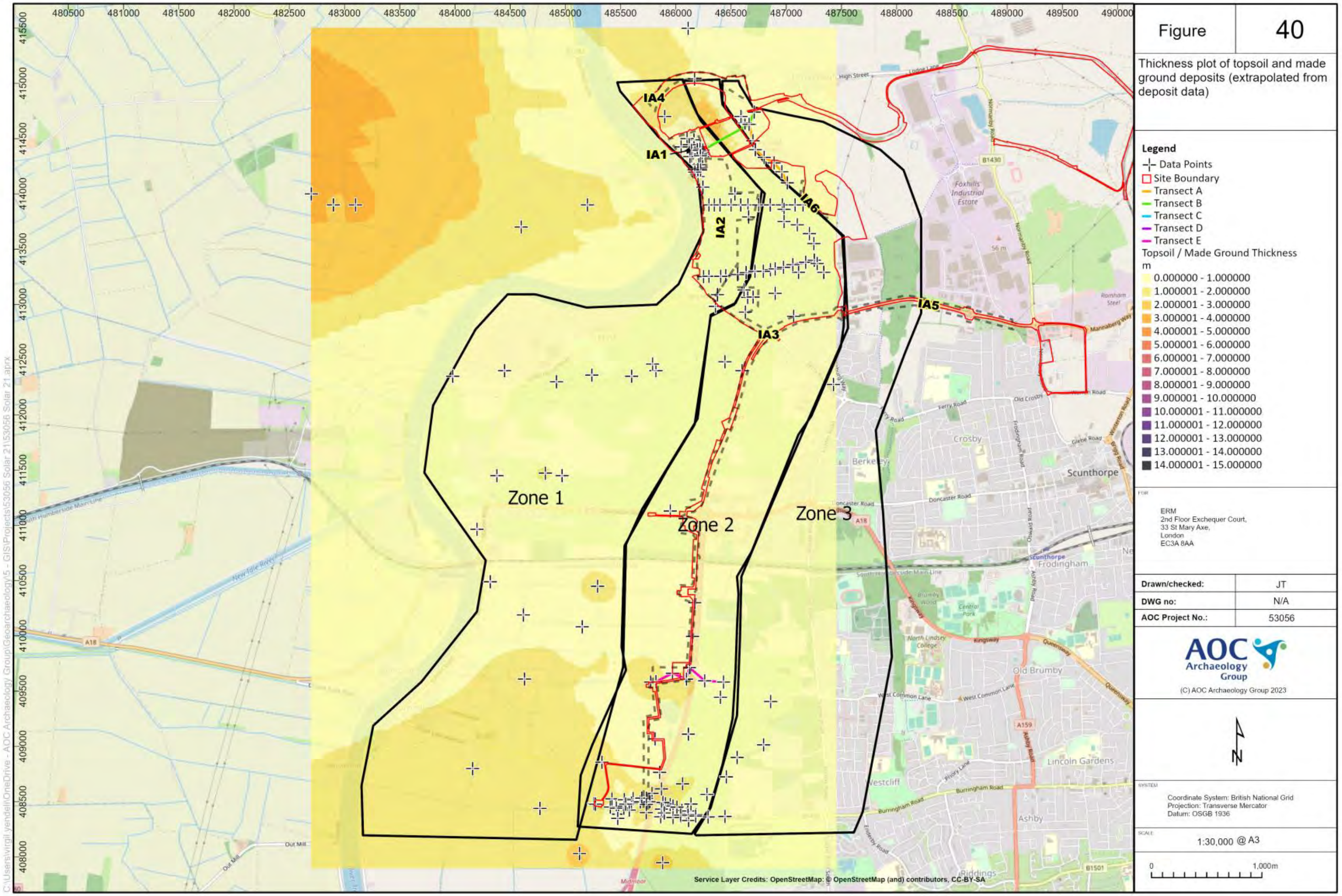


Figure 40: Thickness plot of topsoil and made ground deposits (extrapolated from deposit data)



APPENDICES

17 APPENDIX A – DEPOSIT MODEL DATA REFERENCES

Deposit log	Easting	Northing	Elevation	Source
AECOM1216_LincLakes_BH01	485456.3	408458.6	2.5	AECOM
AECOM1216_LincLakes_BH02	485481.1	408387.4	2.22	AECOM
AECOM1216_LincLakes_BH03	485613.5	408527.7	2.03	AECOM
AECOM1216_LincLakes_BH04	485732.8	408401.4	9.92	AECOM
AECOM1216_LincLakes_BH05	485784.4	408575.4	1.76	AECOM
AECOM1216_LincLakes_BH06	485948.8	408473.8	2.09	AECOM
AECOM1216_LincLakes_BH07	486097.5	408390.5	2.25	AECOM
AECOM1216_LincLakes_SA01	485598.3	408487.4	2.17	AECOM
AECOM1216_LincLakes_SA02	485679.1	408498.6	1.94	AECOM
AECOM1216_LincLakes_SA03	485906.5	408481.2	1.95	AECOM
AECOM1216_LincLakes_SA04	485974.5	408460.9	2.24	AECOM
AECOM1216_LincLakes_TP01	485260	408482.9	1.32	AECOM
AECOM1216_LincLakes_TP02	485406.9	408451.7	2.43	AECOM
AECOM1216_LincLakes_TP03	485421.8	408525.9	1.79	AECOM
AECOM1216_LincLakes_TP04	485461.6	408441.3	2.51	AECOM
AECOM1216_LincLakes_TP05	485469.3	408348.8	2.3	AECOM
AECOM1216_LincLakes_TP06	485529.4	408442.1	2.18	AECOM
AECOM1216_LincLakes_TP07	485533.8	408517.6	1.83	AECOM
AECOM1216_LincLakes_TP08	485735.3	408531.2	1.86	AECOM
AECOM1216_LincLakes_TP09	485765.6	408500	1.92	AECOM
AECOM1216_LincLakes_TP10	485883.2	408493.6	1.76	AECOM
AECOM1216_LincLakes_TP11	486047.9	408368.7	1.91	AECOM
AECOM1216_LincLakes_TP12	486055.2	408420.2	2.17	AECOM
AECOM1216_LincLakes_TP13	486108.3	408415.8	2.08	AECOM
AECOM1216_LincLakes_TP14	486111	408378.6	2.13	AECOM
AECOM1216_LincLakes_TP15	486183.7	408383.3	2.15	AECOM
AECOM1216_LincLakes_WS01	485579	408424.7	4.74	AECOM
AECOM1216_LincLakes_WS02	485691.5	408532.2	1.96	AECOM
AECOM1216_LincLakes_WS03	485870.1	408615.8	3.92	AECOM
AECOM1216_LincLakes_WS04	485863.2	408363.3	7.68	AECOM
AECOM1216_LincLakes_WS05	485974.9	408356.8	3.12	AECOM
AECOM1216_LincLakes_WS06	486010.2	408450.9	2.09	AECOM
AECOM1216_LincLakes_WS07	486115.9	408329.9	2.05	AECOM
AECOM1216_LincLakes_WS08	486291.9	408362.2	2.45	AECOM
AOC52033_BH1	485273	408478	1.475053	AOC
AOC52033_BH2	485474	408349	2.310903	AOC
AOC52033_BH3	485546	408478	2.479138	AOC
AOC52033_BH4	485734	408475	1.937275	AOC
AOC52033_BH5	485870	408433	2.39711	AOC
AOC52033_BH6	486043	408379	2.084866	AOC
AOC52033_BH7	486137	408479	2.199354	AOC
AOC53056_AH1	486251	413251	1.81	AOC
AOC53056_AH12	486857	413314	0.634347	AOC
AOC53056_AH13	486900	413321	0.457444	AOC

AOC53056_AH16	487111.4	413290.2	1.174495	AOC
AOC53056_AH20	487254.2	413400	1.21567	AOC
AOC53056_AH24	486349	413900.1	2.309862	AOC
AOC53056_AH26	486588	413900	1.337877	AOC
AOC53056_AH27	487219.9	413912.9	1.878774	AOC
AOC53056_AH30	486626	414642	6.200014	AOC
AOC53056_AH31	486599	414693	7.393005	AOC
AOC53056_AH5	486452	413260	1.23644	AOC
AOC53056_AH9	486650.9	413062.9	0.690924	AOC
AOC53056_BH1	486156.2	414369.7	2.91456	AOC
AOC53056_BH2	486663.9	414628.9	7.336347	AOC
AOC53056_BH3	486700.1	413066	0.899715	AOC
AOC53056_BH4	486090	409611.1	2.565646	AOC
AOC53056_BH5	486299.9	413900	2.4271	AOC
AOC53056_BH6	486653.5	413899.8	0.905602	AOC
AOC53056_BH7	486299.9	413253.7	1.621606	AOC
AOC53056_BH8	486406.3	413254	1.533232	AOC
AOC53056_WS1	486500	413900	1.751561	AOC
AOC53056_WS10	486792.5	413299.7	1.077281	AOC
AOC53056_WS11	486975.1	413335.2	0.303925	AOC
AOC53056_WS12	487059.7	413359.2	0.410388	AOC
AOC53056_WS13	487176.1	413381.2	0.919248	AOC
AOC53056_WS2	486750.2	413899.9	0.963402	AOC
AOC53056_WS3	486855.3	413900	0.838918	AOC
AOC53056_WS4	486965.1	413900	0.770907	AOC
AOC53056_WS5	487080.1	413900	1.395873	AOC
AOC53056_WS6	487152.3	413900	1.714448	AOC
AOC53056_WS7	486560.8	413269.8	0.819435	AOC
AOC53056_WS8	486636.9	413287.5	1.06439	AOC
AOC53056_WS9	486716.9	413300	1.439985	AOC
AOC_25864_HW1	482700	414000	0.16	AOC
AOC_25864_HW2	482900	413900	0.55	AOC
AOC_25864_HW3	483100	413900	0.65	AOC
AOC_25864_HW4	484600	413700	1.7	AOC
AOC_25864_HW5	485200	413900	2.15	AOC
AOC_25864_HW6	486400	413900	3.015	AOC
AOC_25864_HW7	486900	413100	2	AOC
AOC_25864_HW8	486600	412400	2	AOC
AOC_25864_MW0	486659	413791.1	2.972	AOC
AOC_25864_MW1	486535	413999.7	3.772	AOC
AOC_25864_MW5	486199.4	414370.7	3.68	AOC
AOC_25864_MW7	486164.5	414488.8	3.498	AOC
AOC_25864_MW8	486698.4	414480.8	4.064	AOC
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AOC_25864_TP12	486096.6	409609.3	2.655	AOC
AOC_25864_TP14	486151.4	409995.2	2.828	AOC
AOC_25864_TP16	486171.4	410300.8	2.938	AOC

AOC_25864_TP21	486618.2	413130.2	2.921	AOC
AOC_25864_TP22	486377	413088.1	2.99	AOC
AOC_25864_TP26	486200.9	414156.9	2.811	AOC
AOC_25864_TP32	485812.7	409068.7	4.234	AOC
AOC_25864_TP35	485853.7	408765.7	3.911	AOC
ARC_25864_WT1	486111.3	415498.2	4.5	AOC
DS20-1405.01_CP101	486242.3	414356.7	4.1	DS
DS20-1405.01_CP102	486223.6	414383.2	4.06	DS
DS20-1405.01_CP103	486223	414422.9	3.53	DS
DS20-1405.01_DS101	486140.9	414343.3	5	DS
DS20-1405.01_DS102	486242.7	414361.1	4	DS
DS20-1405.01_DS103	486243.4	414337.9	4.18	DS
DS20-1405.01_DS104	486237.8	414373.4	4.09	DS
DS20-1405.01_DS105	486223.6	414360.3	3.74	DS
DS20-1405.01_DS106	486201.8	414385.9	4.08	DS
DS20-1405.01_DS106B	486203.9	414392.7	3.78	DS
DS20-1405.01_DS107	486219.2	414389	4.04	DS
DS20-1405.01_DS108	486244.7	414396	4.07	DS
DS20-1405.01_DS109	486194.7	414397.9	3.61	DS
DS20-1405.01_DS110	486219.1	414406.1	3.53	DS
FWS1115_LincLakes_BH1	486457.8	408724.9	2.5	FWS
FWS1115_LincLakes_BH2	486179.9	408370.5	2.1	FWS
FWS1115_LincLakes_BH3	486061.7	408661.8	1.74	FWS
FWS1115_LincLakes_BH4	486858.8	409406.9	2.21	FWS
FWS1115_LincLakes_BH5	486795	409014.5	2.79	FWS
FWS1115_LincLakes_BH6	486403.9	409445.1	2.49	FWS
FWS1115_LincLakes_BH7	486555.2	408900.7	2.54	FWS
FWS1115_LincLakes_BH8	486113.7	409111.6	2.39	FWS
FWS1115_LincLakes_TP01	486445.4	408366.7	2.64	FWS
FWS1115_LincLakes_TP02	485895.2	408398	1.85	FWS
FWS1115_LincLakes_TP03	486281.9	408565.6	2.25	FWS
SE80NE69	485772	409583	3	BGS
SE80NE72	485331	408857	1.8	BGS
SE80NE75	485128	408031	1.5	BGS
SE80NE76	485881	407948	0.9	BGS
SE80NW10	484630	409610	1.5	BGS
SE80NW14	484160	408800	1.2	BGS
SE80NW53	484770	408440	2	BGS
SE81SE1	487428	412275	2.44	BGS
SE81SE15	485153	410083	2.6	BGS
SE81SE204	485950	411130	3	BGS
SE81SE21	486245	414061	3	BGS
SE81SE224	485900	414700	4.45	BGS
SE81SE23	486359	412982	2.1	BGS
SE81SE24	487067	412892	2.4	BGS
SE81SE26	486445	412481	1.5	BGS
SE81SE27	484819	411473	1.5	BGS

SE81SE28	485292	410450	1.8	BGS
SE81SE34	485820	412400	1	BGS
SE81SE40	486710	414740	19.66	BGS
SE81SE41	486590	414700	8.59	BGS
SE81SE42	486720	414400	2.85	BGS
SE81SE43	486800	414330	2.55	BGS
SE81SE44	486890	414280	2.65	BGS
SE81SE45	486960	414200	2.03	BGS
SE81SE46	487010	414100	1.6	BGS
SE81SE47	486980	413860	1.51	BGS
SE81SE48	486980	413750	1.16	BGS
SE81SE49	487100	413720	1.39	BGS
SE81SE50	487210	413640	1.93	BGS
SE81SE51	487250	413550	2	BGS
SE81SE52	487280	413370	1.46	BGS
SE81SE53	487340	413290	1.35	BGS
SE81SE70	485600	412350	1	BGS
SE81SE78	486630	412930	2	BGS
SE81SE79	485790	412460	1	BGS
SE81SE80	485240	412360	1	BGS
SE81SW26	484450	412400	2.7	BGS
SE81SW31	484380	411450	2.1	BGS
SE81SW34	484320	410490	2.4	BGS
SE81SW53	484620	410190	2.49	BGS
SE81SW6	484970	411450	2.44	BGS
SE81SW70	484920	412300	1	BGS
SE81SW72	483980	412350	3	BGS
SE81SW91	484200	410965	7	BGS
SOLAR21_IFA_BH1	486048	414425	5	IFA
SOLAR21_IFA_BH2	486102	414500	5	IFA
SOLAR21_IFA_BH3	486121	414445	5	IFA
SOLAR21_IFA_BH4	486142	414393	5	IFA
SOLAR21_IFA_BH5	486128	414337	5	IFA
SOLAR21_IFA_BH6	486223	414345	5	IFA
TLP_25864_BH1	486208.8	414264.1	2.81	TLP
TLP_25864_BH2	486166	414218	2.81	TLP
TLP_25864_BH3	486200.1	414218.9	2.81	TLP
TLP_25864_BH4	486224	414216.2	2.81	TLP
TLP_25864_BH5	486172.3	414196.8	2.81	TLP

18 APPENDIX B – RADIOCARBON DATING SPECIALIST REPORTS

BETA Beta Analytic
TESTING LABORATORY

Beta Analytic, Inc.
4985 SW 74th Court
Miami, FL 33155 USA
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2017-Accredited Testing Laboratory

January 05, 2023

Miss Jackaline Robertson
AOC Archaeology Group
Edgefield Road Industrial Estate
Loanhead
Loanhead, EH20 9SY
United Kingdom

RE: Radiocarbon Dating Results

Dear Miss Robertson,

Enclosed is the radiocarbon dating result for one sample recently sent to us. As usual, specifics of the analysis are listed on the report with the result and calibration data is provided where applicable. The Conventional Radiocarbon Age has been corrected for total fractionation effects and where applicable, calibration was performed using 2020 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

The reported result is accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all pretreatments and chemistry were performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analysis.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C was measured separately in an IRMS (isotope ratio mass spectrometer). It is NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the result, please consider any communications you may have had with us regarding the sample. As always, your inquiries are most welcome. If you have any questions or would like further details of the analysis, please do not hesitate to contact us.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely,

[redacted]

Chris Patrick
Vice President of Laboratory Operations

Page 1 of 3

Beta Analytic, Inc.
4985 SW 74th Court
Miami, FL 33155 USA
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Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2017-Accredited Testing Laboratory

REPORT OF RADIOCARBON DATING ANALYSES

Jackaline Robertson — Report Date: January 05, 2023

AOC Archaeology Group — Material Received: December 20, 2022

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
Beta - 650161	**53056 BH8 <1.2-1.4>**	**2460 +/- 30 BP**	IRMS δ13C: -28.8 o/oo

(60.5%)	**671 - 452 cal BC**	**(2620 - 2401 cal BP)**
(29.2%)	**757 - 679 cal BC**	**(2706 - 2628 cal BP)**
(5.7%)	**446 - 416 cal BC**	**(2395 - 2365 cal BP)**

Submitter Material: Willow Roundwood
Pretreatment: (wood) acid/alkali/acid
Analyzed Material: Wood
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 73.62 +/- 0.27 pMC
Fraction Modern Carbon: 0.7362 +/- 0.0027
D14C: -263.79 +/- 2.75 o/oo
Δ14C: -270.26 +/- 2.75 o/oo (1950:2023)
Measured Radiocarbon Age: (without d13C correction): 2520 +/- 30 BP
Calibration: BetaCal4.20: HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB. References for calendar calibrations are cited at the bottom of calibration graph pages.

BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: d13C = -28.8 o/oo)

Laboratory number **Beta-650161**

Conventional radiocarbon age **2460 ± 30 BP**

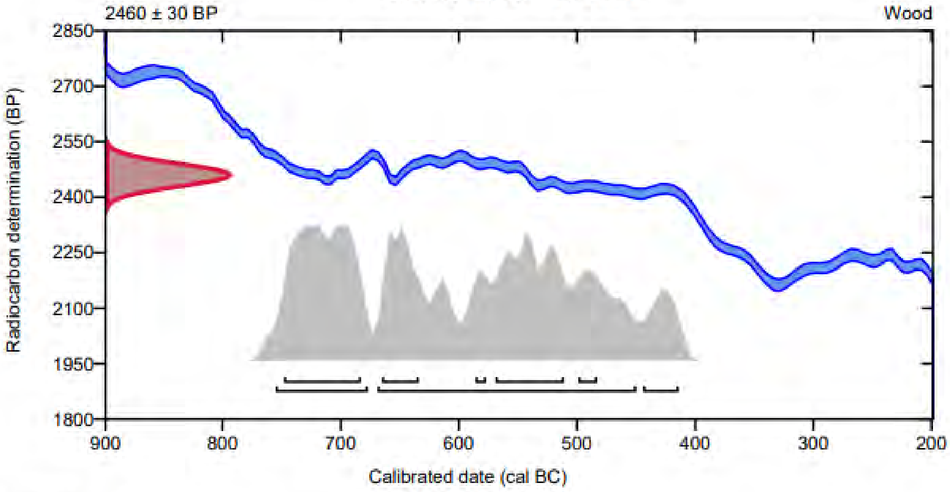
95.4% probability

(60.5%)	671 - 452 cal BC	(2620 - 2401 cal BP)
(29.2%)	757 - 679 cal BC	(2706 - 2628 cal BP)
(5.7%)	446 - 416 cal BC	(2395 - 2365 cal BP)

68.2% probability

(27.8%)	750 - 685 cal BC	(2699 - 2634 cal BP)
(21%)	571 - 513 cal BC	(2520 - 2462 cal BP)
(11.8%)	667 - 636 cal BC	(2616 - 2585 cal BP)
(4.8%)	501 - 485 cal BC	(2450 - 2434 cal BP)
(2.8%)	588 - 579 cal BC	(2537 - 2528 cal BP)

53056 BH8 <1.2-1.4>



Database used

INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al., 2020, Radiocarbon 62(4):725-757.

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • Email: beta@radiocarbon.com

Beta Analytic
TESTING LABORATORY

Beta Analytic, Inc.
4985 SW 74th Court
Miami, FL 33155 USA
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2017-Accredited Testing Laboratory

Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NISTSRM-1990C and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: January 05, 2023
Submitter: Miss Jackaline Robertson

QA MEASUREMENTS

Reference 1

Expected Value: 129.41 +/- 0.06 pMC
Measured Value: 129.31 +/- 0.35 pMC
Agreement: Accepted

Reference 2

Expected Value: 0.44 +/- 0.04 pMC
Measured Value: 0.44 +/- 0.04 pMC
Agreement: Accepted

Reference 3

Expected Value: 96.69 +/- 0.50 pMC
Measured Value: 97.04 +/- 0.29 pMC
Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation: [redacted]

Date: January 05, 2023

Beta Analytic
TESTING LABORATORY

Beta Analytic, Inc.
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Miami, FL 33155 USA
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ISO/IEC 17025:2017-Accredited Testing Laboratory

February 20, 2023

Miss Jackaline Robertson
AOC Archaeology Group
Edgefield Road Industrial Estate
Loanhead
Loanhead, EH20 9SY
United Kingdom

RE: Radiocarbon Dating Results

Dear Miss Robertson,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2020 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

Thank you for prepaying the analyses. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely,

[redacted]

Digital signature on file

Ronald E. Hatfield President

Beta Analytic, Inc.
4985 SW 74th Court
Miami, FL 33155 USA
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

Beta Analytic
TESTING LABORATORY

ISO/IEC 17025:2017-Accredited Testing Laboratory

REPORT OF RADIOCARBON DATING ANALYSES

Jackaline Robertson
AOC Archaeology Group

Report Date: February 20, 2023
Material Received: February 06, 2023

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
Beta - 655329	**53056 BH1 <5.8-5.85>**	**3330 +/- 30 BP**	IRMS δ13C: -27.6 o/oo

(94.4%)	**1688 - 1517 cal BC**	**(3637 - 3466 cal BP)**
(1.0%)	**1729 - 1723 cal BC**	**(3678 - 3672 cal BP)**

Submitter Material: Woody Material
Pretreatment: (wood) acid/alkali/acid
Analyzed Material: Wood
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 66.06 +/- 0.25 pMC
Fraction Modern Carbon: 0.6606 +/- 0.0025
D14C: -339.36 +/- 2.47 o/oo
Δ14C: -345.17 +/- 2.47 o/oo (1950:2023)
Measured Radiocarbon Age: (without d13C correction): 3370 +/- 30 BP
Calibration: BetaCal4.20: HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB. References for calendar calibrations are cited at the bottom of calibration graph pages.

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ISO/IEC 17025:2017-Accredited Testing Laboratory

REPORT OF RADIOCARBON DATING ANALYSES

Jackaline Robertson — Report Date: February 20, 2023

AOC Archaeology Group — Material Received: February 06, 2023

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
Beta - 655330	**53056 BH6 <1.2-1.3> A**	**2850 +/- 30 BP**	IRMS δ13C: -27.2 o/oo

(95.4%) **1114 - 924 cal BC** **(3063 - 2873 cal BP)**

Submitter Material: Woody Material
Pretreatment: (wood) acid/alkali/acid
Analyzed Material: Wood
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 70.13 +/- 0.26 pMC
Fraction Modern Carbon: 0.7013 +/- 0.0026
D14C: -298.68 +/- 2.62 o/oo
Δ14C: -304.84 +/- 2.62 o/oo (1950:2023)
Measured Radiocarbon Age: (without d13C correction): 2890 +/- 30 BP
Calibration: BetaCal4.20: HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB. References for calendar calibrations are cited at the bottom of calibration graph pages.

Page 3 of 5

BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: d13C = -27.6 o/oo)

Laboratory number **Beta-655329**

Conventional radiocarbon age **3330 ± 30 BP**

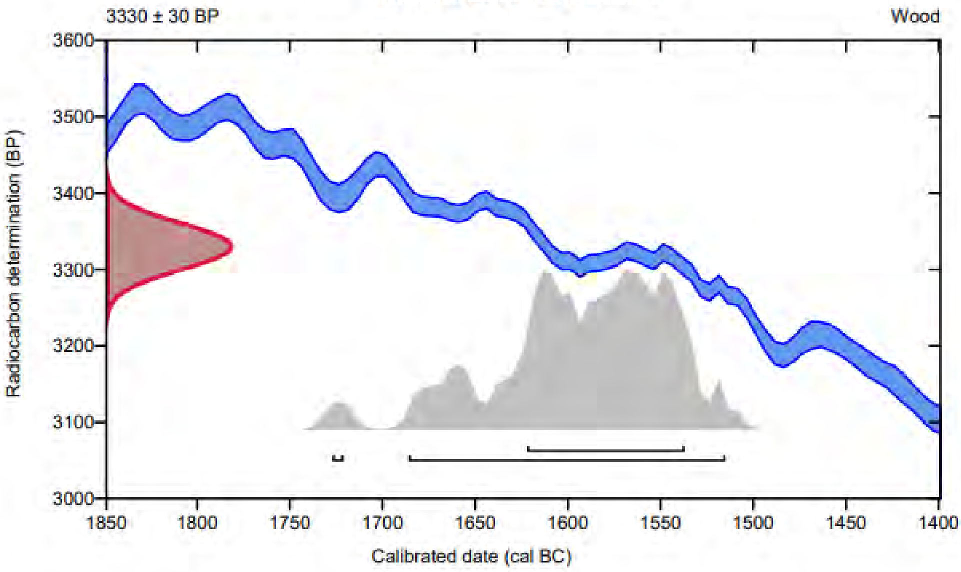
95.4% probability

(94.4%)	1688 - 1517 cal BC	(3637 - 3466 cal BP)
(1%)	1729 - 1723 cal BC	(3678 - 3672 cal BP)

68.2% probability

(68.2%)	1624 - 1539 cal BC	(3573 - 3488 cal BP)

53056 BH1 <5.8-5.85>



Database used
INTCAL20

References

References to Probability Method
Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.
References to Database INTCAL20
Reimer, et al., 2020, Radiocarbon 62(4):725-757.

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • Email: beta@radiocarbon.com

BetaCal 4.20

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: d13C = -27.2 o/oo)

Laboratory number **Beta-655330**

Conventional radiocarbon age **2850 ± 30 BP**

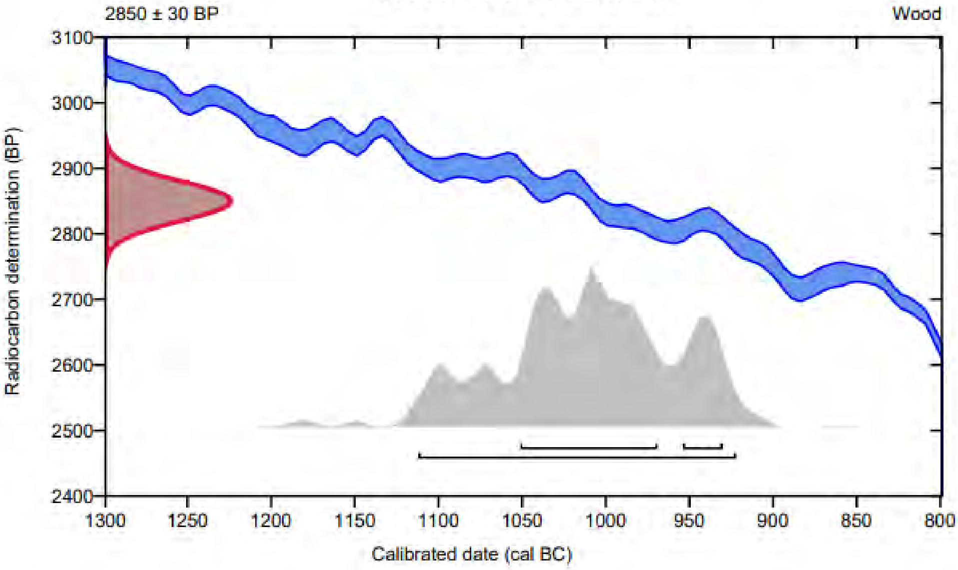
95.4% probability

(95.4%)	1114 - 924 cal BC	(3063 - 2873 cal BP)

68.2% probability

(55.2%)	1053 - 971 cal BC	(3002 - 2920 cal BP)
(13%)	956 - 932 cal BC	(2905 - 2881 cal BP)

53056 BH6 <1.2-1.3> A



Database used
INTCAL20

References

References to Probability Method
Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.
References to Database INTCAL20
Reimer, et al., 2020, Radiocarbon 62(4):725-757.

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Beta Analytic
TESTING LABORATORY

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ISO/IEC 17025:2017-Accredited Testing Laboratory

Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990C and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: March 02, 2023
Submitter: Miss Jackaline Robertson

QA MEASUREMENTS

Reference 1

Expected Value: 0.44 +/- 0.04 pMC
Measured Value: 0.44 +/- 0.04 pMC
Agreement: Accepted

Reference 2

Expected Value: 129.41 +/- 0.06 pMC
Measured Value: 129.42 +/- 0.34 pMC
Agreement: Accepted

Reference 3

Expected Value: 96.69 +/- 0.50 pMC
Measured Value: 97.10 +/- 0.28 pMC
Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation: [redacted]

Date: March 02, 2023

Scottish Universities Environmental Research Centre
Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride, Glasgow G75 0QF, Scotland, UK
Director: Professor F M Stuart Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE
07 February 2023

Laboratory Code	SUERC-108441 (GU63229)
Submitter	Jackaline Robertson AOC Holdings Ltd Unit A7 Edgefield Road Industrial Estate Loanhead EH20 9SY
Site Reference	53056
Context Reference	11.4-11.5
Sample Reference	BH1
Material	Waterlogged round wood : Alder
$\delta^{13}C$ relative to VPDB	-30.0 ‰
Radiocarbon Age BP	6979 ± 23

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

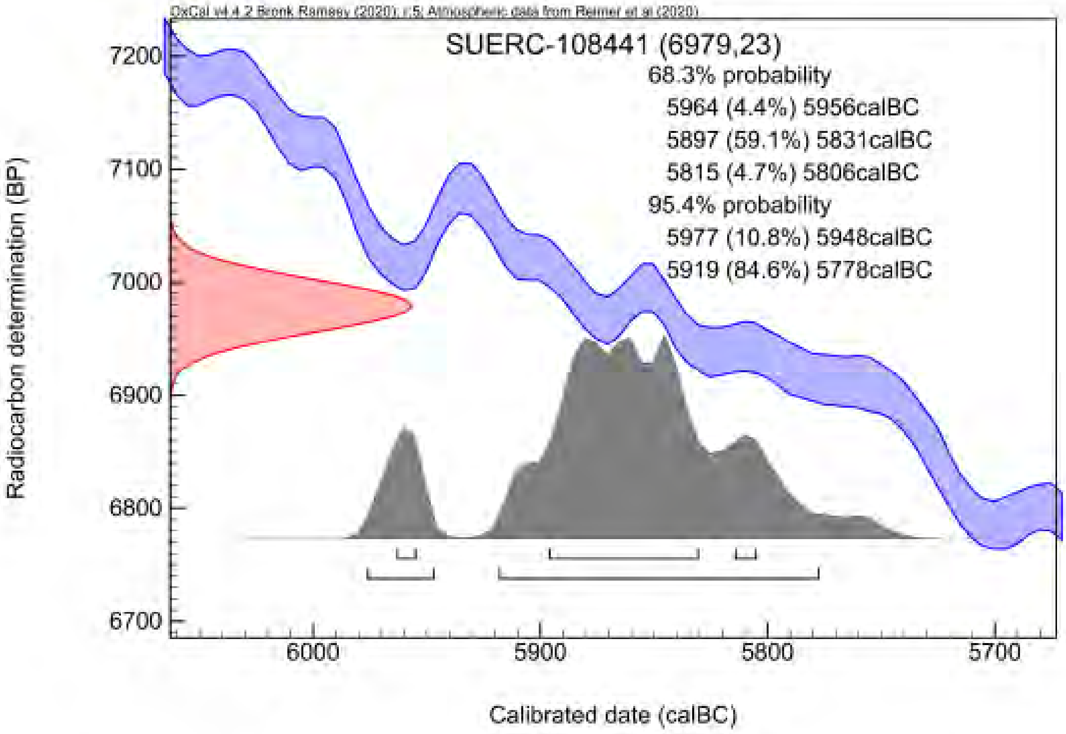
Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Laboratory and should be quoted as such in any reports within the scientific literature. The laboratory GU coding should also be given in parentheses after the SUERC code.

Detailed descriptions of the methods employed by the SUERC Radiocarbon Laboratory can be found in Dunbar et al. (2016) *Radiocarbon 58(1) pp.9-23.*

For any queries relating to this certificate, the laboratory can be contacted at suerc-c14lab@glasgow.ac.uk.

Conventional age and calibration age ranges calculated by : [redacted]

Checked and signed off by : [redacted]



The radiocarbon age given overleaf is calibrated to the calendar timescale using the Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.*

The above date ranges have been calibrated using the IntCal20 atmospheric calibration curve.†

Please contact the laboratory if you wish to discuss this further.

* Bronk Ramsey (2009) *Radiocarbon 51(1) pp.337-60*
† Reimer et al. (2020) *Radiocarbon 62(4) pp.725-57*

SUERC
Scottish Universities Environmental Research Centre
Rankine Avenue, Scottish Enterprise Technology Park, East Kilbride, Glasgow G75 0QF, Scotland, UK
Director: Professor F M Stuart Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE
07 February 2023

Laboratory Code	SUERC-108442 (GU63230)
Submitter	Jackaline Robertson AOC Holdings Ltd Unit A7 Edgefield Road Industrial Estate Loanhead EH20 9SY
Site Reference	53056
Context Reference	7.74-7.94
Sample Reference	BH6
Material	Waterlogged round wood : Alder
$\delta^{13}C$ relative to VPDB	-29.3 ‰
Radiocarbon Age BP	6789 ± 25

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD) and requires calibration to the calendar timescale. The error, expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error.

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Laboratory and should be quoted as such in any reports within the scientific literature. The laboratory GU coding should also be given in parentheses after the SUERC code.

Detailed descriptions of the methods employed by the SUERC Radiocarbon Laboratory can be found in Dunbar et al. (2016) *Radiocarbon 58(1) pp.9-23.*

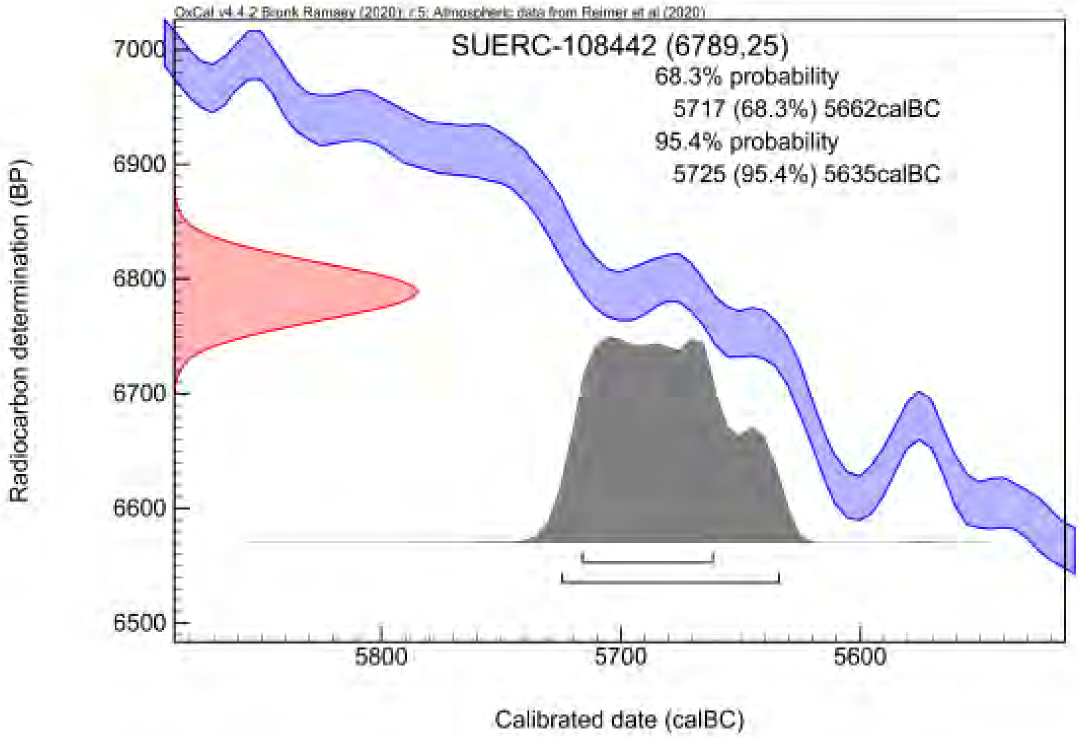
For any queries relating to this certificate, the laboratory can be contacted a[redacted]

Conventional age and calibration age ranges calculated by : [redacted]

Checked and signed off by : [redacted]

University of Glasgow
The University of Glasgow, charity number SC004401

The University of Edinburgh is a charitable body, registered in Scotland, with registration number SC005336



The radiocarbon age given overleaf is calibrated to the calendar timescale using the Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.*

The above date ranges have been calibrated using the IntCal20 atmospheric calibration curve†

Please contact the laboratory if you wish to discuss this further.

* Bronk Ramsey (2009) *Radiocarbon 51(1) pp.337-60*
† Reimer et al. (2020) *Radiocarbon 62(4) pp.725-57*

19 APPENDIX C – OASIS FORM

Summary for aocarcha1-514653

OASIS ID (UID)	aocarcha1-514653
Project Name	Evaluation at Solar 21
Sitename	Solar 21
Activity type	Evaluation
Project Identifier(s)	53056
Planning Id	
Reason For Investigation	Planning requirement
Organisation Responsible for work	AOC Archaeology Group
Project Dates	26-Sep-2022 - 30-Sep-2022
Location	Solar 21 NGR : SE 86995 13621 LL : 53.611929166230624, -0.686520806747518 12 Fig : 486995,413621
Administrative Areas	Country : England County : Lincolnshire District : North Lincolnshire Parish : Burringham Parish : Flixborough Parish : Gunness Parish : Roxby cum Risby Parish : North Lincolnshire, unparished area
Project Methodology	A geoarchaeological evaluation was undertaken on 26th-30th September 2022 at the site of the land adjacent to the Flixborough Industrial Estate, situated at Stather Road, Flixborough, Scunthorpe (NGR TA 1676 6108). The work was undertaken by AOC Archaeology Group for the consultancy ERM on behalf of the client, the North Lincolnshire Green Energy Park (NLGEP). This document summarises the stratigraphic sequence of geoarchaeological remains and discusses the results in relation to their archaeological and palaeoenvironmental potential. The principal objective of this report is to present the results, refine the research objectives of the project in light of the findings, and make recommendations concerning any subsequent archaeological investigations in order to address these research objectives. The geoarchaeological evaluation comprised the drilling of 17 purposive geoarchaeological boreholes to a maximum depth of c. 6 to 12m bgl, and the extraction and retention of the cored samples.

Project Results	The deposit sequence recorded across the site included Tertiary bedrock of Mercia mudstone underlies the site, with a surface between approximately -16 and -2m OD. This unit is overlain by Pleistocene glaciofluvial deposits in the northeast, and Sutton Sand or lower alluvium across the rest of the lower study area. The glaciofluvial / glaciolacustrine deposits are overlain with Pleistocene head on the hillslopes of the northeast. They suggest the higher elevations to have been impacted most by higher energy periglacial action. If OSL results prove the silty sands to be the pre-Holocene Sutton Sand, this would suggest the floodplain area to have been exposed and dry for a long period. As a lower alluvial deposit, it would suggest a floodplain of a wide, shallow, and potentially braided river channel with relatively high velocity existed prior to the development of wetland. The lower alluvium / Sutton Sand deposits are overlain with Holocene organics, primarily peat. The peat infills much of the lower surface of the below underlying sands. The organics vary in thickness but are shown to have a relatively level surface. They suggest a long, stable period throughout which the landscape was dominated by wetland environments. In the east, the organics are a times directly overlain with topsoil, however alluvium or warp seals much of the organic unit elsewhere and is generally thickest toward the river. The alluvium or warp is generally of finer fabric than the lower alluvium / Sutton Sand, reflecting a lower energy depositional environment. Topsoil seals the site. Made ground is identified to the north in the Flixborough Industrial Estate and adjacent to the roads throughout, as well as across the southernmost area. It truncates earlier deposits. Organic horizons sampled within the borehole interventions have been radiocarbon dated. The dates returned reveal a long period of accumulation ranging between the Late Mesolithic to the Early Iron Age. This suggests a significant portion of the later prehistoric period is likely to be represented in the sequence, with potential for palaeoenvironmental remains capturing the environmental conditions and development as well as archaeological remains associated with wetland and riparian environs.
Keywords	Palaeochannel - UNCERTAIN - FISH Thesaurus of Monument Types
Funder	
HER	North Lincolnshire HER - unRev - STANDARD
Person Responsible for work	Jessica, Taylor
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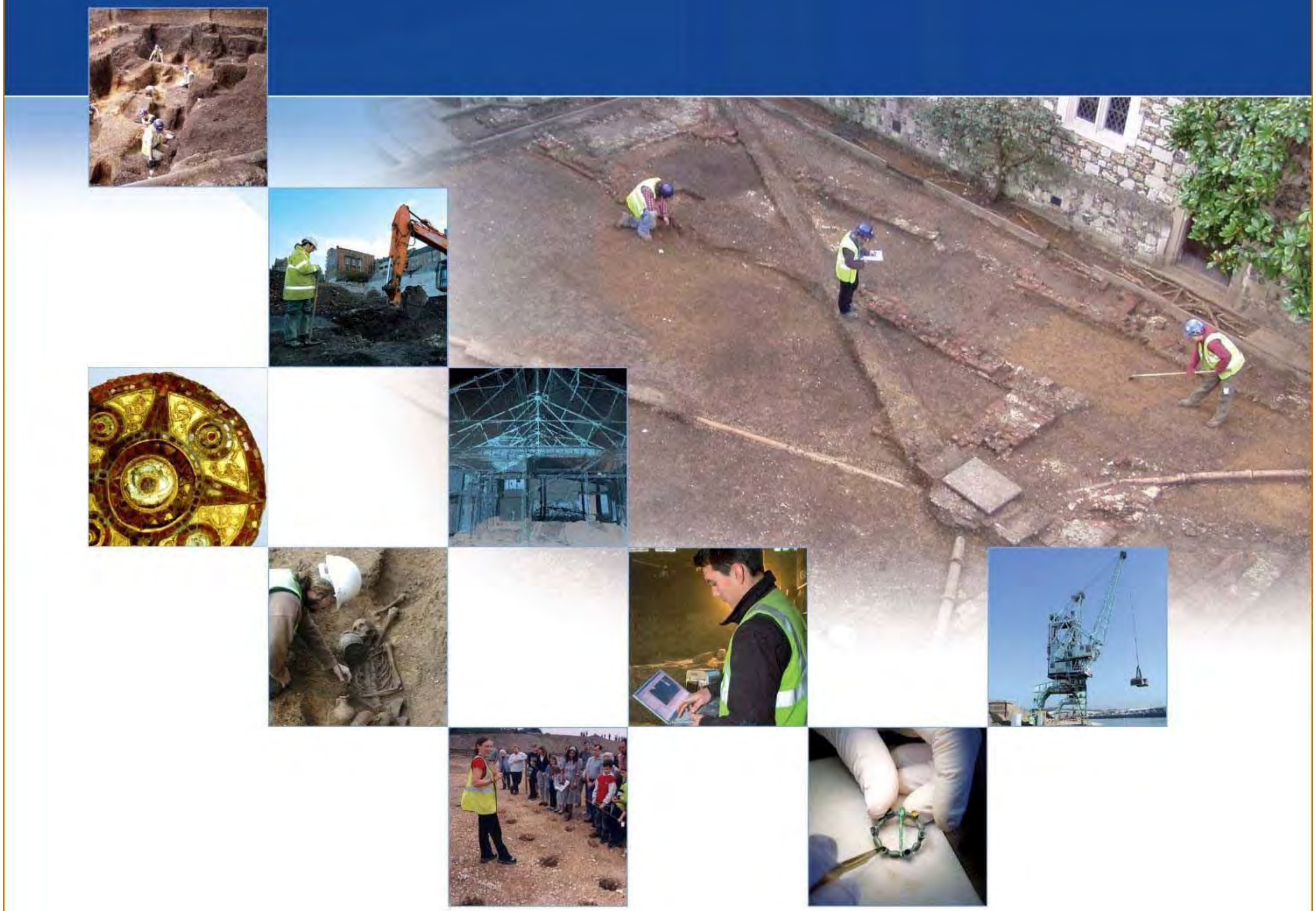

AOC Archaeology Group

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APPENDIX D TRIAL TRENCH EVALUATION REPORT

The Proposed North Lincolnshire Green Energy Park

Archaeological Evaluation

Accession Number: FXBO
Ref: 261860.04
May 2023

Unit R6
Sheaf Bank Business Park
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Sheffield
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[redacted]

Document Information

Document title	The Proposed North Lincolnshire Green Energy Park
Document subtitle	Archaeological Evaluation
Document reference	261860.04
Commissioned by	ERM Ltd
Address	2nd Floor Exchequer Court 33 St Mary Axe London EC3A 8LL
Client name	Solar 21
Address	Rathcoole Premier Office Centre Main Street Rathcoole Co Dublin Ireland D24 K519
Site location	Flixborough Wharf and Industrial Estate
County	North Lincolnshire
National grid reference (NGR)	486762 413093 (SE 86762 13093)
Planning authority	North Lincolnshire Council
Museum name	North Lincolnshire Museum
Museum accession code	FXBO
OASIS Id	wessexar1-514465
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Quality Assurance

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1	May 2023	KF	[redacted]

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Summary

Wessex Archaeology was commissioned by ERM Ltd, on behalf of Solar 21, to undertake an archaeological evaluation of four areas across a 5.5 km long scheme to the north-west of Scunthorpe that centred on NGR 486762 413093.

A total of 168 trial trenches were excavated, 17 of which contained archaeological features. The uncovered features comprised ditches and gullies, a small number of postholes and pits, one animal burial, a furrow and a hedgerow. The majority of the remains are likely to be associated with post-medieval or modern agricultural drainage practices or warping activities. There is potential for settlement of an earlier date, represented by ditches, gullies and pits, three of which are sealed by peat deposits. Previous geoarchaeological investigations undertaken within the vicinity of the scheme area have indicated a Mesolithic to Early Iron Age date for similar deposits of peat.

The finds assemblage is small but it ranges in date from the Early/Middle Mesolithic to the modern period. The three pits which produced dateable material were all post-medieval or modern in date, and any earlier material was residual or recovered from alluvial deposits. The range of the assemblage suggests that some degree of nearby occupation occurred in the Mesolithic and medieval periods, but this cannot be linked to any specific features. The relatively small size of the assemblage indicates occupation was neither intensive nor sustained.

The environmental assemblage produced evidence for medieval to post-medieval arable farming regimes through the presence of free-threshing wheat and barley. Coal/coal shale and clinker/cinder, which was widely used as a fuel in the medieval and post-medieval periods, was present in most of the samples.

The investigation has met the majority of its aims and objectives: the extent and quality of the archaeological remains have been determined; however, the lack of datable artefacts has hindered the dating of the majority of the excavated features. Little correlation was observed between the results of the geophysical survey and the evaluation trenching programme. Fifty-one of the excavated trenches targeted anomalies from the preceding geophysical survey, but archaeological features were only revealed in nine of these trenches. The remainder of the archaeological remains recorded in the evaluation were not detected through geophysical survey.

The sequence of natural deposits encountered in the trial trenching reflected the deposit model produced during geoarchaeological analysis. Seven trenches confirmed archaeological activity in the vicinity of heritage assets listed in the DBA.

The archive resulting from the evaluation is currently held at the offices of Wessex Archaeology in Sheffield. The North Lincolnshire Museum has agreed to accept the archive under the accession code FXBO, upon completion of the project. An OASIS form, wessexar1-514465, has been provisionally completed and will be finalised at the time of deposition.

Acknowledgements

Wessex Archaeology would like to thank ERM Ltd for commissioning the archaeological evaluation on behalf of Solar 21. Wessex Archaeology is also grateful for the advice of the Historic Environment Officer for North Lincolnshire Council, who monitored the project for North Lincolnshire Council, the local planning authority.

The Proposed North Lincolnshire Green Energy Park

Archaeological Evaluation

1 INTRODUCTION

1.1 Project and planning background

1.1.1 Wessex Archaeology was commissioned by ERM Ltd, on behalf of Solar 21, to undertake an archaeological evaluation of four areas along a 5.5 km long scheme (Fig. 1). The areas were located to the north-west of Scunthorpe and covered a combined total of 75 ha, centred on NGR 486762 413093. The northern extent of the evaluation areas was at NGR 486128 415118 and the southern was NGR 485748 409093.

1.1.2 The proposed development comprises a multi-technology integrated energy park comprising an Energy Recovery Facility (ERF) capable of converting non-recyclable waste into electricity and a carbon capture, utilisation and storage facility which will treat the excess gasses released from the ERF to remove and store carbon dioxide prior to emission into the atmosphere.

1.1.3 The development of the scheme has been split into several areas. Wessex Archaeology was commissioned to investigate Areas 2, 3, 4 and 6 (see Fig. 1). The areas are presented below, ordered from north to south:

- Area 4 was the furthest north, covered an area of approximately 18.5 ha and contained trenches 1–57 (Fig. 2).
- Area 6 covered 2.5 ha and contained trenches 58–59 and 61–65 (Fig. 3).
- Area 2 was 40.5 ha at its full extent, although the excavated trenches, 199–210, covered approximately 13 ha (Fig. 3).
- Area 3 contained trenches 66–157 and covered an area of approximately 41.2 ha (Figs 3–6).

1.1.4 A geoarchaeological borehole survey, undertaken in 2022, confirmed the presence of Holocene alluvial silt deposits at >10 m below ground level in the eastern, central and northern parts of Area 2 (AOC 2023). Trial trenching was therefore deemed unsuitable within these areas and the scope of the investigation within this part of the scheme was reduced (ERM 2022). Trenches were, however, excavated in the south and the east of the area, where the geoarchaeological deposit model had shown Holocene silts to be less than 1 m in depth (AOC 2023). Trenches 60 and 158–198 were not excavated.

1.1.5 All works were undertaken in accordance with a written scheme of investigation (WSI) which detailed the aims, methodologies and standards to be employed in order to undertake the evaluation (ERM 2022). The Historic Environment Officer for North Lincolnshire Council approved the WSI, on behalf of the Local Planning Authority (LPA), prior to fieldwork commencing.

1.1.6 The evaluation, comprising 168 trial trenches, was undertaken between 5th December 2022 and 17th February 2023.

1.2 Scope of the report

1.2.1 The purpose of this report is to provide a detailed description of the results of the evaluation, to interpret the results within a local, regional or wider archaeological context and assess whether the aims of the evaluation have been met.

1.2.2 This report is preceded by an interim report (Wessex Archaeology 2023b) that did not include the environmental analysis. Comments received from the client and the Historic Environment Officer for North Lincolnshire Council regarding the interim report have been considered within this report.

1.2.3 The presented results will provide further information on the archaeological resource that may be impacted by the proposed development and facilitate an informed decision with regard to the requirement for, and methods of, any further archaeological mitigation.

1.3 Location, topography, and geology

1.3.1 The evaluation area stretched north–south for 5.5 km and covered a combined area of 75 ha. Its northern extent (Area 4) was located approximately 0.8 km west of the town of Flixborough, in agricultural fields directly to the north of Flixborough Industrial Estate. Its southern extent (Area 3) lay in agricultural fields to the south of Brumby Common Lane and north of Burringham Road. The scheme was bounded to the west by the River Trent and to the south-east by the M181 and A1077 roads.

1.3.2 The scheme is located on a south-west and west facing slope, between 11 m above Ordnance Datum (aOD) at the northern end (Area 4) and 2–3 m aOD at its southern extent (Area 3).

1.3.3 The underlying geology is mapped as mudstone of the Mercia Mudstone Group, a sedimentary bedrock formed between 252.2 and 201.3 million years ago during the Triassic period. There is also a north-south aligned band of mudstone of the Penarth Group on the eastern side of Areas 3, 4 and 6. Superficial deposits of Head, windblown sand and Hemingbrough Glaciolacustrine Formation are recorded within the far eastern side of Area 4, while deposits of alluvium are recorded within the central and western parts of Area 4 and Areas 2, 3 and 6. Deposits of Warp are also recorded within Area 6, immediately to the west of the M181 and A1077 roads (British Geological Survey 2023).

1.3.4 Geoarchaeological investigations undertaken as part of the North Lincolnshire Green Energy Park (NLGEP) project have provided further understanding of the superficial deposits in the lower lying parts of the scheme (AOC 2023). Holocene organics, primarily peat, overlie the Holocene lower alluvial/Late Pleistocene Sutton Sand deposits. The organics were found to be relatively level but varied in thickness and are likely to reflect an extended stable period where the landscape was dominated by wetland environments. The organic deposits were predominantly sealed by Holocene upper alluvium or warp deposits, although some of the organic deposits within the eastern part of the scheme were sealed by topsoil. A deposit of post-medieval/modern made ground was identified in the north, in Flixborough Industrial Estate and close to Area 4 (*ibid*, ii).

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Introduction

2.1.1 The full archaeological and historical background was assessed in a prior Desk-Based Assessment (DBA) which considered the recorded historic environment resource within a 1 km study area of the proposed development (ERM 2021). The WSI (ERM 2022) assessed archaeological investigations undertaken within and on the periphery of the scheme. A summary of this is presented below and the location of relevant non-designated heritage assets is shown on Figs 2 and 3, using the site reference numbers allocated in the DBA. Additional sources of information are referenced, as appropriate.

2.2 Previous investigations within the vicinity of the proposed development

Fieldwalking, metal detecting, geophysical survey and evaluation (Allen Archaeology 2015)

2.2.1 A programme of fieldwalking, metal detecting, geophysical survey and a subsequent archaeological evaluation was conducted by Allen Archaeology on land located on either side of the M181, north of Brumby Common Lane and adjacent to the southern section of Area 3 (Allen Archaeology 2015a; 2015b; 2015c). The evaluation consisted of seventeen trial trenches aimed at testing anomalies noted in the geophysical survey and evaluating other parts of the site. Sixty-nine hand-dug test pits were also excavated to investigate the geological deposits on the site. Peat deposits were identified in a number of trenches. Possibly modern agricultural practices or warping activities were represented by linear features.

Borehole investigation and watching brief (Allen Archaeology 2015)

2.2.2 Located 300 m west of the M181 and the southern section of Area 3, Allen Archaeology undertook paleoenvironmental assessment of borehole samples from which a detailed deposit model was constructed (Allen Archaeology 2015d). A watching brief during excavation of geotechnical test pits was also undertaken (Allen Archaeology 2015e). These investigations identified the potential for the survival of prehistoric ground surfaces buried at depth across the site, as well as peats of some palaeoenvironmental potential sealed by post-medieval warping deposits.

Geophysical survey and archaeological evaluation (AOC 2017)

2.2.3 AOC Archaeology undertook a geophysical survey and archaeological evaluation immediately to the east of the M181 and adjacent to the southern section of Area 3 (AOC 2017a; 2017b). A succession of peat and sand deposits were identified, along with post-medieval warping deposits. Monolith samples revealed well preserved pollen and the lower peat deposit was dated to the Mesolithic, consistent with the results from the other investigations in the area.

Palaeoenvironmental and geoarchaeological analysis (Trent and Peak 2021)

2.2.4 Geoarchaeological and palaeoenvironmental analysis was undertaken on a column sample from a trench excavated in the 2015 Allen Archaeology evaluation (Trent and Peak Archaeology 2021). The peat was shown to date from the Mesolithic to the Early Bronze Age. Variations noted in the underlying sub-surface topography suggests areas of intermittent deep sedimentation within depressions in the underlying Sutton Sands, rather than a single blanket peat deposit.

Georchaeological analysis and deposit model (AOC 2021–2023)

2.2.5 A programme of geoarchaeological investigation has also been undertaken as part of the NLGEP project. AOC Archaeology undertook a geoarchaeological watching brief consisting of ground investigations and desk-based assessment of previous work, resulting in the creation of a preliminary deposit model and the delineation of three zones of archaeological potential (AOC 2021).

2.2.6 The zones of archaeological potential are summarised below:

- Zone 1: In the areas immediately east of the River Trent (northern Area 3 and Area 2) there was considered to be low potential for significant archaeological remains as the landscape would have been too wet for occupation or cultivation until the drainage and warping methods of the 17th century. However, remains of prehistoric date could be encountered sealed beneath the deep Holocene sequences. The stabilisation of the landscape represented by the formation of peat may have created horizons for archaeological activity.

- Zone 2: In Areas 3 and 4 there was potential for Neolithic/Bronze Age activity as well as seasonal occupation between the Iron Age and medieval periods. The areas extend from the edge of the floodplain towards the valley slopes and would have likely been suited to occupation. The area has historically been uncultivated and unenclosed common land.

- Zone 3: Areas 4 and 6 were considered to have potential for significant multi-period archaeological remains due to their location on the valley slopes and east of the floodplain, a location in which archaeological remains have previously been recorded.

2.2.7 A geoarchaeological borehole evaluation was completed in 2022 to provide further data, after which a revised deposit model was created (AOC 2023). Five samples were also obtained from peat deposits within the boreholes and provided radiocarbon dates ranging from the Late Mesolithic to the Early Iron Age (AOC 2023, Table 19).

Geophysical investigation (Wessex Archaeology 2022–2023)

2.2.8 Wessex Archaeology (2023a) undertook a geophysical survey across Areas 3, 4 and 5, prior to this programme of evaluation. A substantial portion of the results were deemed to relate to ridge and furrow cultivation. Two large enclosures on a parallel alignment to the ridge and furrow were identified in Area 4. Curvilinear and linear anomalies of potential archaeological origin were identified across Area 4. Several discrete anomalies were interpreted as possible extraction or refuse pits located in all areas. A number of natural variations within the geological substrate were present in Areas 3 and 4.

2.2.9 An electrical resistivity tomography (ERT) survey was undertaken in 2023 by Wessex Archaeology to provide further data. The results identified the extent of the River Trent's former channel in the north of Area 2 and Area 6 and blown sand landforms visible as cropmarks that were detected in the south of Area 2 and north of Area 3 (Wessex Archaeology 2023a, 22).

2.3 Archaeological and historical context

Palaeolithic (1,000,000–10,000 BC)

2.3.1 Only a single find of Palaeolithic date has been recorded within the DBA study area, comprising a tanged flint blade found approximately 700 m east of Area 3, close to the village of Dragonby. Due to the local landscape history, it is likely that prehistoric activity in the area would be buried beneath alluvial deposits and post-medieval warping sediments (ERM 2021, 4).

Mesolithic (10,000–4,000BC)

2.3.2 Fifteen non-designated heritage assets of Mesolithic date are recorded in the DBA study area. Some comprise occupation or flint-working sites with assemblages of flint tools, charcoal and poorly preserved deer bone. Microliths and flint scrapers have been recovered as surface finds from locations between Areas 6 and 2 (DBA site 8, Fig. 3; Historic Environment Record (HER) no. MLS1968). The majority of Mesolithic finds within the scheme are flint tool assemblages found in or close to the windblown sand deposits overlooking the Trent Valley. The absence of sites in the valley itself suggested Mesolithic communities perhaps favoured occupation of the higher and drier ground (ERM 2021, 4).

Neolithic (4,000–2,200 BC)

2.3.3 A pattern similar to the Mesolithic is observable for finds of Neolithic date; evidence of Neolithic settlement has been found in windblown sand deposits overlooking the Trent Valley to the east of the proposed development site, including at Flixborough. Twenty-nine non-designated heritage assets of Neolithic date are recorded within the DBA study area. Two leaf-shaped arrowheads were found between Areas 6 and 2 (DBA site 8, Fig. 3; HER no. MLS1968). Other sites are recorded as occupational and include assemblages of worked flint and pottery from Normanby Park, located to the north of Areas 4 and 6 and pottery from Flixborough Sand Pit located to the east of Area 4. Neolithic axe heads have been found at eight sites within the study area, and the assemblages of Neolithic finds are deemed likely to represent causal discard or loss during the everyday activities of communities (ERM 2021, 5–6).

Bronze Age (2,600–700 BC)

2.3.4 There is a large number of non-designated heritage assets of Bronze Age date within the DBA study area. They include multiple possible burial mounds, some of which are depicted on the 1816 Ordnance Survey map but now thought to have been disturbed by the enclosure of Brumby Common, and a circular ditch surrounding a possible former burial mound located at Brumby Common West. Cremation burials of likely Late Bronze Age date have been found at Phoenix Park to the east of the project, and a Middle Bronze Age urn was excavated at Flixborough Sand Pit, north of Areas 4 and 6. Assemblages of Bronze Age flints were recovered from Crosby, Crosby Warren and Atkinson’s Warren. An assemblage of ceramic surface finds including Beaker pottery was found between Areas 4 and 6 (DBA site 8, Fig. 3; HER no. MLS1968). As in the Mesolithic and Neolithic periods, many of the Bronze Age sites and findspots within the DBA study area are located on the higher lying windblown sands to the east of the alluvial deposits of the Trent Valley, suggesting continued preference for the higher and drier locations (ERM 2021, 6–7).

Iron Age (800 BC–AD 43)

2.3.5 Various cropmarks located within Area 3 and close to Area 6 (DBA sites 9, 11 a, 11b and 12, Fig. 3; HER nos MLS17778, MLS21394 and MLS20573) are thought to represent rectilinear enclosures, pits, a trackway and ditches (ERM 2021). Extensive Iron Age occupation of Flixborough, less than 500 m east of Areas 4 and 6, is suggested through the recovery of large quantities of Iron Age pottery, metalworking hearths, a crouched inhumation burial and clay lined pits at Flixborough quarry, and through Iron Age pottery and animal bone found within the bounds of Flixborough Saxon nunnery and All Saints medieval church (ERM 2021, 7–9).

Roman (AD 43–410)

2.3.6 No Roman material has been found to date within the Areas of this project, although given the numerous Roman heritage assets located within the 1 km DBA study area (ERM 2021), nearby Roman occupation is likely. It is also possible that the cropmarks described above within section 2.3.5 could be of Roman date, as opposed to Iron Age (*ibid*, 9–10).

Early Medieval (AD 410–1066)

2.3.7 The scheduled medieval settlement of Flixborough Saxon nunnery and the site of All Saints Church (National Heritage List for England listing number 1009382) is located immediately adjacent to Areas 4 and 6, albeit just beyond their limits. The scheduled site lies 500 m south of Flixborough village and the remains found within it, dating from the 8th–9th centuries AD, are of a settlement of 39 high status buildings with evidence for elaborate textiles and dress fittings, hunting, feasting, and literacy in the form of numerous metal writing instruments. In the mid–late 10th century the site was used for grain storage, wood working, smithing and trade (ERM 2021, 10–12).

Medieval (1066–1540)

2.3.8 The early medieval settlement at Flixborough Saxon nunnery and the site of All Saints Church continued into the Norman period, when All Saints Church served the village of North Conesby (a deserted medieval village).

2.3.9 Many of the villages in the vicinity of the study area have medieval or early medieval origins, including Flixborough and Conesby and, to the west of the Trent, Amcotts. It is in the medieval period that there is the first substantial evidence for settlement on the floodplain, with documentary evidence indicating that Flixborough Staithe was in existence by the fourteenth century at the latest. As in later centuries this was probably both a ferry crossing and a river port serving the village on the high ground to the east.

2.3.10 Neap House, close to Areas 2 and 3, could also mark the site of a medieval riverside settlement, connected to Conesby on the higher ground to the east by a trackway. The river valley remained largely undrained throughout this period, providing rich grazing land for cattle and sheep during the summer months, but prone to flooding throughout the winter (ERM 2021, 12–14).

Post-medieval (1540–1900)

2.3.11 The landscape of the floodplain was transformed from the seventeenth century onwards by widespread drainage schemes. In the later eighteenth century these were enhanced to enable warping of the low-lying fields of the valley. The drainage of the floodplain enabled the development of scattered farms in the valley. Warping drains are located in the south of the project, near to Area 3.

2.3.12 An estate map produced in 1778 by the Sheffield family of Normanby Park shows the historic layout of Flixborough Staithe/ferry and depicts the Ferry Boat Inn and its associated buildings situated beside the ferry landing on the Flixborough side of the ferry crossing to Amcotts. The First Edition OS map (1885–1886) shows the group of buildings continuing to occupy the same area (ERM 2021, 14–16).

2.3.13 The approximate location of post-medieval lime kilns falls within the limits of Area 4 (DBA sites 119 and 123, Fig. 2; HER no. MLS21375) The locations of the kilns are depicted on the 1778 Normanby Park estate map and the 1840 Flixborough tithe map.

Modern (1900–Present)

2.3.14 Normanby Park steelworks were created in 1905 and were served by a Lindsey Light Railway connecting it to Flixborough Wharf, which passed south of the village of Flixborough, close to the northern extent of Areas 4 and 6. During World War II (WWII) an anti-aircraft battery (DBA site 10, Fig. 3; HER no MLS21394) was built at Neap House, within Area 3, to protect the steelworks and mining activities in the area from air raids. In the post-war period a nitrogen fertilizer factory was built beside the river wharf, between Areas 4 and 2, and where an accident in 1974 caused an explosion which devastated the industrial estate, killing 28 people. The historic Ferry Boat Inn, which stood more or less in the location of the entrance to river wharf today, appears to have been destroyed at this time. The wooden remains of the historic ferry jetty are believed to survive on the river front just outside the limits of Areas 4 and 2 (ERM 2021, 16–17).

3 AIMS AND OBJECTIVES

3.1 General aims

3.1.1 The general aims of the evaluation, as stated in the WSI (ERM 2022) were to:

- Establish whether the evaluation of the Project Areas has been satisfactorily achieved or whether further evaluation is required before a decision on mitigation stage archaeological works is taken.
- Establish whether further investigation of the identified archaeological remains is necessary to mitigate the impact of the Project.

3.2 General objectives

3.2.1 In order to achieve the aims stated above, the general objectives of the evaluation were to:

- Establish the presence or absence of archaeological remains within the described Project Areas.
- Establish the location, extent, date, character, condition, significance and quality of archaeological remains within the described Areas.
- Establish the potential for contributing through further research to regional research frameworks for the East Midlands, as defined by the East Midlands Historic Environment Research Framework (2020), Cooper (2006) and Knight *et al.* (2012).

4 METHODS

4.1 Introduction

4.1.1 All works were undertaken in accordance with the detailed methods set out within the WSI (ERM 2022) and in general compliance with the standards outlined in CIfA guidance (CIfA 2014a). The methods employed are summarised below.

4.2 Fieldwork methods

General

4.2.1 The trench locations were set out using a Global Navigation Satellite System (GNSS), in the approximate positions proposed in the WSI, although trenches 33 and 34 had to be moved slightly to avoid a railway line boundary and trench 103 was moved to avoid an overhead cable buffer zone with trenches 105 and 106 being shortened for the same reason. Trench 208 was moved to avoid a field boundary (Fig. 3).

4.2.2 A total of 168 trial trenches of varied lengths were excavated. Two measured 20 m, sixty-seven measured 30 m, ninety measured 50 m, three measured 60 m and six measured 100 m in length. All were 1.8 m wide and excavated in level spits using a 360º excavator equipped with a toothless bucket, under the constant supervision and instruction of the monitoring archaeologist. Machine excavation proceeded until either the archaeological horizon or the natural geology was exposed.

4.2.3 As detailed in the WSI (ERM 2022), trenches 118 onwards were stripped using a methodology of excavating to a depth of 1.20 m in spits, whilst test pitting at either end. The sondages were sunk to an average depth of 2.50 m.

4.2.4 Where necessary, the base of the trench/surface of archaeological deposits were cleaned by hand. A sample of archaeological features and deposits was hand-excavated, sufficient to address the aims of the evaluation.

4.2.5 Spoil from machine stripping and hand-excavated archaeological deposits was visually scanned for the purposes of finds retrieval. Artefacts were collected and bagged by context. All artefacts from excavated contexts were retained, although those from features of modern date (19th century or later) were recorded on site and not retained.

4.2.6 Trenches completed to the satisfaction of the client and the Historic Environment Officer were backfilled using excavated materials in the order in which they were excavated and left level on completion.

Recording

4.2.7 All exposed archaeological deposits and features were recorded using Wessex Archaeology's pro forma recording system. A complete record of excavated features and deposits was made, including plans and sections drawn to appropriate scales (generally 1:20 or 1:50 for plans and 1:10 for sections) and tied to the Ordnance Survey (OS) National Grid.

4.2.8 A Leica GNSS connected to Leica’s SmartNet service surveyed the location of archaeological features. All survey data is recorded in OS National Grid coordinates and heights above OD (Newlyn), as defined by OSTN15 and OSGM15, with a three-dimensional accuracy of at least 50 mm.

4.2.9 A full photographic record was made using digital cameras equipped with an image sensor of not less than 16 megapixels. Digital images have been subject to managed quality control and curation processes, which has embedded appropriate metadata within the image and will ensure long term accessibility of the image set.

4.3 Finds and environmental strategies

4.3.1 Strategies for the recovery, processing, and assessment of finds and environmental samples were in line with those detailed in the WSI (ERM 2022). The treatment of artefacts and environmental remains was in general accordance with: *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (CIfA 2014b), *Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (English Heritage 2011), and CIfA’s *Toolkit for Specialist Reporting* (Type 2: Appraisal).

4.4 Monitoring

4.4.1 The Historic Environment Officer for North Lincolnshire Council monitored the evaluation on behalf of the LPA. Any variations to the WSI, if required to better address the project aims, were agreed in advance with the client and the Historic Environment Officer for North Lincolnshire Council.

5 STRATIGRAPHIC EVIDENCE

5.1 Introduction

5.1.1 Seventeen of the 168 excavated trial trenches contained archaeological features and deposits. The archaeological remains were sporadically present across all areas, with no discernible concentration (Figs 2–6).

5.1.2 The uncovered features mainly comprised ditches, with a small number of postholes and pits and one animal burial. Most were undated and only three features produced any dateable material. Two ditches (10105 and 15304) were tentatively dated through environmental evidence. The majority of the ditches are likely to represent drainage or boundary ditches, containing mostly unremarkable silty deposits.

5.1.3 All archaeological features were cut into sterile sand and clay deposits and capped by subsoil.

5.1.4 The following section presents the results of the evaluation with archaeological features and deposits discussed by period, area and trench. For each period, the results are described from north–south along the scheme, beginning with Area 4 at the northern extent, followed by Area 6, Area 2 and finally Area 3 at the southern extent.

5.1.5 Detailed descriptions of individual contexts are provided in the trench summary tables (Appendix 1). Figures 7–17 show all archaeological features recorded within the trenches, together with the preceding geophysical survey interpretation.

5.2 Soil sequence and natural deposits

5.2.1 Across the scheme, complex stratigraphic sequences of various alluvial, peat and sand deposits were observed. To the far north-west (trenches 1 to 13) in Area 4, the excavations exposed a firm, mid-yellowish brown silt clay. Sondages dug at either end of trenches 1 to 5, to a depth of 1.20 m, revealed this to be a thick, undifferentiated alluvial deposit, close to the River Trent. The alluvium, corresponding to the upper alluvium/warp deposit identified in the geoarchaeological deposit model (AOC 2023, 6–7), was overlain by a mid-greyish brown silt clay topsoil with an average thickness of 0.40 m.

5.2.2 Further to the east within Area 4, as the ground rises away from the River Trent, trenches 14 to 20 revealed the geological substrate that underlies the upper alluvium and the Holocene organics. The substrate was a mixed yellowish and greyish brown silty sand, again directly overlain by topsoil. The substrate here possibly corresponds to the lower alluvium/Sutton Sand identified in the geoarchaeological investigations (AOC 2023, 3–4). The only exception to this was trench 16 which also contained a yellowish brown silty sand subsoil located above the substrate.

5.2.3 Trenches 21 to 27, in the north-east of Area 4, were located on a steep south-west facing hillslope and generally revealed a firm yellowish-brown clay overlain by topsoil with the exception of trenches 19, 21, 22 and 23 which contained a mid-reddish brown sandy silt clay colluvium overlaying the substrate. The western sondage of Trench 21 identified a potentially localised deposit of peat that likely represents an area of former wetland, likely corresponding to the band of wetland that characterises this area (AOC 2023, 13).

5.2.4 In the south of Area 4, in trenches 28 to 57, the geological substrate consisted of a sequence of sterile sandy layers which, as above, possibly correspond to the lower alluvium/Sutton Sand deposit (AOC 2023, 3–4). A reddish-yellow sand with frequent, subrounded gravels was overlain by a yellowish-brown silty sand colluvium followed by a reddish-brown, slightly silty, windblown sand which was capped by a mid-greyish brown sandy clay topsoil (Figs 19 and 20).

5.2.5 A soft, reddish, mid-brown clayey sand subsoil with frequent subrounded pebbles was observed in trenches 34, 47, 48, 49, 54, 56 and 57, directly below the topsoil.

5.2.6 Area 6 was the most eastern part of the evaluation, situated on low lying land. In this area, the stratigraphic sequence observed in trenches 58–65 comprised a light yellowish-grey alluvial sand substrate overlain by an organically rich, brownish-black peat layer (approx. 0.25 m in depth). These deposits conform with the lower alluvium/Sutton Sand and Holocene organic deposits described in the geoarchaeological deposit model (AOC 2023, 3–6). A mid-brown silty clay subsoil and a mid-greyish brown, silty clay topsoil overlay these deposits. Trench 61 contained a soft, brownish-grey sandy silt alluvium below the subsoil and overlying the peat layer (Fig. 21) which is likely to correspond with the upper alluvium/warp described in the deposit model (AOC 2023, 6–7).

5.2.7 The area broadly corresponding to the middle portion of the scheme (Area 2 and the northern extent of Area 3), covering trenches 66 to 117 and 199 to 210, was located on low lying former marsh land. The alluvial substrate varied from a light grey-brown silt clay to a light yellow brown silty sand and was overlain by a dark greyish brown topsoil (Figs 22 and 23). Subsoil composed of a mid-grey brown silty clay was present in trenches 67, 76, 83, 84, 85, 87, 90, 94, 106, 199, 200, 201, 202 and 203. An organically rich peat layer approximately 0.10 m (trench 99) to >1.20 m (trench 203) in thickness was uncovered in trenches 67, 69, 72, 77, 78, 86, 88, 97, 99, 106, 107, 108, 109, 110, 112, 113, 200, 201, 202, 203 and 206 (Figs 22–25). It was observed directly below the topsoil and subsoil where present and is likely to correspond to the Holocene organic deposits recorded in the geoarchaeological deposit model (AOC 2023, 4–6).

5.2.8 The southern sector of the scheme, Area 3, ran broadly north to south from trenches 118 to 157 and was located on low lying former marsh land. The stratigraphy comprised numerous sand, peat and alluvial layers. Trenches 118 to 141 revealed a sequence of a yellow silty sand substrate overlain by peat, with occasional degraded wood deposits, approximately 0.15 m (trench 133) to 0.31 m (trench 124) thick, followed by an alluvial yellowish brown sandy clay subsoil capped by a mid-greyish brown silty clay topsoil. This succession of deposits reflects the sequence of lower alluvium/Sutton Sand followed by Holocene organic deposits and upper alluvium/warp deposits identified in the geoarchaeological deposit model (AOC 2023, 3–7).

5.2.9 Peat was not present in trenches 135–138.

5.2.10 In trenches 1–5, 7–10, 12, 13, 21–23, 28, 29, 35, 58, 60, 97, 98–101, 103, 104, 109, 111, 112, 115–120, 125–132 and 154 sondages dug to an average depth of 2.20 m established that there were no visible stratigraphic breaks within the yellow sand substrate.

5.2.11 The stratigraphy in trenches 142 to 157 comprised laminations of possibly windblown sand and alluvial sandy clay deposits (Fig. 26). Sondages (on average 2.50 m deep) revealed a peat layer between the substrate and the alluvium in trenches 142–152 and 157, found at an approximate depth of 1.00 m to 1.20 m below ground level, and measuring approximately 0.15 m in thickness. As above, the stratigraphic sequence in these trenches closely resembled the deposit model (AOC 2023, 3–7).

5.2.12 A blueish grey silty sand was found at the bases of sondages dug in trenches 143 and 156. With reference to the geoarchaeological analysis, this is likely to relate to the lower part of the lower alluvium/Sutton Sand deposits.

5.3 Prehistoric to medieval

Area 6

Trench 58

5.3.1 A discrete pit (5806: 0.65 m diameter and 0.1 m depth) and curvilinear gully (5808: 1.7 m wide and 0.1 m deep) were recorded in trench 58 (Fig. 11). The east–west aligned gully extended beyond the limits of the trench. Neither feature contained any dateable material, and a similar grey clay sand deposit filled them both. Both features were capped by peat deposit 5803. Nearby peat deposits have been previously dated Mesolithic–Early Iron Age (AOC 2017; Trent and Peak Archaeology 2021; AOC 2023), perhaps indicating a prehistoric date for these features. The pit and gully were not encountered during the geophysical survey that recorded a similar curvilinear anomaly located to the south-east. The curvilinear anomaly was not identified in neighbouring Trench 59 during the evaluation.

Area 3

Trench 124

5.3.2 A linear feature (12405: 2.2 m wide) was identified crossing trench 124 along a north-east to south-west alignment (Fig. 14). The feature was left unexcavated due to the depth of the trench base exceeding safe working conditions. Peat deposit 12403 had capped the fill of the feature. As above, it is possible this feature is prehistoric, given the dating of nearby peat deposits as Mesolithic–Early Iron Age (AOC 2017; Trent and Peak Archaeology 2021; AOC 2023).

Trench 155

5.3.3 A NNW–SSE aligned gully (15525: >25 m length, 0.5 m width and 0.3 m depth) crossed the southern length of trench 155 and extended beyond the southern trench edge (Fig. 16). It was ‘V’-shaped and contained a sequence of secondary deposits (Fig 18 section 1 and Fig. 27). It was irregularly shaped in plan and could have been a component of a wider enclosure. Although no dateable material was recovered from the gully, its truncation by hedgerow 15515 suggests it pre-dates the post-medieval period. That the gully continued no further north than its intersection with the hedgerow could indicate an otherwise unattested return.

5.4 Post-medieval

Area 4

Trench 24

5.4.1 Trench 24 contained two discrete pits, 2403 and 2406 (Fig. 9). The southerly of the two, 2403 (1.2 m diameter and 0.6 m deep) was filled with two deposits, the lowest of which contained one sherd of late medieval pottery, one sherd of post-medieval pottery and clay pipe stems. The northerly and largest pit, 2406 (7.2 m wide and 0.9 m deep; Fig. 18 section 2) extended beyond the limits of the trench. It contained a sequence of silty deposits likely resulting from natural weathering processes. A single sherd of medieval pottery, ceramic building material, clay pipe and two iron objects were recovered from the fills, although the presence of animal burrows suggests the finds could be intrusive. Both pits had been identified during the geophysical survey.

Area 3

Trench 101

5.4.2 Trench 101 contained the terminal of a ditch (10105: Figs 12 and 28). The ditch (1.9 m wide and 0.65 m depth) was aligned north-west to south-east and corresponded with the approximate position of a cropmark (site 13, Fig. 4) detailed in the DBA (ERM 2021; HER no. MLS20572). No finds were recovered from the feature. The environmental assemblage from the ditch included free-threshing wheat and barley, characteristic of arable farming practices post-dating the Romano-British period and indicating a medieval to post-medieval date.

Trench 118

5.4.3 Trench 118 contained a single WNW–ESE aligned ditch (11804: 1 m wide and 0.25 m deep). The ditch extended beyond the eastern and western limits of the trench, though due to their locations it was not identified in any other trenches. The ditch was filled with a dark brown silty clay that was sampled for environmental analysis. Though no dateable material was retrieved from the deposit within the ditch, it aligned with a field boundary on the 1888 Ordnance Survey map (not reproduced) and had been interpreted as a former field boundary during the geophysical survey (Fig. 14).

Trench 153

5.4.4 Ditch 15304, located in the western part of trench 153, was a north–south aligned drainage ditch (Fig. 15). It was 1 m wide and over 0.5 m deep. The full depth of the ditch was not determined as it exceeded the safe working depth. A primary fill (0.1 m depth) containing charcoal and wood was present on both sides of the ditch. It was capped by a secondary deposit (>0.4 m depth). The environmental assemblage from the primary fill of the ditch included free-threshing wheat and barley, characteristic of arable farming practices post-dating the Romano-British period and indicating a medieval to post-medieval date.

Trench 155

5.4.5 A NNE–SSE aligned furrow (15503: >15.5 m length, 1.1 m width and 0.15 m depth) was recorded in trench 155 (Fig. 16). It had shallow concave sides and a concave base. Hedgerow 15515 (1.7 m width and 0.5 m depth) was aligned east–west and crossed the centre of trench 155, where it cut gully 15525. It showed signs of rooting along its sides and base and contained four secondary deposits. No finds were recovered from these features.

5.5 Modern

Area 4

Trench 37

5.5.1 A 0.7 m extension to the west of trench 37 revealed the full extent of pit 3704 (1.2 m long, 0.7 m wide and 0.3 m depth; Fig. 10). It was in the north of trench 37 and contained the burials of a sheep and a foetal lamb (Fig. 29). Measurements taken from the tibia and metatarsal of the sheep indicate that it was an improved breed and therefore of a probable modern date.

5.6 Undated

Area 4

Trench 7

5.6.1 Trench 7 contained a north–south aligned ditch (703; 2.4 m wide and 0.65 m deep) that corresponded to an anomaly from the geophysical survey (Fig. 7). Its silty sand deposit contained no dateable material. The ditch continued to the north and south beyond the limits of the trench, but no other trenches were placed to investigate it further.

Trench 11

5.6.2 Parallel ditches 1103 (0.7 m wide and 0.3 m deep) and 1105 (1 m wide and 0.2 m deep) crossed trench 11 along a north–south alignment (Fig. 7). Both ditches contained a similar silty clay deposit, and neither contained any dateable material. The ditches were not encountered in trench 12, which was located 20 m to the south.

Trench 14

5.6.3 A north-east to south-west aligned ditch (1403: 0.8 m wide and 0.3 m deep) extended beyond the northern and southern limits of trench 14 (Fig. 8). The ditch contained a single deposit from which no dateable material was recovered. No other trenches investigated this feature.

Area 2

Trench 209

5.6.4 Trench 209 contained a north-east to south-west aligned ditch (20904: 0.6 m wide and 0.3 m deep; Fig. 17). The ditch had a concave base and sides and continued beyond the limits of the trench. It contained a brown sandy clay deposit. No finds were recovered from the feature.

Area 3

Trenches 102 and 103

5.6.5 A ditch was identified stretching across trenches 102 and 103, approximately corresponding with an anomaly identified in the geophysical survey (Fig. 12). It was aligned east–west and recorded in trench 103 as ditch 10303 (1.9 m wide x 0.35 m deep), and as 10203 in trench 102. The ditch was at least 31 m long and extended beyond both trenches. It had concave sides and a flat base and produced no dateable material.

Trench 115

5.6.6 Trench 115 contained an alignment of four postholes (11505, 11507, 11509 and 11511: average 0.5 m long, 0.4 m wide and 0.15 m deep; Figs 13 and 30). The postholes were spaced 0.5 m apart and extended north-west to south-east across the trench. Posthole 11511 continued beneath the limit of excavation. No finds were recovered from their deposits. The postholes were all sub-rectangular in plan, with either flat or concave bases and straight sides. Environmental analysis suggested the posts had degraded *in situ* over time. The environmental evidence indicated that the samples had either been contaminated during excavation or the postholes were modern in date.

Trench 116

5.6.7 A north-west to south-east aligned ditch (11603: 0.5 m wide and 0.4 m deep) was identified in trench 116, extending beyond the northern and southern limits of the trench (Fig. 13). The ditch had a gentle bend to the east through its centre, with straight sides and a 'V'-shaped base. It contained a single secondary deposit. No finds were recovered from the feature.

Trench 154

5.6.8 A single discrete pit (15404: 0.55 m diameter and 0.2 m depth) was located in the southern end of trench 154 (Figs 15 and 18 section 3). The full dimensions of the pit were unknown as it extended beyond the western trench edge. The pit contained a single silty deposit. No finds were recovered from the pit.

6 FINDS EVIDENCE

6.1 Introduction

6.1.1 A small assemblage of finds totalling 2.2 kg was recovered from three trenches (24, 31 and 37). This ranges in date from Early/Middle Mesolithic to modern. The finds have been cleaned and quantified by material type in each context (Table 1), and scanned to assess their nature, condition, and potential date range. All information has been entered into a site-specific finds database linked to the stratigraphic information; this will form part of the project archive.

Table 1 All finds by context (number of pieces/weight in grams)

Context	Feature	Pottery	Chert	Clay pipe	CBM	Iron	Animal bone	TOTAL
2404	Fill of pit 2403	3/48		1/3				4/51
2413	Fill of pit 2406	1/7			2/27			3/34
2415	Fill of pit 2406			1/2	1/27			2/29
2416	Fill of pit 2406			1/1		2/27		3/28
3101	Topsoil		1/1					1/1
3102	Alluvium	1/87						1/87
3707	Fill of pit 3704						216/1985	216/1985
TOTAL		**5/142**	**1/1**	**3/6**	**3/54**	**2/27**	**216/1985**	**230/2215**

6.2 Pottery

6.2.1 The pottery has been assessed and archived using the methodology laid out by the Medieval Pottery Research Group (Barclay *et al.* 2016). With reference to the *Archaeology Handbook* (Lincolnshire County Council 2019: Appendix 10*),* identified ware types are listed in brackets. Pottery ware types and quantities are limited, dating from around the 13th/14th centuries to the early 20th century. With the exception of one larger sherd, the condition is highly abraded.

6.2.2 Three fragments from pit 2403 were post-medieval to modern in date, consisting of an oxidised coarse sandy ware jar/jug rim with an abraded lead glaze (BERTH), a worn and laminated fragment of Staffordshire slipware (STSL), and a small sherd of modern refined whiteware (WHITE).

6.2.3 Pit 2406 contained a single base sherd of undiagnostic micaceous sandy ware (MISC MSKW), which is potentially medieval in date, but is small in size and heavily abraded making definitive identification difficult.

6.2.4 The largest sherd, and the most notable in the pottery assemblage, is a medieval glazed ware loop rod handle with an oval profile from a jug or a jar from alluvium layer 3102. This is an oxidised orange fabric with light grey reduced core, containing sparse sub-rounded quartz inclusions up to 0.1 mm. The glaze is light green with mottled orange patches. Most likely this represents a Lincoln Glazed ware (LSW) that dates from approximately the 13th/14th centuries (Young *et al.* 2005, 133). There are longitudinal grooves down the centre of the handle and two basal thumbings on either side (including the remains of a fingerprint). Ribbed oval handles with lateral thumbings are the most common type on medium-sized jugs from North Lincolnshire (Hayfield 1982, 758).

6.3 Animal bone

6.3.1 The animal bone assemblage comprises two associated bone groups (ABGs): 3705 and 3706 from undated pit 3704 (Table 2). These were the burials of a sheep and a lamb. The bones of the adult are in good condition and fully fused, allowing measurement of the complete right tibia and metatarsal. These indicate a withers (or shoulder) height of 0.73 m, consistent with an adult improved breed and of probable modern date (Lorrain Higbee Pers. Comm.). The partial remains of the lamb are foetal, as the metapodials are unfused centrally, which occurs before birth. A single complete and fused metatarsal from a dog or fox accompanied the sheep.

Table 2 Animal bone data

Context	Material	Count	Kept	Weight (g)	Description
3707	Animal bone	103	103	918	Animal bone group 3705 - ribs/ vertebrae
3707	Animal bone	32	32	330	Animal bone group 3705 - skull
3707	Animal bone	15	15	271	Animal bone group 3705 - right hindlimb
3707	Animal bone	7	7	147	Animal bone group 3705 - right forelimb
3707	Animal bone	10	10	146	Animal bone group 3705 - left forelimb
3707	Animal bone	49	49	173	Animal bone group 3706 - foetal lamb
TOTAL		**216**	**216**	**1985**	

6.4 Other finds

6.4.1 There is a chert microlith in lanceolate/curved back form from topsoil layer 3101, this measures 22 mm from proximal to distal end, and 7 mm at its maximum width, with a maximum thickness of 2 mm. This is likely to date from the early/middle Mesolithic, and is only slightly worn indicating limited post-depositional reworking.

6.4.2 Three fragments of ceramic building material (CBM) were recovered from pit 2406. The fragments from fill 2413 are from a modern land drain; whereas the one from fill 2415 is roof tile, although there are no measurable dimensions other than the thickness of 15 mm. The fabric is coarse and could indicate a late medieval/early post-medieval date.

6.4.3 Three undiagnostic partial clay pipe stems were recovered from pits 2403 and 2406.

6.4.4 The two iron objects were from pit 2406, these are a nail and a small fragment of sheet that might originate from agricultural machinery.

7 ENVIRONMENTAL EVIDENCE

7.1 Introduction

7.1.1 Fifteen bulk sediment samples were taken from a range of linear features, a pit, a layer, and postholes, and were processed for the recovery and assessment of the environmental evidence. The samples break down into the following area groups:

Table 3 Sample provenance summary

Trench	Area	No. of bulk samples	Volume (litres)	Unprocessed waterlogged subsamples	Volume of subsamples (litres)	Feature types
24	4	1	27	-	-	Pit
58	3	1	39	-	-	Gully
101	3	1	25	-	-	Ditch
103	3	1	40	-	-	Ditch
115	3	4	8	-	-	Postholes
118	3	1	13	1	10	Ditch
141	3	1	3.5	1	3.5	Peat Layer
153	3	1	9	1	10	Ditch
155	3	3	54	2	20	Gully, hedgerow, furrow
209	3	1	26	-	-	Ditch
Totals	-	**15**	**244.5**	**5**	**43.5**	-

7.2 Aims and methods

7.2.1 The aim of this assessment is to determine the nature and significance of the environmental remains preserved at the site, and their potential to address the project aims.

7.2.2 This assessment has been undertaken in accordance with Historic England's guidelines outlined in *Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-Excavation* (English Heritage 2011).

7.2.3 The size of the bulk sediment samples varied between 2 and 40 litres, with an average volume of approximately 16.3 litres. The samples were processed by standard flotation methods on a Siraf-type flotation tank; the flot retained on a 1 mm or 0.25 mm mesh as appropriate, residues retained on 4 mm and 1 mm fractions. The coarse fractions of the residues (>4 mm) were sorted by eye for artefactual and environmental remains. The environmental material extracted from the residues was added to the flots. The flots were dried prior to examination. Some of the waterlogged samples were subsampled prior to processing, with approximately 10 litres retained for potential further work. A riffle box was used to split large flots and fine residues into smaller subsamples as appropriate.

7.2.4 The fine residue fractions and the flots were scanned and sorted for wood charcoal, charred/uncharred plant remains, and other environmental material (e.g., insects/beetles, molluscs) using a Leica MS5 stereomicroscope at magnifications of up to x40. The presence of recent material within the flots was noted where present, including modern roots, modern seeds, earthworm eggs, soil fungal sclerotia, and shells of the burrowing blind snail (*Cecilioides acicula*), which was introduced in the medieval period. The volume of wood charcoal (>2 mm) was estimated. Plant remains were identified through comparison with modern reference material held by Wessex Archaeology and relevant literature (Cappers *et al.* 2006). Nomenclature follows Stace (1997) for wild taxa, and Zohary *et al*. (2012) for cereals and other cultivated crops (using traditional names).

7.3 Results

7.3.1 The results are presented in Appendix 2. The flots from the bulk sediment samples are of varying volumes. The samples contain environmental evidence preserved by charring, and potentially waterlogging. Indicators of potential bioturbation are very abundant, indicating the high possibility of contamination from later intrusive material, or that the excavated features are very recent (e.g., post-medieval or modern) in date. The samples contain abundant modern cereal crop processing waste (predominantly straw, but some bread wheat – *Triticum aestivum* – rachis segments are identifiable), as well as modern roots, burrowing blind snails, abundant fungal sclerotia, earthworm eggs and insects. While some samples may contain genuinely waterlogged wood fragments (e.g., potentially those from trench 115 postholes and hedgerow 15515), many samples contain uncharred wood fragments and uncharred seeds (e.g., birches (*Betula* sp.), thistles (*Carduus/Cirsium* sp.) and rushes (*Juncus* sp.)) which are likely, modern, indicators of recent contamination. The following results are described from north–south along the scheme, beginning with Area 4 at the northern extent, Area 2 and Area 3 at the southern extent.

Area 4

Trench 24

7.3.2 The sample from pit 2406 contains a modest array of charred plant remains, including knotgrasses (*Polygonum aviculare*), clovers/trefoils/medicks (Trifolieae), common chickweed (*Stellaria* cf. *media*), campions (*Silene* sp.), probable species of the daisy family, goosefoots and grasses (Poaceae). Also recovered were monocotyledon stems and tubers/rhizomes. A small number of mineralised specimens are noted in the flot of this sample; however, none of them are identifiable to any particular taxon or plant remain type, and generally comprise amorphous fragments of mineralised remains. A very small number of well-preserved fragments of wood charcoal are also recorded. Clinker/cinder and coal/coal shale are present in the flot.

Area 6

Trench 58

7.3.3 The sample from gully 5808 contains only scraps of mineral-stained wood charcoal and highly fragmented clinker/cinder.

Area 2

Ditch 209

7.3.4 The sample from ditch 20904 was very small, is sterile in charred plant remains and only contains trace quantities of wood charcoal. Highly fragmented clinker/cinder, and small fragments of uncharred wood are also present.

Area 3

Trench 101

7.3.5 The sample from ditch 10105 contained a single free-threshing (*Triticum aestivum/turgidum)* wheat grain, trace quantities of wood charcoal, and abundant clinker/cinder and coal/coal shale fragments. The uncharred seeds and insects/invertebrates noted in the flot are also likely modern contaminants.

Trench 103

7.3.6 The sample taken from ditch 10303 contains a moderately abundant sample including charred plant remains and wood charcoal. The charred plant remains comprise tubers/rhizomes, monocot stems, heath-grass (*Danthonia decumbens*), sedges (Cyperaceae), great fen-sedge (*Cladium mariscus*), ribwort plantain (*Plantago lanceolata*) goosefoots (Chenopodiaceae), species of the daisy family (Asteraceae) and indeterminate seeds. The wood charcoal was very heavily mineral-stained, which obscured any attempt at identification through morphological characteristics.

Trench 115

7.3.7 The flots from the four postholes (11505, 11507, 11509, 11511) sampled from this trench are all very small, predominantly composed of very fragmented uncharred wood, uncharred seeds, and very small scraps of mineral-stained wood charcoal. The uncharred wood fragments may represent the remains of the degraded posts. The good preservation condition of the uncharred seeds, largely from wind-dispersed taxa (e.g., birches), suggests these are likely recently deposited, modern, specimens which could have been easily wind-blown into open features during excavation.

Trench 118

7.3.8 The sample from ditch 11804 comprises a small volume of fragmented charcoal, some of which were only partially charred, alongside degraded uncharred vegetative material, including deciduous leaf litter and some seeds. Both the leaf litter and uncharred seeds may indicate waterlogging. The uncharred seeds are identifiable as elder (*Sambucus* sp.), branched burr-reed (*Sparganium erectum*), sun-spurge (*Euphorbia helioscopia*), chickweeds (*Stellaria* sp.), thistles (*Carduus/Cirsium* sp.), goosefoots, black bindweed (*Fallopia convolvulus*). A small number of terrestrial molluscs, invertebrate eggs and fungal sclerotia are also noted.

Trench 141

7.3.9 One sample was taken from layer 14104 which was interpreted in the field as a possible peat deposit. The flot contains earthworm egg cases and small scraps of wood charcoal, including one partially charred wood fragment which is likely to have been preserved in waterlogged conditions. There are abundant uncharred rush seeds, however, it seems likely that these are modern intrusive contaminants, as rush seeds are present in the other samples taken across the site.

Trench 153

7.3.10 Ditch 15304 was sampled for environmental remains, and the resulting flot contains a small number of charred cereal remains and wild plant taxa, including the grains of free-threshing wheat and barley (*Hordeum* sp.), and the chaff (a single rachis node) of bread wheat. Other charred plant remains included ribwort plantain, knotgrasses (Polygonaceae) and a fragment of a bedstraw (*Galium* sp.) seed. Wood charcoal was present in only mineral-stained, scrappy, fragments. Small animal bone, terrestrial molluscs and clinker/cinder and coal/coal shale are all also present in the flot. Likely recent, rather than waterlogged, fragments of uncharred wood and seeds are also noted in the flot.

Trench 155

7.3.11 The samples from gully 15510 and furrow 15503 are broadly similar in composition, and comprise a small number of charred plant remains, including tubers/rhizomes, monocotyledon stems and heath-grass, and scraps of mineral-stained non-oak charcoal, including tentatively identified heather-type (cf. *Calluna vulgaris* tp.) stems. The sample from hedgerow 11515 was nearly identical in composition to those from the gully and furrow, with the addition of abundant fragments of uncharred wood and a clinker/cinder and coal/coal shale. Considering the condition of the uncharred remains they are likely either recently deposited or deposited through post-medieval and/or modern waterlogging.

8 CONCLUSIONS

General

8.1.1 Of the 168 excavated trial trenches, 151 were archaeologically blank, with 17 trenches containing archaeological features and deposits. The evaluation has shown that there is potential for features of possible prehistoric date to be present beneath localised deposits of peat within Areas 3 and 6, specifically in the vicinity of trenches 58 and 124. Post-medieval, modern and undated archaeological remains are sporadically present in all areas (Figs 1–6).

8.1.2 The excavated features containing artefactual material (pits 2403, 2406 and 3704) are all datable to the post-medieval and modern periods. Earlier finds were residual or derived from alluvial deposits. Some degree of occupation is likely to have occurred between the Mesolithic and medieval periods, although the occupation is unlikely to have been intensive or sustained. While the activity cannot be linked to any anthropogenic features, the presence of gullies and pits sealed beneath peat deposits dated in the locality as Mesolithic to Early Iron Age is indicative of earlier occupation (AOC 2017; Trent and Peak Archaeology 2021; AOC 2023).

8.1.3 The finds have been recorded to a suitable archive level. Their potential for further analysis is limited by the small quantities recovered and the undiagnostic nature of some of the items. The animal bone assemblage comprised the burial of a sheep and lamb, of probable modern date.

8.1.4 The majority of archaeological features uncovered comprised ditches and gullies from which no datable material was recovered. One excavated ditch in trench 103 was found to continue into an adjacent trench (102) where it was mapped using GPS but not excavated. The stratigraphic sequence observed in trenches 58 and 124 provided an indicative date for a pit, a gully and a linear feature sealed by peat deposits locally dated as Mesolithic to Early Iron Age (AOC 2017; Trent and Peak Archaeology 2021; AOC 2023). An otherwise undated gully in trench 155 was deemed certain to pre-date the post-medieval period due to its truncation by a post-medieval hedgerow.

8.1.5 Ditch terminal 10105 corresponds with the approximate position of a cropmark (site 13; Fig. 4) listed in the DBA (ERM 2021; HER no. MLS20572). The cropmark has been interpreted as a sub-rectangular enclosure of possible Bronze Age or Iron Age date. However, the environmental assemblage recovered from ditch terminal 10105 was indicative of agricultural practices post-dating the Romano-British period, consistent with a medieval or post-medieval date.

8.1.6 Six further trenches containing archaeological remains confirmed activity in the immediate vicinity of recorded heritage assets.

- Trench 58, containing an undated curvilinear ditch and a pit, was located approximately 400 m north of a suspected Iron Age/Romano-British enclosure and various Mesolithic–Bronze Age surface finds (DBA sites 8 and 9, Fig. 3; HER no. MLS1968 and MLS17778). No finds were recovered from the pit or ditch, although they were both sealed by a deposit of peat, indicating a potential prehistoric date for these features.

- The undated ditch which passed through trenches 102 and 103 was located approximately 200 m south of the recorded location of cropmarks (DBA sites 11a and 11b, Fig. 3; HER no. MLS21377) representing possible Iron Age/Romano-British stock or settlement enclosure.

- A line of four postholes in trench 115 and a ditch in trench 116 were located in close proximity to an Iron Age enclosure (DBA site 12, Fig. 3; HER no. MLS20573) identified through cropmarks. Both the postholes and the ditch were undated, and approximately 50 m south of the recorded location of the enclosure.

- Two post-medieval pits within Trench 24 were approximately 400 m north of the recorded location of post-medieval industrial limekilns (DBA sites 119 and 123, Fig. 3; HER no. MLS21375).

8.1.7 Additionally, there was no evidence found for a WWII searchlight battery (DBA site 10, Fig. 3; HER no. MLS21394) within the evaluation area.

8.1.8 Fifty-one of the excavated trenches targeted anomalies from the preceding geophysical survey, but archaeological features were only revealed in nine of these trenches. These comprised three north-south aligned ditches (trenches 7, 11 and 116), two east-west aligned ditches (trenches 118, 102 and 103), two post-medieval or modern pits (trench 24), the modern sheep burial (trench 35) and four sub-rectangular postholes (trench 115).

8.1.9 A penannular anomaly was identified by geophysics in trench 59 but no archaeological features were identified there during evaluation (Fig. 11). However, a single curvilinear gully, approximately conforming to the outline identified in the geophysical survey, was found in the neighbouring trench (trench 58) beneath a layer of peat that was not present in trench 59.

8.1.10 As all the trenches listed in the WSI (besides the descoped Areas previously discussed, see 1.1.4) were able to be excavated, there is a good level of confidence that the results of the evaluation are an accurate reflection of the archaeology that is present.

Environmental

8.1.11 The samples contained some environmental evidence preserved by charring, such as charred plant remains and wood charcoal. Waterlogged wood and seeds are potentially present. The samples from the postholes in trench 115 and hedgerow 15515 in trench 155 contain some potentially waterlogged wood. The wood identified in the postholes from trench 115 likely originates from the posts degrading over time, in the fluctuating water-levels. However, many of the samples contain uncharred wood and uncharred seeds/bracts which are likely either modern contaminants (e.g., wind-blown into open features), or alternatively evidence waterlogging but of a modern date, as the fluctuating water-levels (indicated by the mineral-staining on much of the wood charcoal) would not support preservation of uncharred organic material in the long term.

8.1.12 Most of the charred taxa recovered likely reflect fuel debris from the burning of heathy vegetation (e.g., turves) or animal dung (Hall and Huntley 2007). The presence of heath-grass, sedges, tubers/rhizomes, probable heather stems, amongst others, are an array of plant remains consistent with burning turves, and/or damp, acidic grassland, or animal dung. The possible origin as animal dung is also supported by the mineralisation observed in the sample from pit 2406.

8.1.13 Free-threshing wheat (probably bread wheat) was identified in ditches 10105 and 15304, where it was identified alongside barley. Free-threshing wheat (particularly bread wheat) and barley, amongst others, are characteristic of arable farming regimes which developed after the Romano-British period. This assemblage would be consistent with a date anywhere between the early medieval to late medieval/post-medieval period (Moffett 2006).

8.1.14 Coal/coal shale and clinker/cinder was present in most of the samples. Some of this material may be natural in origin (deriving from the underlying geology); however, coal was widely used as a fuel in the medieval and post-medieval periods.

8.1.15 Layer 14104 was interpreted in the field as a possible peat deposit and although the layer may originally have been waterlogged, it has undergone degradation during burial and there is no potential for further work to be undertaken.

Discussion

8.1.16 The archaeological trial trenching has indicated potential for the presence of significant archaeological remains across the site, including possible prehistoric activity sealed by peat deposits.

8.1.17 The majority of excavated features likely relate to post-medieval or modern agricultural drainage practices or warping activities. Two post-medieval or modern pits in trench 24 were likely used for the deposition of refuse. The environmental assemblage provided evidence for medieval–post-medieval agricultural regimes and nearby occupation in the form of fuel residues.

8.1.18 Three otherwise undated features (gully 5808, pit 5806 and linear feature 12405) were sealed by peat deposits. A series of investigations previously undertaken along the scheme had dated local peat deposits as Mesolithic–Early Iron Age, with the lowest of the peat deposits yielding a Mesolithic date (AOC 2017; Trent and Peak Archaeology 2012; AOC 2023). This stratigraphic sequence provides an indicative prehistoric date for features in trenches 58 and 124. Due to its stratigraphic relationship with a post-medieval hedgerow, a gully in trench 155 is certain to pre-date the post-medieval period and could possibly be a component of earlier settlement in the area.

8.1.19 The evaluation results also verified the sedimentary sequence and zones of archaeological potential previously outlined in the geoarchaeological investigations (AOC 2023). Little variation was observed.

8.1.20 The results of the trial trench evaluation have some correlation with the results of the HER search and the conclusions formed in the DBA. Ditch 10105 has the potential to relate to an enclosure that has previously been recorded as a cropmark on the HER (DBA site 13, Fig. 4), although in contrast to the suspected Bronze Age/Iron Age date the environmental assemblage recovered from this ditch was consistent with a medieval to post-medieval date. Six further trenches (24, 58, 102, 103, 115 and 116) which were located in close proximity to recorded heritage assets contained archaeological remains, verifying archaeological activity in the immediate vicinity.

8.1.21 There was little correlation with the geophysical survey interpretation (Wessex Archaeology 2023a); in large parts potential anomalies that were identified in the geophysical survey were not seen in the trenches, and ditches that were uncovered during the trench evaluation were not shown in the geophysical survey interpretation. It is unclear why there is such a discrepancy, as the type of geological substrate has been shown to produce magnetic contrasts acceptable for the detection of archaeological remains.

8.1.22 There is potential to better understand the chronology of the features in trenches 58 and 124 through dating the peat layers that seal them. The gully 15504 and the undated ditches and gullies across the site could be further understood, in order to establish the existence of a settlement or field system.

8.1.23 The archaeological remains have the potential to contribute to the regional research framework (Research Frameworks 2023). Specifically:

- Mesolithic 2.2.2: How were sites distributed across low-lying and upland areas, and in particular how many sites might be concealed beneath alluvium, colluvium and other masking deposits or beneath the sea?
  [redacted]

- Neolithic and Early to Middle Bronze Age 3.3.4: When did the first field and boundary systems develop, how did this vary regionally and what processes may underlie their development?
  [redacted]

- Late Bronze Age and Iron Age 4.6.1: Can we shed further light upon the development of field and boundary systems?
  [redacted]

- Romano-British 5.4.4: How did field and boundary systems relate to earlier systems of land allotment, and how did these boundary networks develop over time?
  [redacted]

- High medieval 7.7.6: How best may we enhance study of the origins and development of early land reclamation and drainage, particularly in Lincolnshire?
  [redacted]

8.1.24 The trial trench evaluation has met the majority of its aims and objectives: the extent, character, condition and quality of the remains have been determined; however, the lack of datable artefacts has hindered the dating of the majority of these features. The results of the geophysical survey have been tested. The potential for possible prehistoric features sealed beneath layers of peat in Areas 4 and 3 has been established. The findings are considered to have the potential to be further understood and to contribute to the regional research frameworks.

9 ARCHIVE STORAGE AND CURATION

9.1 Museum

9.1.1 The archive resulting from the evaluation is currently held at the offices of Wessex Archaeology in Sheffield. North Lincolnshire Museum has agreed in principle to accept the archive on completion of the project, under the accession code FXBO. Deposition of any finds with the museum will only be carried out with the full written agreement of the landowner to transfer title of all finds to the museum.

9.2 Preparation of the archive

Physical archive

9.2.1 The archive, which includes paper records, graphics, artefacts and ecofacts, will be prepared following the standard conditions for the acceptance of excavated archaeological material by North Lincolnshire Museum, and in general following nationally recommended guidelines (Brown 2011; CIfA 2014c; SMA 1995).

9.2.2 All archive elements will be marked with the site and accession code, and a full index will be prepared. The physical archive currently comprises the following:

- 4 cardboard boxes or airtight plastic boxes of artefacts and ecofacts, ordered by material type
- 1 cardboard box of paper records

Digital archive

9.2.3 The digital archive generated by the project, which comprises born-digital data (e.g., site records, survey data, databases and spreadsheets, photographs, and reports), will be deposited with a Trusted Digital Repository, in this instance the Archaeology Data Service (ADS), to ensure its long-term curation. Digital data will be prepared following ADS guidelines (ADS 2013 and online guidance) and accompanied by metadata.

9.3 Selection strategy

9.3.1 It is widely accepted that not all the records and materials (artefacts and ecofacts) collected or created during the course of an archaeological project require preservation in perpetuity. These records and materials will be subject to selection in order to establish what will be retained for long-term curation, with the aim of ensuring that all elements selected to be retained are appropriate to establish the significance of the project and support future research, outreach, engagement, display and learning activities, i.e., the retained archive should fulfil the requirements of both future researchers and the receiving Museum.

9.3.2 The selection strategy, which details the project-specific selection process, is underpinned by national guidelines on selection and retention (Brown 2011, section 4) and generic selection policies (SMA 1993; Wessex Archaeology's internal selection policy) and follows CIfA's *Toolkit for Selecting Archaeological Archives*. It should be agreed by all stakeholders (Wessex Archaeology's internal specialists, external specialists, local authority, museum) and fully documented in the project archive.

9.3.3 In this instance, given the relatively low level of finds recovery, the selection process has been deferred until after the fieldwork stage was completed. Project-specific proposals for selection are presented below. These proposals are based on recommendations by Wessex Archaeology's internal specialists and will be updated in line with any further comment by other stakeholders (museum, local authority). The selection strategy will be fully documented in the project archive.

9.3.4 Any material not selected for retention may be used for teaching or reference collections by Wessex Archaeology.

Finds

9.3.5 The assemblage should be retained until the conclusion of fieldwork and reappraised in light of the recovery of any additional material. The chert microlith is of some intrinsic interest and should be retained. The other finds are not recommended for retention. The animal bone could be selected for use in a reference collection.

Environmental material

9.3.6 The material should be retained as part of the archive until further sampling has been undertaken when recommendations for analysis and deposition will be made.

9.3.7 If no further work is undertaken, the samples can be discarded in light of their limited significance.

9.3.8 The residues were discarded after sorting.

Documentary records

9.3.9 Paper records comprise site registers (other pro-forma site records are digital), drawings and reports (written scheme of investigation, client report). All will be retained and deposited with the project archive.

Digital data

9.3.10 The digital data comprise site records (tablet-recorded on site) in spreadsheet format; finds records in spreadsheet format; survey data; photographs; reports. All will be deposited, although site photographs will be subject to selection to eliminate poor quality and duplicated images, and any others not considered directly relevant to the archaeology of the site.

9.4 Security copy

9.4.1 In line with current best practice (e.g., Brown 2011), on completion of the project a security copy of the written records will be prepared, in the form of a digital PDF/A file. PDF/A is an ISO-standardised version of the Portable Document Format (PDF) designed for the digital preservation of electronic documents through omission of features ill-suited to long-term archiving.

9.5 OASIS

9.5.1 An OASIS (online access to the index of archaeological investigations) record (http://oasis.ac.uk) has been initiated, with key fields completed (Appendix 3). A .pdf version of the final report will be submitted following approval by the Historic Environment Officer on behalf of the LPA. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and national records and published through the Archaeology Data Service (ADS) ArchSearch catalogue.

10 COPYRIGHT

10.1 Archive and report copyright

10.1.1 The full copyright of the written/illustrative/digital archive relating to the project will be retained by Wessex Archaeology under the *Copyright, Designs and Patents Act 1988* with all rights reserved. The client will be licenced to use each report for the purposes that it was produced in relation to the project as described in the specification. The museum, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

10.1.2 Information relating to the project will be deposited with the Historic Environment Record (HER) where it can be freely copied without reference to Wessex Archaeology for the purposes of archaeological research or development control within the planning process.

10.2 Third party data copyright

10.2.1 This document and the project archive may contain material that is non-Wessex Archaeology copyright (e.g., Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the *Copyright, Designs and Patents Act 1988* with regard to multiple copying and electronic dissemination of such material.

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APPENDICES

Appendix 1 Trench summaries

These trench tables are presented in numerical order organised by trench number.

Area 4

Trench No 1		Length 50 m	Width 1.8 m	Depth 0.73 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
101		Topsoil	Mid greyish brown silty clay. Moderately compacted. Rooting from ground surface throughout.	0.00–0.36
102		Natural	Light brownish grey clay mottled with yellowish brown. Fairly consistent throughout trench. No visible inclusions.	0.36+

Trench No 2		Length 50 m	Width 1.8 m	Depth 0.61 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
201		Topsoil	Mid greyish brown silty clay. Moderately compacted. 1-3% fine sub-angular gravel. Rooting from ground surface to approximately 0.2m.	0.00–0.46
202		Natural	Mid yellowish brown silty clay with intermittent patches of darker brown silty clay. One area of concentrated chalk and flint gravel in middle of trench.	0.46+

Trench No 3		Length 50 m	Width 1.8 m	Depth 0.62 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
301		Topsoil	Mid greyish brown silty clay. Moderately compacted. 1-3% fine sub-angular gravel. Rooting from ground surface to approximately 0.2m.	0.00–0.48
302		Natural	Dark yellowish brown silty clay with intermittent patches of lighter yellowish brown silty clay. Fairly consistent throughout trench.	0.48+

Trench No 4		Length 50 m	Width 1.8 m	Depth 0.54 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
401		Topsoil	Mid greyish brown silty clay. Moderately compacted. Rooting from ground surface throughout.	0.00–0.40
402		Natural	Mid greyish brown clay mottled with darker grey / black. Fairly consistent throughout trench.	0.40+

Trench No 5	Length 50 m	Width 1.8 m	Depth 0.60 m

Trench No 5		**Length 50 m**	**Width 1.8 m**	**Depth 0.60 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
501		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 20cm.	0.00–0.46
502		Natural	Light brownish grey clay, mottled with yellowish brown clay. 3% chalky stone inclusions, ≤10 / 6cm.	0.46+

Trench No 6		**Length 50 m**	**Width 2 m**	**Depth 0.60 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
601		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-40mm, sparse light rooting concentrated near surface, moderate compaction, moderately diffuse horizon with 602 due to mixing on the interface.	0.00–0.40
602		Natural	Mid yellowish grey with an orange hue silty clay, 1% rare poorly sorted sub-rounded gravel 2-30mm, moderate compaction, moderately diffuse horizon with 601 due to some mixing between the layers, broken land drains in trench.	0.40+

Trench No 7		**Length 30 m**	**Width 1.8**	**Depth 0.45 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
701		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 20cm.	0.00–0.38
702		Natural	Light yellowish grey clay. Roughly linear patch of reddish silty sand towards W end of trench. Waterlogged.	0.38+
703	704	Ditch	Linear ditch aligned N-S with moderate, concave sides and a concave base. Length: >2.00 m. Width: >2.40 m. Depth: 0.65 m.	0.38–1.03+
704	703	Secondary fill	Mid brown with mid reddish brown inclusions silty sand with rare rounded and sub-rounded stone inclusions.	0.38–1.03+

Trench No 8		**Length 30 m**	**Width 1.8**	**Depth 0.46 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
801		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 30cm.	0.00–0.38
802		Natural	Mid yellowish brown silty clay. Waterlogged.	0.38+

Trench No 9		**Length 50 m**	**Width 1.8**	**Depth 0.49 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
901		Topsoil	Mid greyish brown silty clay. Moderately compacted. 1-3% medium sub-rounded chalky gravel. Rooting from ground surface to approximately 0.25m.	0.00–0.38
902		Natural	Dark greyish brown silty clay, mottled with yellowish grey in places. Fairly consistent throughout trench. Waterlogged.	0.38+

Trench No 10		**Length 30 m**	**Width 1.8**	**Depth 0.57 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1001		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 20cm.	0.00–0.39
1002		Natural	Light yellowish grey clay with occasional patches of reddish sand. Waterlogged.	0.39+

Trench No 11		**Length 30 m**	**Width 1.8**	**Depth 0.51 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1101		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 20cm.	0.00–0.46
1102		Natural	Mid yellow silty clay with patches of pale grey silty sand. Becoming more consistently grey towards W end of trench, which is also waterlogged.	0.46+
1103	1104	Ditch	Linear ditch aligned N-S with moderate, straight sides and a concave base. Length: >2.00 m. Width: >0.68 m. Depth: 0.31 m.	0.46–0.77
1104	1103	Secondary fill	Light yellowish grey silty clay with sand inclusions with rare rounded and sub-rounded stone inclusions.	0.46–0.77
1105	1106	Ditch	Linear ditch aligned N-S with moderate, straight sides and a flat base. Length: >2.00 m. Width: >1.04 m. Depth: 0.19 m.	0.46–0.65
1106	1105	Secondary fill	Mid yellowish grey with mottled light yellowish brown inclusions sandy clay with silty sand inclusions with rare rounded and sub-rounded stone inclusions.	0.46–0.65

Trench No 12		**Length 30 m**	**Width 1.8**	**Depth 0.45 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

1201		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 20cm.	0.00–0.36
1202		Natural	Mid yellowish grey silty clay mottled with yellowish brown silty clay.	0.36+

Trench No 13		**Length 50 m**	**Width 1.8**	**Depth 0.45 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1301		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 20cm. 1% charcoal flecks.	0.00–0.38
1302		Natural	Mid yellowish brown clay with intermittent patches of yellowish grey sandy clay. 3-5% white medium gravel, well sorted.	0.38+

Trench No 14		**Length 30 m**	**Width 1.8**	**Depth 0.56 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1401		Topsoil	Mid greyish brown silty clay. Loosely compacted. 1-3% fine white gravel. Rooting from ground surface to approx. 20cm.	0.00–0.31
1402		Natural	Mid brownish grey silty sand interspersed with patches of light yellowish brown silty sand. Changing to more consistent yellowish brown sand towards SE end of trench. 3-5% fine-medium white gravel.	0.31–0.47
1403	1404	Ditch	Linear ditch aligned NE-SW with moderate, straight sides and a flat base. Length: >2.00 m. Width: 0.80 m. Depth: 0.30 m.	0.31–0.62
1404	1403	Secondary fill	Light grey silty sand with 30% yellow sand, 1% charcoal flecks.	0.31–0.62

Trench No 15		**Length 50 m**	**Width 1.8**	**Depth 0.47 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1501		Topsoil	Mid greyish brown silty clay. Moderately compacted. Flecked with chalky white sand (approx. 20%). Rooting from ground surface to 0.3m.	0.00–0.38
1502		Natural	Light grey silty sand interspersed with orangey-brown silty sand. Occasional patches of chalky white clay, more common towards SW end of trench.	0.38+

Trench No 16		**Length 30 m**	**Width 1.8**	**Depth 0.57 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 16	Length 30 m	Width 1.8	Depth 0.57 m	
1601		Topsoil	Mid greyish brown silty clay. Moderately compacted. Flecked with chalky white sand (approx. 20%), more common on SE side of trench. Rooting from ground surface to 0.24m.	0.00–0.40
1602		Subsoil	Mid yellowish brown silty sand. Moderately compacted. Intermittent patches of chalky white sand. 1-3% charcoal flecks.	0.40–0.51
1603		Natural	Variable. Orangey-brown silty sand interspersed with darker grey silty sand and silty clay. Intermittent and irregular patches of chalky white silty material, approx. 6cm deep and overlaying grey silty sand.	0.51+

Trench No 17	Length 50 m	Width 1.8	Depth 0.64 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1701		Topsoil	Mid greyish brown silty clay. Moderately compacted. Flecked with chalky white sand (approx. 20%). Rooting from ground surface to 0.3m.	0.00–0.51
1702		Natural	Mid yellowish grey silty sand interspersed with orangey yellow silty sand. Occasional small patches of chalky clay.	0.51+

Trench No 18	Length 30 m	Width 1.8	Depth 0.61 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1801		Topsoil	Mid greyish brown silty clay. Moderately compacted. Flecked with chalky white sand (approx. 20%). Rooting from ground surface to 0.3m.	0.00–0.48
1802		Natural	Variable. Mid orangey-brown silty sand interspersed with patches of yellowish grey silty sand and pale yellow silty sand. Occasional, irregular patches of white, chalky clay.	0.48+

Trench No 19	Length 50 m	Width 1.8	Depth 0.95 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1901		Topsoil	Mid greyish brown silty clay. Moderately compacted. 3% medium-coarse white gravel. Rooting from ground surface throughout.	0.00–0.34
1902		Natural	Colluvium. Light yellowish brown silty sand. Fairly loose compaction. Homogeneous in colour throughout trench. Shallower towards SE end. 5% fine-medium white gravel, well sorted.	0.34–0.90

Trench No 19		Length 50 m	Width 1.8	Depth 0.95 m
Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
1903		Natural	Mid greyish brown sand with occasional patches of yellowish brown and whiteish grey sand. 3% chalky gravel, varying sizes. Larger patches of chalky stone towards SE end.	0.90+

Trench No 20		Length 50 m	Width 1.8	Depth 0.41 m
Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
2001		Topsoil	Mid greyish brown silty clay. Moderately compacted. 3% medium coarse white gravel. Rooting from ground surface throughout.	0.00–0.35
2002		Natural	Mid orangey brown sand interspersed with large, irregular patches of chalky stone. More sandy and less stony towards SE end.	0.35+

Trench No 21		Length 50 m	Width 1.8	Depth 0.36 m
Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
2101		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-40mm, sparse light rooting concentrated near surface, loose compaction, moderately clear horizon with 2102.	0.00–0.23
2102		Natural	Light yellowish grey with a brown hue clay, common patches of mid brown sandy silt throughout layer, 3% sparse poorly sorted sub-rounded to sub-angular gravel 2-80mm, moderate compaction, moderately clear horizon with 2101, patch of light greyish white geology in trench.	0.23+
2103		Natural	Colluvium. Mid brown sandy silt, 5% sparse poorly sorted sub-rounded gravel 2-70mm, loose compaction, clear horizon with 2101 and 2103, layer is only present in western end of trench.	0.23–1.10

Trench No 22		Length 50 m	Width 1.8	Depth 0.48 m
Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
2201		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 5% sparse poorly sorted sub-rounded gravel 2-70mm, sparse light rooting concentrated near surface, loose compaction, moderately clear horizon with 2202 and 2203.	0.00–0.30

Trench No 22		**Length 50 m**	**Width 1.8**	**Depth 0.48 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2202		Natural	Colluvium. Mid reddish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-80mm, moderate compaction, moderately clear horizon with 2201 and 2203, is not present in all of trench.	0.30+
2203		Natural	Mid yellowish brown with a grey hue silty clay, 5% sparse poorly sorted sub-angular gravel 2-70mm, firm compaction, moderately clear horizon with 2001 and 2202, SE end of trench has a mid grey colour variation in layer.	0.30+

Trench No 23		**Length 50 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2301		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 5% sparse sub-angular gravel 2-90mm, sparse light rooting concentrated near surface, clear horizon with 2302, loose compaction.	0.00–0.35
2302		Natural	Colluvium. Mid reddish brown sandy silty clay, 3% sparse poorly sorted sub-rounded to sub-angular gravel 2-80mm, moderate compaction, clear horizon with 2301 and 2303.	0.35–0.90
2303		Natural	Mid yellowish brown with a grey hue silty clay, 3% sparse poorly sorted sub-angular gravel 2-80mm, firm compaction, clear horizon with 2302.	0.90+

Trench No 24		**Length 50 m**	**Width 1.8**	**Depth 0.50 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2401		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 3% sparse poorly sorted sub-angular to sub-rounded gravel 2-70mm, sparse light rooting concentrated near surface, loose compaction, clear horizon with 2402.	0.00–0.30
2402		Natural	Mid yellowish grey silty clay, 5% sparse poorly sorted sub-angular gravel 2-90mm, firm compaction, clear horizon with 2401, potential archaeology in trench, layer at NE end of trench has a mid grey colour.	0.30+
2403	2404, 2405	Pit	Incomplete pit with moderate, irregular sides and a sloping base. Diameter: 1.14 m. Depth: 0.61 m.	0.30–1.07
2404	2403	Secondary fill	Greyish brown silty clay with 10% sub-angular stones and coarse gravel, poorly sorted. 5% charcoal flecks.	0.30–0.55

Trench No 24		Length 50 m	Width 1.8	Depth 0.50 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2405	2403	Secondary fill	Dark reddish brown silty clay with 5% sub-angular fine gravel, moderately well sorted. 1% charcoal flecks.	0.55–1.07
2406	2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417	Pit	Sub-circular pit with irregular sides, and a flat base. Length: 7.20 m. Width: 1.10 m. Depth: 0.92 m.	0.30–1.22
2407	2406	Primary fill	Light yellow silty clay with 20% greyish yellow sand.	0.62–0.92
2408	2406	Secondary fill	Light yellowish brown silty sand with 1% charcoal flecks.	0.22–1.10
2409	2406	Secondary fill	Dark greyish brown silty clay with 5% sub-angular / sub-rounded stones, poorly sorted. 3% charcoal flecks.	0.22–1.00
2410	2406	Secondary fill	Dark greyish brown silty clay with 3% large sub-angular stones, ≤12 / 10cm. 5% charcoal flecks.	0.36–1.22
2411	2406	Secondary fill	Light greyish brown silty clay with 5% sub-rounded coarse gravel. 1% charcoal flecks.	0.92–1.22
2412	2406	Secondary fill	Light yellowish grey silty clay with 10% yellowish coarse sand.	0.28–0.92
2413	2406	Secondary fill	Mid yellowish brown silty clay with 15% coarse reddish sand. 10% sub-rounded stones and medium coarse gravel. 3% charcoal flecks.	0.35–1.22
2414	2406	Secondary fill	Light greyish yellow silty clay with 3% sub-rounded pebbles, 1% charcoal flecks.	0.25–0.55
2415	2406	Secondary fill	Mid yellowish grey silty clay with 10% yellowish sand. 3% medium gravel.	0.42–0.82
2416	2406	Secondary fill	Dark greyish brown silty clay with 5% coarse gravel, 3% sub-angular stones ≤10 / 8cm.	0.40–0.74
2417	2406	Secondary fill	Light yellowish grey silty clay with 1% charcoal flecks.	0.24–0.58

Trench No 25		Length 50 m	Width 1.8	Depth 0.55 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2501		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose compaction, generally a clear horizon with 2502, more diffuse at NE end of trench where 2502 is a similar colour to 2501.	0.00–0.22

Trench No 25		Length 50 m	Width 1.8	Depth 0.55 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2502		Natural	Mid yellowish brown with a grey hue silty clay, patches of reddish brown sandy silt throughout layer, 5% sparse poorly sorted sub-angular gravel 2-90mm, firm compaction, clear horizon with 2501, layer has a mid greyish brown colour at the NE end of trench where horizon is more diffuse.	0.22+

Trench No 26		Length 50 m	Width 1.8	Depth 0.48 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2601		Topsoil	Topsoil. Dark greyish brown sandy silty clay, 5% sparse poorly sorted sub-rounded gravel 2-80mm, sparse light rooting concentrated near surface, loose compaction, moderately clear horizon with 2602.	0.00–0.25
2602		Natural	Mid yellowish brown with a grey hue clay, southern end of trench is a dark yellowish brown with a grey hue silty clay, moderate to firm compaction, moderately clear horizon with 2601.	0.25+

Trench No 27		Length 50 m	Width 1.8	Depth 0.58 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2701		Topsoil	Topsoil. Dark greyish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-70mm, sparse light rooting concentrated near surface, loose compaction, moderately clear horizon with 2702.	0.00–0.40
2702		Natural	Mid yellowish brown with a grey hue clay, sparse patches of mid brown sandy silt throughout layer, 3% sparse poorly sorted sub-rounded gravel 2-40mm, firm compaction, moderately clear horizon with 2701, S end of trench has a mid yellowish grey silty clay geology.	0.40+

Trench No 28		Length 30 m	Width 1.8	Depth 0.60 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2801		Topsoil	Light brown silty (10%) sand clay, soft.	0.00–0.60
2802		Natural	Light to mid clayey (20 %) sand. Soft, slightly friable.	0.60+

Trench No 29		Length 30 m	Width 1.8	Depth 0.60 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 29		Length 30 m	Width 1.8	Depth 0.60 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2901		Topsoil	Light brown silty (10%) sand. Soft. Crop field.	0.00–0.60
2902		Natural	Light to mid clayey (20%) sand. Soft to friable.	0.60+

Trench No 30		Length 100 m	Width 1.8	Depth 1 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3001		Topsoil	Reddish mid to dark brown silty (20%) sand, loose. Topsoil.	0.00–0.40
3002		Natural	Mid reddish brown sandy (90%) silt (10%), no inclusions very well sorted.	0.40–1.00
3003		Natural	Mid reddish brown sandy clay pockets of smaller coarse sand & fine gravel & larger comp 10% med / coarse gravel mod well sorted. Starts east end.	1.0+
3004		Natural	Light yellowish red sandy (90%) silt (10%), no inclusions very well sorted. Merges with (3003) ~20m from east end.	1.0+

Trench No 31		Length 100 m	Width 1.8	Depth 1.7 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3101		Topsoil	Dark brown silty (30%) sand. Loose. Moderate organic component, basically crop field soil.	0.00–0.40
3102		Natural	Mid brownish red sand (90%) silt (10%). No inclusions. Starts ~1 / 3 downslope.	0.40–0.70
3103		Natural	Mid orangish red clay (40%) sand (20%). Smaller components 25% coarse sand / gravel, larger components 15% medium / coarse gravel.	1.30+
3104		Natural	Angular stone and reddish mid brown clayey (20%) coarse sand at E end of trench.	0.40+
3105		Natural	In west (lower) half of trench (probably alluvial) barely reddish light yellow fine sand. Larger components 10% medium / coarse gravel, moderately well sorted.	1.70+

Trench No 32		Length 50 m	Width 1.8	Depth 0.84 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3201		Topsoil	Mid greyish brown sandy silt with grass rooting. Soft.	0.00–0.28
3202		Natural	Mid reddish brown silty sand, homogenous, clear boundaries with alluvium and topsoil. Soft.	0.28–0.54

Trench No 32		Length 50 m	Width 1.8	Depth 0.84 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3203		Natural	Alluvium. Mid yellowish brown, silty sand, homogenous, clear boundary in colour with 3202, clear boundary in texture with 3204. Soft.	0.54–0.80
3204		Natural	Pale yellow sand with patches of red ferrous natural deposits. Firm.	0.80–0.84+

Trench No 33		Length 50 m	Width 1.8	Depth 0.39 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3301		Topsoil	Mid greyish brown sandy silt with grass rooting. Soft.	0.00–0.19
3302		Natural	Soft sand. Mid red when at border to 3303, pale yellowish brown when further from 3303.	0.19–0.30
3303		Natural	Gravel. Stony base with varying sizes of stone from 4cm to 30 cm diameter.	0.30–0.39+

Trench No 34		Length 50 m	Width 1.8	Depth 0.71 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3401		Topsoil	Mid brownish grey loosely compacted silty sand. Fairly homogenous. ~% small sub-rounded inclusions found throughout but more common towards the base.	0.00–0.44
3402		Subsoil	Light greyish brown loosely compacted silty sand. Fairly homogenous. ~15% mid-sized sub-angular inclusions scattered throughout.	0.44–0.71
3403		Natural	Light yellow grey moderately compacted sandy silt, with scattered sandier patches. ~80% small to mid-sized sub-angular inclusions found throughout.	0.71+

Trench No 35		Length 50 m	Width 1.8	Depth 0.59 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3501		Topsoil	Mid greyish brown soft sandy silt, frequent grass rooting. No inclusions.	0.00–0.41
3502		Natural	Mid reddish brown silty sand. No inclusions. Clear boundary with topsoil.	0.41+

Trench No 36		Length 50 m	Width 1.8	Depth 0.62 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3601		Topsoil	Mid greyish brown soft sandy silt, frequent grass rooting. No inclusions.	0.00–0.36
3602		Natural	Mid reddish brown silty sand. No inclusions. Clear boundary with topsoil and natural.	0.36–0.61

Trench No 36		Length 50 m	Width 1.8	Depth 0.62 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3603		Natural	Stony layer with stone varying in composition and size from 4cm in diameter to 20cm, with small patches of reddish brown silty sand, also natural.	0.61+

Trench No 37		Length 50 m	Width 1.8	Depth 0.50 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3701		Topsoil	Mid greyish brown soft sandy silt, frequent grass rooting. No inclusions.	0.00–0.23
3702		Natural	Mid reddish brown silty sand. No inclusions. Clear boundary with topsoil and natural.	0.23–0.48
3703		Natural	Stony layer with stone varying in composition and size from 4cm in diameter to 20cm, with small patches of reddish brown silty sand, also natural.	0.48+
3704	3707	Pit	Sub-oval pit with steep, straight sides and an irregular / undulating base. Length: 1.22 m. Width: 0.71 m. Depth: 0.27 m.	0.48–0.75
3705	3704	Animal bone deposit	Animal bone group aligned N-S. Lying on left side, legs drawn up towards the body. Relatively undisturbed, approx. 80% complete.	0.48–0.75
3706	3704	Animal bone deposit	Animal bone group. Very poor condition, only longer bones have survived, scattered within the feature. Approx. 10% complete.	0.48–0.75
3707	3704	Deliberate backfill	Mid brownish grey silty sand with ~5% small sub-angular stone inclusions found throughout.	0.48–0.75

Trench No 38		Length 100 m	Width 1.8	Depth 0.96 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3801		Topsoil	Mid greyish brown sandy silt, sparse-moderate 10-15% sub-angular 10-65mm fine gravels-cobbles, sparce 15-20% fine rooting, loose compaction, clear interface with underlying layer.	0.00–0.28
3802		Natural	Mid reddish yellow silty sand, rare 1-2% sub-rounded 5-10mm fine grains, loose compaction, clear interface with underlying layer.	0.28+
3803		Natural	Mid-dark yellowish brown silty sand, common 60-75% sub-rounded / sub-angular 20-250mm moderate gravels, moderate compaction.	0.28+

Trench No 39		Length 30 m	Width 1.8	Depth 0.37 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 39		**Length 30 m**	**Width 1.8**	**Depth 0.37 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
3901		Topsoil	Mid greyish brown sandy silt, moderate-common 30-35% sub-angular / sub-rounded 10-35mm fine-coarse gravels, sparse 3-5% fine rooting, loose compaction, diffuse interface with underlying layer.	0.00–0.29
3902		Natural	Mid yellowish brown silty sand, common 50-60% sub-rounded / sub-angular 20-350mm moderate gravels, loose compaction.	0.29+

Trench No 40		**Length 50 m**	**Width 1.8**	**Depth 0.57 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4001		Topsoil	Mid greyish brown sandy silt, 1-2% rare sub-angular 10-15mm fine gravels, moderately sorted, sparce 10-15% fine rooting, loose compaction, clear interface with underlying layer.	0.00–0.33
4002		Natural	Mid reddish brown silty sand, rare 1-2% sub-rounded 5-10mm pebbles, well sorted, loose to moderate compaction, clear interface with underlying layer.	0.33–0.45
4003		Natural	Mid-dark reddish brown silty sand, common 50-60% sub-rounded / sub-angular 20-250mm moderate gravels-boulders, poorly sorted, moderate compaction.	0.45+

Trench No 41		**Length 30 m**	**Width 1.8**	**Depth 0.48 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4101		Topsoil	Mid greyish brown sandy silt, sparse 3-5% sub-angular 10-15mm fine gravels, moderately sorted, sparce 10-15% fine rooting, loose compaction, clear interface with underlying layer.	0.00–0.31
4102		Natural	Mid reddish brown silty sand, sparce 3-5% sub-angular 20-60mm moderate gravels-cobbles, poorly sorted, loose-moderate compaction, clear interface with underlying natural.	0.31–0.42
4103		Natural	Mid-dark reddish brown silty sand, common 50-60% sub-rounded / sub-angular 20-200mm moderate gravels-boulders, poorly sorted, moderate compaction.	0.42+

Trench No 42		**Length 50 m**	**Width 1.8**	**Depth 0.56 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 42		**Length 50 m**	**Width 1.8**	**Depth 0.56 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4201		Topsoil	Mid greyish brown sandy silt, 5-8% sparse sub-angular / sub-rounded 10-20mm fine-moderate gravels, sparce 10-15% fine rooting, loose compaction, clear interface with underlying layer.	0.00–0.34
4202		Natural	Mid reddish brown silty sand, sparse-moderate 15-20% sub-rounded / sub-angular 10-50mm fine gravels-cobbles, poorly sorted, loose-moderate compaction, clear interface with underlying layer.	0.34–0.48
4203		Natural	Mid-dark reddish brown silty sand, common 60-70% sub-rounded / sub-angular 20-300mm moderate gravels-boulders, moderate compaction.	0.48+

Trench No 43		**Length 30 m**	**Width 1.8**	**Depth 0.84 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4301		Topsoil	Mid greyish brown soft sandy silt, frequent grass rooting. No inclusions.	0.00–0.40
4302		Natural	Mid reddish brown silty sand. No inclusions. clear boundary with topsoil and natural.	0.40–0.74
4303		Natural	Mid brownish yellow soft sand with naturally occurring deposits of ironstone.	0.74–0.84+

Trench No 44		**Length 30 m**	**Width 1.8**	**Depth 0.60 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4401		Topsoil	Mid greyish brown soft sandy silt, frequent grass rooting. No inclusions.	0.00–0.30
4402		Natural	Mid reddish brown silty sand. No inclusions. Clear boundary with topsoil and natural.	0.30–0.44
4403		Natural	Mid brownish yellow soft sand with naturally occurring deposits of ironstone.	0.44+

Trench No 45		**Length 50 m**	**Width 1.8**	**Depth 0.40 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4501		Topsoil	Mid greyish brown soft sandy silt, frequent grass rooting. No inclusions.	0.00–0.26
4502		Natural	Stony layer with stone varying in composition and size from 4cm in diameter to 20cm, with small patches of reddish brown silty sand, also natural.	0.26+

Trench No 46	**Length 100 m**	**Width 1.8**	**Depth 0.58 m**

Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
4601		Topsoil	Mid greyish brown sandy silt, 1-2% rare sub-angular 10-20mm fine-moderate gravels, poorly sorted, sparce 10-15% fine rooting, loose compaction, clear interface with underlying layer.	0.00–0.28
4602		Natural	Mid reddish brown silty sand, rare 1-2% sub-rounded 10-50mm fine gravels-cobbles, poorly sorted, loose-moderate compaction, clear interface with underlying natural.	0.28–0.40
4603		Natural	Mid-dark reddish brown silty sand, common 50-60% sub-rounded / sub-angular 20-250mm moderate gravel, poorly sorted, moderate compaction.	0.40+

Trench No 47	Length 50 m	Width 1.8	Depth 0.50 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4701		Topsoil	Mid brown clayey (30%) silt, friable. Frequent grit and rooting.	0.00–0.25
4702		Subsoil	Reddish mid brown clayey (20%) sand, soft. Very frequent grit and pebbles.	0.25–0.50
4703		Natural	Reddish light brown clayey (20%) coarse sand, loose, with abundant gravels and pebbles. Occasional patches of clayey sand similar to 4702.	0.50+

Trench No 48	Length 30 m	Width 1.8	Depth 0.50 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4801		Topsoil	Mid brown clayey (30%) silt, friable. Frequent grit and rooting.	0.00–0.25
4802		Subsoil	Reddish mid brown clayey (20%) sand, soft. Very frequent grit and pebbles.	0.25–0.45
4803		Natural	Reddish light brown clayey (20%) coarse sand, loose, with abundant gravels and pebbles. Occasional patches of clayey sand.	0.45+

Trench No 49	Length 30 m	Width 1.8	Depth 0.50 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
4901		Topsoil	Mid brown clayey (30%) silt, friable. Frequent grit and rooting.	0.00–0.25
4902		Subsoil	Reddish mid brown clayey (20%) sand, soft. Very frequent grit and pebbles.	0.25–0.40
4903		Natural	Reddish light brown clayey (20%) coarse sand, loose, with abundant gravels and pebbles. Occasional patches of clayey sand.	0.40+

Trench No 50	Length 30 m	Width 1.8	Depth 0.38 m

Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
5001		Topsoil	Mid greyish brown sandy silt, 1-2% rare sub-angular 10-15mm fine gravels, moderate 15-20% fine rooting, loose compaction, clear interface with underlying layer.	0.00–0.25
5002		Natural	Mid reddish brown silty sand, rare 1-2% sub-rounded 10-15mm fine gravels, loose to moderate compaction, clear interface with underlying natural.	0.25–0.35
5003		Natural	Mid reddish brown silty sand, common 60-70% sub-rounded / sub-angular 20-150mm moderate gravels-boulders, moderate compaction.	0.35+

Trench No 51	Length 50 m		Width 1.8	Depth 0.46 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5101		Topsoil	Mid brown silty clay. Rooting throughout and moderate compaction.	0.00–0.36
5102		Natural	Light yellowish brown silty sand with frequent irregular, angular stone inclusions (c.70%) at W end of trench.	0.36+

Trench No 52	Length 30 m		Width 1.8	Depth 0.40 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5201		Topsoil	Mid brown silty clay. Rooting throughout and moderate compaction.	0.00–0.35
5202		Natural	Reddish loose light brown clayey (20%) coarse sand with abundant gravels and pebbles.	0.35+

Trench No 53	Length 30 m		Width 1.8	Depth 0.30 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5301		Topsoil	Mid brown clayey (30%) silt, friable. Frequent grit and rooting.	0.00–0.30
5302		Natural	Reddish light brown clayey (20%) coarse sand. Loose with abundant gravels and pebbles. Occasional patches of clayey sand.	0.30+

Trench No 54	Length 100 m		Width 1.8	Depth 1.10 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5401		Topsoil	Mid brown clayey (30%) silt, friable. Frequent grit and rooting. Pasture soil.	0.00–0.30
5402		Subsoil	Reddish mid brown clayey (20%) sand, soft. Very frequent grit and pebbles.	0.30–1.00
5403		Natural	Alluvial layer. Yellowish brown fine sand, with several patches of yellow coarse sand with very frequent pebbles and grit.	1.00+

Trench No 54		Length 100 m	Width 1.8	Depth 1.10 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5404		Natural	Colluvium layer. Yellow coarse sand with very frequent pebbles and grit.	1.00+

Trench No 55		Length 50 m	Width 1.8	Depth 0.43 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5501		Topsoil	Mid greyish brown silty sand. Loosely compacted. Fairly homogeneous in colour. 5% sub-rounded pebbles / coarse gravel. Rooting from ground surface throughout.	0.00–0.37
5502		Natural	Mid reddish brown sandy silt. Moderately compacted. 50-60% sub-rounded / sub-angular cobbles and coarse gravel, poorly sorted.	0.37+

Trench No 56		Length 50 m	Width 1.8	Depth 1 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5601		Topsoil	Mid brown clayey (30%) silt, friable. Frequent grit and rooting. Pasture soil.	0.00–0.30
5602		Subsoil	Reddish mid brown clayey (20%) sand, soft. Very frequent grit and pebbles.	0.30–0.70
5603		Natural	Reddish light brown clayey (20%) coarse sand, loose, with abundant gravels and pebbles (mostly flat, up to 20 cm size, either mud- or limestone). Apparently alluvial layer in low riverbank. Occasional patches of clayey sand.	0.70+

Trench No 57		Length 50 m	Width 1.8	Depth 0.60 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5701		Topsoil	Mid brown clayey (30%) silt, friable. Frequent grit and rooting. Pasture soil.	0.00–0.30
5702		Subsoil	Reddish mid brown clayey (20%) sand, soft. Very frequent grit and pebbles.	0.30–0.60
5703		Natural	Reddish light brown clayey (20%) coarse sand, loose, with abundant gravels and pebbles (mostly flat, up to 20 cm size, either mud- or limestone). Apparently alluvial layer in low riverbank. Occasional patches of clayey sand similar to 5702.	0.60+
5704		Natural	Pale mid brown clayey (20%) silt, loose, with high % (≥ 60% in vol.) of flat and sub-angular pebbles.	0.60+

Area 6

Trench No 58		Length 30 m	Width 1.8	Depth 1.10 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5801		Topsoil	Pale light brown silty (10%) clay. Friable. Moderately waterlogged crop field.	0.00–0.60
5802		Subsoil	Mid grey clay, slightly friable.	0.60–0.80
5803		Natural	Peat. Black. Soft, organic layer with degraded tree trunks.	0.80–1.00
5804		Natural	Light yellow, fine sand. Soft, occasionally in light to mid reddish yellow strips.	1.00+
5805	5806	Secondary fill	Mid grey clayey (30%) sand, very friable.	1.00–1.07
5806	5805	Pit	Circular pit with shallow, irregular sides and an irregular / undulating base. Diameter: 0.65 m. Depth: >0.07 m.	1.00–1.07
5807	5808	Secondary fill	Mid grey clayey (30%) sand, very friable.	1.00–1.09
5808	5807	Gully	Curvilinear gully aligned west - east with shallow, irregular sides and an irregular / undulating base. Length: >2.00 m. Width: 1.70 m. Depth: 0.09 m.	1.00–1.09

Trench No 59		Length 50 m	Width 1.8	Depth 0.45 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
5901		Topsoil	Mid greyish brown, silty clay, moderate compaction, rooting.	0.00–0.29
5902		Natural	Pale yellowish brown, sand, no inclusions.	0.29+

Trench No 61		Length 50 m	Width 1.8	Depth 1 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6101		Topsoil	Moderately compact dark brownish grey silty clay (40 / 60) frequent rooting.	0.00–0.30
6102		Subsoil	Moderately compact brownish yellow silty clay (30 / 70).	0.30–0.50
6103		Natural	Alluvium. Soft brownish grey sandy silt (20 / 80).	0.50–0.65
6104		Natural	Peat. Friable dark brownish black peat frequent organic remains.	0.65–0.90
6105		Natural	Light yellowish grey alluvial sands.	0.90+

Trench No 62		Length 50 m	Width 1.8	Depth 0.88 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6201		Topsoil	Mid greyish brown, silty clay, moderate compaction, rooting.	0.00–0.33
6202		Subsoil	Mid brown, silty clay, no inclusions, moderate compaction.	0.33–0.47
6203		Natural	Peat. Dark reddish brown with clayey silt element, loose compaction, degraded organic material.	0.47–0.77

Trench No 62		Length 50 m	Width 1.8	Depth 0.88 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6204		Natural	Pale greyish yellow, sand, powdery compaction.	0.77+

Trench No 63		Length 50 m	Width 1.8	Depth 0.94 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6301		Topsoil	Mid greyish brown, silty clay, moderate compaction, rooting.	0.00–0.35
6302		Subsoil	Mid brown, silty clay, no inclusions, moderate compaction.	0.35–0.52
6304		Natural	Peat. Dark reddish brown with clayey silt element, loose compaction, degraded organic material.	0.52–0.85
6305		Natural	Pale greyish yellow, sand, powdery compaction.	0.85+

Trench No 64		Length 50 m	Width 1.8	Depth 1.12 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6401		Topsoil	Mid greyish brown, silty clay, moderate compaction, rooting, friable.	0.00–0.46
6402		Subsoil	Light orangish brown, silty clay, no inclusions, moderate compaction.	0.46–0.62
6403		Natural	Peat. Dark reddish brown with clayey silt component, loose compaction, degraded organic material.	0.62–0.98
6404		Natural	Pale greyish yellow, sand, soft compaction.	0.98+

Trench No 65		Length 50 m	Width 1.8	Depth 0.90 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6501		Topsoil	Mid greyish brown, silty clay, moderate compaction, rooting.	0.00–0.35
6502		Subsoil	Mid brown, silty clay, no inclusions, moderate compaction.	0.35–0.47
6503		Natural	Peat. Dark reddish brown with clayey silt component, loose compaction, degraded organic material.	0.47–0.67
6504		Natural	Pale greyish yellow, sand, powdery compaction, glacial banding of clay.	0.67+

Area 3

Trench No 66		Length 30 m	Width 1.8	Depth 0.44 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 66		Length 30 m	Width 1.8	Depth 0.44 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6601		Topsoil	Light greyish brown silty clay. Loose to moderate compaction. Fine rooting throughout the layer. Fairly clear interface with underlying natural. ≥1% small, sub-rounded gravels, poorly sorted.	0.00–0.27
6602		Natural	Mix of mid greyish brown silty clay and dark blackish brown peat. Moderate compaction. ≥2% fine rooting. Large pieces of degraded trees throughout trench base.	0.27+

Trench No 67		Length 50 m	Width 1.8	Depth 0.66 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6701		Topsoil	Dark greyish brown, silty clay, soft compaction. Rare small sized stone inclusions, upper material plough soil with sparse rooting and vegetation.	0.00–0.38
6702		Subsoil	Mid yellowish brown, silty clay, mid soft compaction. Rare small sized stone inclusions, consistent in colour and composition.	0.38–0.58
6703		Natural	Peat. Dark greyish black, very soft compaction. Rare streaks of clay or clay silt, contains abundant small roots.	0.58+

Trench No 68		Length 50 m	Width 1.8	Depth 0.65 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6801		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. Fine rooting throughout the layer. ≥1% small, poorly sorted sub-rounded gravels.	0.00–0.32
6802		Natural	Light greyish brown silty clay with dark blackish brown peat. Moderate compaction. No rooting. No inclusions. Contains large amount of degraded wood on the base.	0.32+

Trench No 69		Length 50 m	Width 1.8	Depth 0.49 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
6901		Topsoil	Dark greyish brown, silty clay. Soft compaction. Rare small sized stone inclusions, upper material plough soil with sparse rooting and vegetation.	0.00–0.31
6902		Natural	Peat / Natural. Dark blackish grey, very soft compaction. Rare streaks of clay or clay silt, material stains easily and contains abundant small roots.	0.31+

Trench No 70		Length 30 m	Width 1.8	Depth 0.49 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7001		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. Fine rooting throughout the layer. ≥1% small, poorly sorted sub-rounded gravels.	0.00–0.37
7002		Natural	Varied natural. Light greyish brown silty clay with dark blackish brown peat. Moderate compaction. No rooting. No inclusions.	0.37+

Trench No 71		Length 30 m	Width 1.8	Depth 0.53 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7101		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. Fine rooting throughout the layer. ≥1% small, poorly sorted sub-rounded gravels.	0.00–0.35
7102		Natural	Varied natural. Light greyish brown silty clay with dark blackish brown peat. Moderate compaction. No rooting. No inclusions.	0.35–0.53

Trench No 72		Length 30 m	Width 1.8	Depth 0.40 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7201		Topsoil	Mid-greyish brown silty clay. Moderate compaction with fine rooting throughout.	0.00–0.24
7202		Natural	Mix of light greyish-brown silty clay and dark blackish brown peat. Moderate compaction with fine rooting throughout.	0.24+

Trench No 73		Length 30 m	Width 1.8	Depth 0.51 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7301		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fine rooting throughout the layer. Fairly clear interface with underlying natural. ≥1% small, poorly sorted sub-rounded gravels.	0.00–0.23
7302		Natural	Mix of light greyish brown silty clay and dark blackish brown peat. Moderate compaction. Fine rooting throughout.	0.23+

Trench No 74		Length 30 m	Width 1.8	Depth 0.40 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 74		Length 30 m	Width 1.8	Depth 0.40 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7401		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. Fine rooting throughout. ≥1% small, poorly sorted, sub-rounded gravels.	0.00–0.24
7402		Natural	Mix of light greyish brown silty clay and dark blackish brown peat. Moderate compaction. Fine rooting throughout.	0.24+

Trench No 75		Length 50 m	Width 1.8	Depth 0.48 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7501		Topsoil	Dark greyish brown silty clay. Moderate compaction. Fine and thick rooting throughout the layer. Fairly clear interface with underlying natural. ≥1% small, sub-rounded poorly sorted gravels.	0.00–0.31
7502		Natural	Part mid yellowish brown sand, and dark blackish brown peat. Sand located in W end of trench. Fine rooting throughout. No other inclusions.	0.31+

Trench No 76		Length 30 m	Width 1.8	Depth 0.84 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7601		Topsoil	Dark greyish brown, silty clay with sand, medium compaction. Upper material plough soil with sparse vegetation and rooting. Rare stone inclusions.	0.00–0.34
7602		Subsoil	Mid greyish brown, silty clay with sand, mid soft compaction. Patches of natural sand and leeching from above and below layers. Consistent in colour and composition.	0.34–0.64
7603		Natural	Light yellowish brown, sand with silty sand, soft compaction. Patches of clear white and grey colour in silt patches. Half trench consists of peat.	0.64+

Trench No 77		Length 50 m	Width 1.8	Depth 0.40 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7701		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. Fine rooting throughout ≥ 1 % small, poorly sorted, sub-rounded gravels.	0.00–0.24
7702		Natural	Dark blackish brown peat. Moderate compaction. Fine rooting throughout.	0.24+

Trench No 78		**Length 50 m**	**Width 1.8**	**Depth 0.50 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7801		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. Fine rooting throughout ≥ 1 % small, poorly sorted, sub-rounded gravels.	0.00–0.40
7802		Natural	Dark blackish brown peat. Moderate compaction. Fine rooting throughout.	0.40+

Trench No 79		**Length 50 m**	**Width 1.8**	**Depth 0.60 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
7901		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fine and thick rooting at upper 20cm. Somewhat diffuse interface with underlying natural layer. ≥1% small, sub-rounded poorly sorted gravels.	0.00–0.32
7902		Natural	Part mid yellowish brown sand, and dark blackish brown peat. Sand located in SE half of trench. Fine rooting throughout. No inclusions.	0.32+

Trench No 80		**Length 30 m**	**Width 1.8**	**Depth 0.52 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8001		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. ≥5% rooting throughout the layer. ≥1% small, poorly sorted sub-rounded gravels.	0.00–0.26
8002		Natural	Light greyish brown clay, and dark blackish brown peat. Moderate compaction. No rooting. No inclusions.	0.26+

Trench No 81		**Length 50 m**	**Width 1.80 m**	**Depth 0.72 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8101		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fine rooting throughout. Thick rooting at upper 20cm of layer. Fairly clear interface with underlying natural. Interface slightly obscured by bioturbation. ≥1% small, sub-rounded, poorly sorted gravels.	0.00–0.41
8102		Natural	Mix of light yellowish brown sand and dark blackish brown peat. Peat present in NE third of trench. SW two thirds sand. No rooting or inclusions.	0.41+

Trench No 82		**Length 50 m**	**Width 1.8**	**Depth 0.50 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 82		**Length 50 m**	**Width 1.8**	**Depth 0.50 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8201		Topsoil	Dark greyish brown silty clay. Moderate compaction. Clear interface with underlying natural. Thick and fine rooting throughout the layer. ≥1% poorly sorted, sub-rounded small gravels.	0.00–0.32
8202		Natural	Mid yellowish brown sand. Loose compaction. No rooting. No inclusions. Patches of peat present in S end of trench.	0.32+

Trench No 83		**Length 50 m**	**Width 1.8**	**Depth 0.50 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8301		Topsoil	Dark greyish brown, silty clay with sand, medium compaction. Upper material plough soil with sparse vegetation and rooting. Rare stone inclusions.	0.00–0.27
8302		Subsoil	Mid greyish brown, silty clay with sand, mid soft compaction. Patches of natural sand and leeching from above and below layers. Consistent in colour and composition.	0.27–0.40
8303		Natural	Light yellowish brown, sand with silty sand, soft compaction. Patches of clear white and grey colour in silt patches.	0.40+

Trench No 84		**Length 50 m**	**Width 1.8**	**Depth 0.73 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8401		Topsoil	Dark greyish brown, silty clay with sand, medium compaction. Upper material plough soil with sparse vegetation and rooting. Rare stone inclusions.	0.00–0.40
8402		Subsoil	Mid greyish brown, silty clay with sand, mid soft compaction. Patches of natural sand and leeching from above and below layers. Consistent in colour and composition.	0.40–0.69
8403		Natural	Light yellowish brown, sand with silty sand, soft compaction. Patches of clear white and grey colour in silt patches. Peat also present.	0.69+

Trench No 85		**Length 50 m**	**Width 1.8**	**Depth 0.88 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 85		Length 50 m	Width 1.8	Depth 0.88 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8501		Topsoil	Dark greyish brown, silty clay with sand, medium compaction. Upper material plough soil with sparse vegetation and rooting. Rare stone inclusions.	0.00–0.28
8502		Subsoil	Mid greyish brown, silty clay with sand, mid soft compaction. Patches of natural sand and leeching from above and below layers. Consistent in colour and composition.	0.28–0.62
8503		Natural	Light yellowish brown, sand with silty sand, soft compaction. Patches of clear white and grey silt patches.	0.62–0.88+

Trench No 86		Length 30 m	Width 1.8	Depth 0.52 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8601		Topsoil	Dark greyish brown, silty clay, medium compaction. Upper material plough soil with sparse vegetation and rooting. No inclusions visible, consistent in colour and composition.	0.00–0.44
8602		Natural	Peat. Dark blackish grey, silty peat, mid soft compaction. Natural here consists nearly entirely of peat, streaks of leeching from upper layer, sparse chunks of degraded wood and large root inclusions.	0.44–0.52+

Trench No 87		Length 50 m	Width 1.8	Depth 0.87 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8701		Topsoil	Dark greyish brown, silty clay with sand, medium compaction. Upper material plough soil with sparse vegetation and rooting. Rare stone inclusions.	0.00–0.27
8702		Subsoil	Mid greyish brown, silty clay with sand, mid soft compaction. Patches of natural sand and leeching from above and below layers. Consistent in colour and composition.	0.27–0.57
8703		Natural	Light yellowish brown, sand with silty sand, soft compaction. Patches of clear white and grey colour in silt patches. Peat present.	0.57–0.87+

Trench No 88		Length 30 m	Width 1.8	Depth 0.63 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 88		Length 30 m	Width 1.8	Depth 0.63 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8801		Topsoil	Mid greyish brown silty clay. Moderate compaction. Clear interface with underlying natural. Fine rooting throughout the layer. ≥1% small, sub-rounded poorly sorted gravels.	0.00–0.50
8802		Natural	Dark blackish brown peat. Moderate compaction. Very fine rooting throughout. No inclusions.	0.50–0.63+

Trench No 89		Length 30 m	Width 1.8	Depth 0.41 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
8901		Topsoil	Dark brownish grey, silty clay with sand, medium compaction. Upper material plough soil with sparse vegetation and rooting. Rare stone inclusions, consistent in colour and composition.	0.00–0.29
8902		Natural	Light yellowish brown, sand with patches of silty sand and clay, soft compaction. Multi coloured streaks and mottles, uneven, inconsistent colour patches.	0.29–0.41+

Trench No 90		Length 50 m	Width 1.8	Depth 0.95 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9001		Topsoil	Dark brownish grey, silty clay with sand, medium compaction. Upper material plough soul with heavy rooting. Rare stone inclusions.	0.00–0.35
9002		Subsoil	Mid brownish grey, silty clay with sand, medium compaction. Sparse dark grey mottles, rare stone inclusions, consistent in colour and composition.	0.35–0.51
9003		Deliberate backfill	Dumping layer. Dark grey, sandy clay with silt, mid soft compaction. Mostly composed of natural silt, clay, sand and random objects. Possible levelling material.	0.51–0.80
9004		Natural	Mid yellowish brown, orange hue, sand with patches of silty sand, soft compaction. Streaks of grey leeching through from upper layers. Rare small stone inclusions.	0.80–0.95+

Trench No 91		Length 50 m	Width 1.8	Depth 0.40 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 91		**Length 50 m**	**Width 1.8**	**Depth 0.40 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9101		Topsoil	Mid greyish brown silty clay. Moderate compaction. Fairly clear interface with underlying natural. Fine rooting throughout ≥ 1 % small, poorly sorted, sub-rounded gravels.	0.00–0.35
9102		Natural	Light yellowish brown, silty sand, soft compaction. Patches of clear white and grey colour in silt patches. Some peat patches.	0.35–0.40+

Trench No 92		**Length 50 m**	**Width 1.8**	**Depth 0.69 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9201		Topsoil	Dark greyish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-30mm, sparse light rooting concentrated near surface, moderate compaction, moderately clear horizon with 9202, slightly more diffuse horizon in places due to varied nature of 9202.	0.00–0.51
9202		Natural	Light whiteish grey with a yellow hue silty sand, large patches of very dark grey sandy silt and peat throughout layer, peat contains large organic inclusions, degraded roots and plant material, 1% rare poorly sorted sub-rounded gravel 2-30mm, moderate compaction. Moderately clear horizon with Topsoil generally but is more diffuse in places due to the peat.	0.51+

Trench No 93		**Length 30 m**	**Width 1.8**	**Depth 0.92 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9301		Topsoil	Mid greyish brown silty clay. Dense compaction. Diffuse interface with underlying natural. Fine rooting at upper 10cm of layer. ≥2% poorly sorted, sub-rounded small gravels.	0.00–0.30
9302		Natural	Light greyish brown clay. Dense compaction. No rooting. No inclusions. ≥3% patches of iron panning. Dark blackish brown peat.	0.30–0.92

Trench No 94		**Length 30 m**	**Width 1.8**	**Depth 0.70 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9401		Topsoil	Mid greyish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-40mm, sparse light rooting concentrated near surface, moderate to loose compaction, moderately clear horizon with Subsoil.	0.00–0.38

Trench No 94		Length 30 m	Width 1.8	Depth 0.70 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9402		Subsoil	Light greyish brown with a yellow hue sandy silt, 3% sparse poorly sorted sub-rounded gravel 2-40mm, moderately clear horizon with 9401 and 9403, moderate compaction.	0.38–0.52
9403		Natural	Varied mid greyish brown clay with a very dark grey peaty, silt clay with abundant organic material inclusions, moderate compaction, moderately clear horizon with Subsoil.	0.52+

Trench No 95		Length 50 m	Width 1.8	Depth 0.66 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9501		Topsoil	Dark greyish brown sandy silty clay, 1% rare poorly sorted sub-rounded gravel 2-30mm, sparse light rooting concentrated near surface, moderate compaction, clear horizon with Natural.	0.00–0.40
9502		Natural	Light whiteish grey with a yellow hue silty sand with some light orangey brown variation at both ends of trench. 1% sparse poorly sorted sub-rounded gravel 2-40mm, moderate compaction, clear horizon with Topsoil.	0.40+

Trench No 96		Length 50 m	Width 1.8	Depth 0.54 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9601		Topsoil	Mid brownish grey sandy silt clay, 3% sparse poorly sorted sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose to moderate compaction, moderately clear horizon with Natural.	0.00–0.36
9602		Natural	Light whiteish grey silty sand, layer peat patches which have abundant degraded tree rooting, 1% rare poorly sorted sub-rounded gravel 2-30mm, loose to moderate compaction, moderately clear horizon with Topsoil.	0.36+

Trench No 97		Length 30 m	Width 1.8	Depth 0.75 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9701		Topsoil	Mid greyish brown silty clay. Dense compaction. Clear interface with underlying natural (9702). Contains fine rooting at upper c.20cm of layer. ≥5% small, poorly sorted, sub-rounded gravels.	0.00–0.58

Trench No 97		Length 30 m	Width 1.8	Depth 0.75 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9702		Natural	Dark greyish brown silty clay (peat), and light greyish brown silty sand with iron panning. Former: moderate compaction; latter: loose compaction. No rooting. ≥1% small, poorly sorted sub-rounded gravels.	0.58–0.75

Trench No 98		Length 30 m	Width 1.8	Depth 0.60 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9801		Topsoil	Dark greyish brown sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-30mm, sparse light rooting concentrated near surface, moderate to loose compaction, clear horizon with Natural.	0.00–0.44
9802		Natural	Light whiteish grey silty sand with yellowish patches. Also contains patches of very dark grey silty peat containing degraded tree rooting, moderate compaction, clear horizon with Topsoil.	0.44+

Trench No 99		Length 30 m	Width 1.8	Depth 0.66 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
9901		Topsoil	Mid brownish grey sandy silt clay, 3% sparse poorly sorted sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose to moderate compaction, moderately clear horizon with Natural.	0.00–0.40
9902		Natural	Peat. Soft. Brownish black. Organically rich layer.	0.40–0.50
9903		Natural	Mid grey clay, layer varies at NE end of trench where it is a light yellowish grey sandy clay, majority of trench is a very dark grey silty peat filled with organic matter, 1% rare poorly sorted sub-rounded gravel 2-30mm, moderate to firm compaction, generally a moderately clear horizon with overlaying strata.	0.50+

Trench No 100		Length 30 m	Width 1.8	Depth 0.52 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10001		Topsoil	Topsoil. Mid brownish grey sandy silty clay, 3% sparse poorly sorted sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose to moderate compaction, moderately clear horizon with Natural.	0.00–0.30

Trench No 100		Length 30 m	Width 1.8	Depth 0.52 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10002		Natural	Light brownish grey with a yellow hue clay, layer is more varied at NW end of trench with patches of light grey sandy clay and also some iron panning. Patches of very dark grey silty peat are present which contain degraded tree roots. 1% rare poorly sorted sub-rounded gravel 2-40mm, firm compaction, generally a moderately clear horizon with Topsoil.	0.30+

Trench No 101		Length 50 m	Width 1.8	Depth 0.45 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10101		Topsoil	Mid greyish brown, sandy clay, moderate rooting.	0.00–0.18
10102		Natural	Light yellowish orange, sand, loose compaction, no inclusions.	0.18–0.45+
10103	10104	Shrub	Oval pit with shallow, concave sides and a concave base. Length: 0.38 m. Width: 0.42 m. Depth: 0.22 m.	0.45–0.60
10104	10103	Tertiary fill	Dark greyish brown silty sand.	0.45–0.60
10105	10106	Ditch	Sub-oval ditch with moderate, concave sides and a u-shaped base. Length: >0.58 m. Width: 3.62 m. Depth: 0.65 m.	0.25–0.95
10106	10105	Secondary fill	Mid orangey brown silty sand.	0.25–0.95

Trench No 102		Length 50 m	Width 1.8	Depth 0.68 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10201		Topsoil	Dark brownish grey, silty clay sand, soft compaction. Plough soil with moderate rooting and chunks of material from the lower layers. Consistent in colour and composition.	0.00–0.32
10202		Natural	Varied mid brownish orange and dark grey clayey sands with silt, soft compaction. No inclusions, consistent in composition.	0.32–0.68 +
10203	10204	Ditch	Ditch. Unexcavated as identified in neighbouring trench 103.	N/A

Trench No 103		Length 50 m	Width 1.8	Depth 0.69 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10301		Topsoil	Dark greyish brown, silty clay with sand, mid soft compaction. Upper material is plough soil with heavy rooting, rare small sized stone inclusions. Consistent in colour and composition.	0.00–0.43

Trench No 103		Length 50 m	Width 1.8	Depth 0.69 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10302		Natural	Light yellowish brown, sand, soft compaction. Sparse patches of dark grey silty sand with clay. Moderate small sized orange mottles, consistent in colour and composition. Peat on one side of the trench.	0.43–0.69+
10303	10304, 10305	Ditch	Linear ditch aligned ESE - WNW with moderate, concave sides and a flat base. Length: >1.80 m. Width: 1.90 m. Depth: 0.35 m.	0.69–1.03
10304	10303	Secondary fill	Mid greyish brown silty sand.	0.69–0.99
10305	10303	Secondary fill	Mid brownish grey silty sand.	0.69–1.03

Trench No 104		Length 50 m	Width 1.8	Depth 0.48 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10401		Topsoil	Dark greyish brown, silty clay with sand, soft compaction. Plough soil with heavy rooting, rare small sized stone inclusions. Consistent in colour and composition.	0.00–0.37
10402		Natural	Light yellowish brown, sand, soft compaction. Sparse patches of white sand and grey silty clay throughout. Rare small sized stone inclusions, consistent in colour and composition.	0.37–0.48+

Trench No 105		Length 50 m	Width 1.8	Depth 0.66 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10501		Topsoil	Dark greyish brown, silty clay with sand, mid soft compaction. Plough soil with heavy rooting, rare small sized stone inclusions. Consistent in colour and composition.	0.00–0.26
10502		Subsoil	Colluvium. Mid dark brown, grey hue, silty clay, mid firm compaction. Likely formed by silt carried down the bank from nearby or the hills further away. No inclusions, consistent in colour and composition.	0.26–0.41
10503		Natural	Dark blackish grey, silty sand mixed with peat, very soft compaction. The material from the upper layer has mixed with the peat overlying the sand causing the natural to be very dark and saturated here. Rare patches of clear sand, consistent in colour and composition.	0.41–0.66+

Trench No 106		Length 50 m	Width 1.8	Depth 0.70 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 106		Length 50 m	Width 1.8	Depth 0.70 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10601		Topsoil	Dark greyish brown, silty clay with sand, mid soft compaction. Plough soil with heavy rooting, rare small sized stone inclusions. Consistent in colour and composition.	0.00–0.26
10602		Subsoil	Light greyish brown, silty sand, soft compaction. No inclusions, sparse small sized orange mottles, consistent in colour and composition.	0.26–0.38
10603		Natural	Colluvium. Mid dark brown, grey hue, silty clay, mid firm compaction. Likely formed by silt carried down the bank from nearby or the hills further away. No inclusions, consistent in colour and composition.	0.38–0.51
10604		Natural	Peat, black, soft compaction. Moderate to large, degraded tree trunks spread randomly throughout. Silty on the surface consistent in colour and composition.	0.51–0.70+

Trench No 107		Length 50 m	Width 1.8	Depth 0.66 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
10701		Topsoil	Dark greyish brown, silty clay with sand, soft compaction. Plough soil with heavy rooting, rare small sized stone inclusions. Consistent in colour and composition.	0.00–0.21
10702		Subsoil	Light greyish brown, silty sand, soft compaction. No inclusions, sparse small sized orange mottles, consistent in colour and composition.	0.21–0.42
10703		Natural	Peat, black, soft compaction. Moderate to large, degraded tree trunks spread randomly throughout. Silty on the surface consistent in colour and composition.	0.42–0.66

Trench No 108		Length 50 m	Width 1.8	Depth 0.80 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1081		Topsoil	Mid greyish-brown silty clay with moderate compaction and rooting throughout.	0.00–0.36
1082		Natural	Alluvium. Mid-brown silty clay with moderate compaction and patches of light yellowish-brown, moderately compacted, sandy clay.	0.36–0.58
1083		Natural	Peat. Mid blueish black with silty clay component, moderate compaction. Occasional rooting present.	0.58–0.64

Trench No 108		Length 50 m	Width 1.8	Depth 0.80 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1084		Natural	Mid-grey sandy clay with mottled white and dark grey patches at NE end of trench. Moderately compacted and no inclusions present. Mid orange-brown sandy clay throughout rest of trench. Moderately compacted with no inclusions present.	0.64–0.80+

Trench No 109		Length 50 m	Width 1.8	Depth 0.84 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1091		Topsoil	Mid greyish-brown silty clay with moderate compaction and rooting throughout.	0.00–0.54
1092		Natural	Alluvium. Mid-brown silty clay with moderate compaction and patches of light yellowish-brown, moderately compacted, sandy clay.	0.54–0.71
1093		Natural	Peat. Mid blueish black with silty clay component, moderate compaction. Occasional rooting present.	0.71–0.80
1094		Natural	Light yellowish-grey sandy clay with mottled appearance. Moderately compacted and no inclusions present.	0.80–0.84+

Trench No 110		Length 50 m	Width 1.8	Depth 0.88 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
11001		Topsoil	Mid greyish-brown silty clay with moderate compaction and rooting throughout.	0.00–0.40
11002		Natural	Alluvium. Mid brown silty clay with moderate compaction.	0.40–0.70
11003		Natural	Peat. Mid blueish black with silty clay component, moderate compaction. Occasional rooting present.	0.70–0.78
11004		Natural	Light yellowish grey sandy clay with mottled appearance. Moderately compacted and no inclusions present and mid orangey yellow sandy clay with moderate compaction and grey mottling.	0.78–0.88+

Trench No 111		Length 50 m	Width 1.8	Depth 0.76 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1111		Topsoil	Mid greyish-brown silty clay with moderate compaction and rooting throughout.	0.00–0.46
1112		Natural	Alluvium. Mid brown silty clay with moderate compaction.	0.46–0.60

1113		Natural	Light yellowish-brown silty clay with grey mottling and moderate compaction and mid blueish-black peat. Moderate compaction with rooting throughout.	0.60–0.76+

Trench No 112		Length 50 m	Width 1.8	Depth 0.88 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1121		Topsoil	Mid greyish-brown silty clay with moderate compaction and rooting throughout.	0.00–0.34
1122		Natural	Alluvium. Mid brown silty clay with moderate compaction.	0.34–0.72
1123		Natural	Peat. Dark greyish black with silty clay component. Moderate compaction with rooting throughout.	0.72–0.88+

Trench No 113		Length 30 m	Width 1.8	Depth 1.10 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1131		Topsoil	Mid greyish-brown silty clay with moderate compaction and rooting throughout.	0.00–0.30
1132		Natural	Alluvium. Light greyish-brown silty clay with moderate compaction.	0.30–0.52
1133		Natural	Peat. Dark greyish black with silty clay component. Moderate compaction with rooting throughout.	0.52–1.10+

Trench No 114		Length 30 m	Width 1.8	Depth 0.74 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1141		Topsoil	Mid greyish-brown silty clay with moderate compaction. Rooting present throughout.	0.00–0.36
1142		Natural	Alluvium. Mid blackish grey silty clay with moderate compaction.	0.36–0.56
1143		Natural	Light yellowish brown sandy clay with mottled grey patches. Moderate compaction	0.56–0.74+

Trench No 115		Length 30 m	Width 1.8	Depth 0.72 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
11501		Topsoil	Mid greyish-brown silty clay with moderate compaction. Rooting present throughout.	0.00–0.50
11502		Natural	Alluvium. Light greyish silty clay with moderate compaction.	0.50–0.54
11503		Natural	Light yellowish-brown sandy clay with moderate compaction. Grey mottling throughout.	0.54+
11504	11505	Secondary fill	Mid grey clayey (10%) sand, friable.	0.50–0.60

Trench No 115		Length 30 m	Width 1.8	Depth 0.72 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
11505	11504	Posthole	Sub-rectangular posthole with moderate, concave sides and a V-shaped base. Length: 0.60 m. Width: 0.40 m. Depth: 0.10 m.	0.50–0.60
11506	11507	Secondary fill	Mid grey clayey (10%) sand, friable.	0.50–0.57
11507	11506	Posthole	Sub-rectangular posthole with moderate, irregular sides and a flat base. Length: 0.60 m. Width: 0.30 m. Depth: 0.07 m.	0.50–0.57
11508	11509	Secondary fill	Mid grey clayey (10%) sand, friable.	0.50–0.60
11509	11508	Posthole	Sub-rectangular posthole with vertical, irregular sides and a flat base. Length: 0.30 m. Width: 0.30 m. Depth: 0.10 m.	0.50–0.60
11510	11511	Secondary fill	Mid grey with a yellow hue silty sand.	0.50–0.74
11511	11510	Posthole	Steep, straight sides and a flat base, passes under trench baulk. Length: 0.40 m. Width: >0.25 m. Depth: 0.24 m.	0.50–0.74

Trench No 116		Length 30 m	Width 1.8	Depth 0.60 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
11601		Topsoil	Mid greyish brown silty clay. Moderate compaction with fine rooting throughout.	0.00–0.44
11602		Natural	Light yellowish brown sandy clay with moderate compaction.	0.44–0.6+
11603	11604	Ditch	Curvilinear ditch aligned N-S with moderate, straight sides and a V-shaped base. Length: >2.00 m. Width: 0.50 m. Depth: 0.40 m.	0.44–0.74
11604	11603	Secondary fill	Pale brown silty (20%) clay, moderately waterlogged, firm with no inclusions.	0.44–0.74

Trench No 117		Length 30 m	Width 1.8	Depth 0.54 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
1171		Topsoil	Mid-greyish brown silty clay. Moderate compaction with fine rooting throughout.	0.00–0.30
1172		Natural	Light yellowish-brown sandy clay with moderate compaction.	0.30–0.54+

Trench No 118		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
11801		Topsoil	Mid greyish brown, silty clay, heavy rooting.	0.00–0.38
11802		Natural	Peat layer. Black with reddish patches, silty organic material, occasional rooting inclusions.	0.38–1.20+
11803		Natural	Pale orangey yellow, silty sand, loose compaction, no inclusions.	1.20+

11804	11805	Ditch	Linear ditch aligned W-E with shallow, concave sides and a flat base. Length: >2.00 m. Width: 0.97 m. Depth: 0.26 m.	1.20–1.46
11805	11804	Secondary fill	Dark brown silty clay with 10% stoney grit.	1.20–1.46

Trench No 119	**Length 50 m**	**Width 1.8**	**Depth 1.20 m**	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
11901		Topsoil	Mid greyish brown, silty clay, heavy rooting.	0.00–0.28
11902		Subsoil	Light yellowish orange, silty sand, no inclusions.	0.28–0.46
11903		Natural	Peat layer. Black with reddish patches, silty organic material, occasional rooting inclusions.	0.46–1.20
11904		Natural	Silty sand, no inclusions.	1.20+

Trench No 120	**Length 50 m**	**Width 1.8**	**Depth 1.20 m**	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12001		Topsoil	Mid greyish brown, silty clay, heavy rooting.	0.00–0.30
12002		Subsoil	Light yellowish orange, silty sand, no inclusions.	0.30–0.64
12003		Natural	Peat layer. Black with reddish patches, silty organic material, occasional rooting inclusions.	0.64–0.93
12004		Natural	Yellow silty sand.	0.93–1.20

Trench No 121	**Length 50 m**	**Width 1.8**	**Depth 1.20 m**	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12101		Topsoil	Mid greyish brown, silty clay, heavy rooting.	0.00–0.25
12102		Natural	Peat layer. Black with reddish patches, silty organic material, occasional rooting inclusions.	0.25–0.35
12103		Natural	Pale orangey yellow, silty sand, powdery compaction, no inclusions.	0.35–1.20+

Trench No 122	**Length 50 m**	**Width 1.8**	**Depth 1.10 m**	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12201		Topsoil	Mid greyish brown, silty clay, heavy rooting.	0.00–0.40
12202		Natural	Peat layer. Black with reddish patches, silty organic material, occasional rooting inclusions.	0.40–0.48+
12203		Natural	Silty sand.	0.48+

Trench No 123	**Length 30 m**	**Width 1.8**	**Depth 1.20 m**	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 123		**Length 30 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12301		Topsoil	Pale mid brown sandy (20%) silt, loose. Crop field.	0.00–0.30
12302		Subsoil	Mid to light brown silty clay, firm. No inclusions.	0.30–0.50
12303		Natural	Peat layer. Black with reddish patches, silty organic material, occasional rooting inclusions.	0.50–0.80
12304		Natural	Whitish to light yellow fine sand, soft.	0.80+

Trench No 124		**Length 50 m**	**Width 1.8**	**Depth 1.05 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12401		Topsoil	Mid greyish brown sandy clay with minimal crop rooting and no inclusions. Moderate compaction.	0.00–0.38
12402		Subsoil	Mid yellowish brown sandy clay with no inclusions. moderate compaction.	0.38–0.57
12403		Natural	Peat. Dark greyish black, moderate compaction with infrequent plant rooting.	0.57– 0.88
12404		Natural	Light yellowish orange silty sand with no inclusions.	0.88–1.05
12405	12406	Ditch	Linear ditch aligned NE-SW Length: 3.00 m. Width: 2.50 m.	1.05+
12406	12405	Secondary fill	Mid yellowish brown moderately compact sandy silt (30 / 70).	1.05+

Trench No 125		**Length 50 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12501		Topsoil	Mid greyish brown sandy clay with minimal crop rooting and no inclusions. Moderate compaction.	0.00–0.28
12502		Subsoil	Light greyish brown sandy clay with minimal crop rooting and no inclusions. Moderate compaction.	0.28–0.43
12503		Natural	Peat layer. Dark greyish black charcoal with infrequent plant rooting and no inclusions. Loose compaction.	0.43–0.72
12504		Natural	Light white yellow silty sand with no plant rooting or inclusions. Loose compaction.	0.72–0.80+

Trench No 126		**Length 30 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12601		Topsoil	Pale mid brown sandy (20%) silt, loose. No inclusions. Crop field.	0.00–0.35
12602		Subsoil	Barely yellowish light brown silty (10%) clay, barely friable (apparently moderately waterlogged). No inclusions.	0.35–0.50

12603		Natural	Peat layer. Very occasional degraded tree trunks, quite homogeneous in colour and texture. Spongey, varying from hard to soft.	0.50–1.00
12604		Natural	Whitish light yellow, reddish in some spots. Soft, fine sand.	1.00+

Trench No 127	**Length 20 m**		**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12701		Topsoil	Pale mid brown clayey (20%) sand, loose. Plough soil.	0.00–0.30
12702		Natural	Alluvium. Pale barely yellowish mid to light brown silty (30%) sand. Friable. Occasional tiny layers of orange sand.	0.30–1.00
12703		Natural	Layer of peat with occasional degraded tree trunks.	1.00–1.60
12704		Natural	Whitish to mid yellow, soft, fine sand.	1.60+

Trench No 128	**Length 50 m**		**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12801		Topsoil	Moderately compact mid greyish brown silty clay.	0.00–0.40
12802		Subsoil	Moderately compact mid brownish yellow sandy silt (30/80).	0.40–1.10
12803		Natural	Peat layer. Friable black humic peat with roots.	1.10–1.50
12804		Natural	Light yellowish grey sand, very homogeneous and sterile.	1.50+

Trench No 129	**Length 30 m**		**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
12901		Topsoil	Moderately compact mid greyish brown clay silt (40/60).	0.00–0.40
12902		Subsoil	Moderately compact mid brownish yellow sandy silt (30/80).	0.4–0.95
12903		Natural	Peat layer. Friable dark black humic peat with roots.	0.95–1.45
12904		Natural	Homogeneous compact yellow grey sand.	1.45+

Trench No 130	**Length 30 m**		**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13001		Topsoil	Friable mid yellowish brown sandy silt with frequent crop rooting.	0.00–0.40
13002		Subsoil	Moderately compact dark brownish orange silty clay (30/70).	0.40–1.20
13003		Natural	Peat layer. Friable, black.	1.20–1.35
13004		Natural	Homogeneous grey sand.	1.35–2.80

Trench No 131	**Length 20 m**	**Width 1.8**	**Depth 1.20 m**

Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
13101		Topsoil	Friable mid orangish brown clay.	0.00–0.37
13102		Subsoil	Colluvial yellowish brown silty clay.	0.37–0.72
13103		Natural	Peat layer. Blackish brown, frequent degraded wood inclusions.	0.72–1.50
13104		Natural	Yellowish grey silty sand.	1.50+

Trench No 132	Length 50 m		Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13201		Topsoil	Friable mid yellowish brown sandy silt with frequent crop rooting.	0.00–0.35
13202		Subsoil	Moderately compact mid brownish yellow sandy silt (30/80).	0.35–0.80
13203		Natural	Peat. Dark brown to black peat layer, frequent degraded wood deposits.	0.80–1.30
13204		Natural	Yellowish grey, sandy silt.	1.30+

Trench No 133	Length 100 m		Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13301		Topsoil	Mid greyish brown silty clay. Stiff. No visible inclusions.	0.00–0.20
13302		Natural	Alluvial deposits. Light greyish brown sandy silty clay. Firm. No visible inclusions.	0.20–0.65
13303		Natural	Peat layer. Dark greyish brown sandy silt. Friable. No visible inclusions.	0.65–0.80
13304		Natural	Light yellowish brown silty sand.	0.80+

Trench No 134	Length 30 m		Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13401		Topsoil	Light brownish grey silty clay. Sparse (1-2 %) angular gravel, poorly sorted.	0.00–0.22
13402		Natural	Alluvium. Light greyish brown sandy silt clay. Stiff. No visible inclusions.	0.22–0.60
13403		Natural	Peat rich layer: dark greyish brown sandy silt. Very dark. No visible inclusions.	0.60–0.78
13404		Natural	Light yellowish brown silty sand. No visible inclusions.	0.78+

Trench No 135	Length 30 m		Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13501		Topsoil	Dark greyish brown with infrequent, poorly sorted, rounded stones. Silty clay composition, about 70% silt to clay.	0.00–0.36

13502		Subsoil	Sandy clay composition, slightly lighter in colour than the overlaying topsoil. Rare small inclusions randomly scattered, the inclusions are rounded, small stones. More sand to silt composition, about 60% sand to silt.	0.36–0 46
13503		Natural	Sandy clay composition, rare, rounded stone inclusions, poorly sorted.	0.46–0.55+

Trench No 136	**Length 30 m**		**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13601		Topsoil	Dark greyish brown in colour with infrequent poorly sorted rounded stones. Silty clay composition, about 70% silt to clay.	0.00–0.36
13602		Subsoil	Sandy clay composition, slightly lighter in colour than the overlaying topsoil. Rare, small, rounded stone inclusions, randomly scattered. More sand to silt composition, about 60% sand to silt.	0.36–0.45
13603		Natural	Sandy clay, rare, rounded stone inclusions, poorly sorted.	0.45–0.48+

Trench No 137	**Length 30 m**		**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13701		Topsoil	Dark greyish brown, silty clay. Infrequent, poorly sorted rounded stone inclusions. About 70% silt to clay.	0.00–0.33
13702		Subsoil	Sandy clay composition, slightly lighter in colour than the overlaying topsoil. Rare, small, rounded stone inclusions, randomly scattered. More sand to silt composition, about 60% sand to silt.	0.33–0.45
13703		Natural	Sandy clay composition, rare, rounded stone inclusions, poorly sorted.	0.45+

Trench No 138	**Length 30 m**		**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13801		Topsoil	Dark greyish brown, silty clay. Infrequent, poorly sorted, rounded stone inclusions. Silty clay composition, about 70% silt to clay.	0.00–0.35
13802		Subsoil	Sandy clay, slightly lighter in colour than the overlaying topsoil. Rare, small, rounded stone inclusions, randomly scattered. More sand to silt composition, about 60% sand to silt.	0.35–0.40
13803		Natural	Sandy clay composition, rare, rounded stone inclusions, poorly sorted.	0.40–0.44
13804		Natural	Tan coloured sands, light grey sandy silts and darker peaty patches.	0.44–0.50
13805		Natural	Slightly lighter sand layer.	0.50–0.66+

Trench No 139		**Length 30 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
13901		Topsoil	Dark greyish brown with infrequent poorly sorted inclusions of rounded stone. Silty clay composition, about 70% silt to clay.	0.00–0.35
13902		Subsoil	Sandy clay composition, slightly lighter in colour than the overlaying topsoil. Rare small, rounded stone inclusions, randomly scattered. More sand to silt composition, about 60% sand to silt.	0.35–0.40
13903		Natural	Sandy clay composition, rare, rounded stone inclusions, poorly sorted.	0.40+
13904		Natural	Peat layer roughly 1.50 m from the surface, seen in sondage.	1.50–1.65
13905		Natural	Grey sand, seen in sondage.	1.65–2.00
13906		Natural	Peat. Reddish brown organic layer, seen in sondage.	2.00–2.20
13907		Natural	Yellowish brown sand.	2.20+

Trench No 140		**Length 30 m**	**Width 1.8**	**Depth 1.10 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14001		Topsoil	Dark greyish brown with infrequent poorly sorted inclusions of rounded stone. Silty clay composition, about 70% silt to clay.	0.00–0.30
14002		Subsoil	Sandy clay composition, slightly lighter in colour than the overlaying topsoil. Rare, small, rounded stone inclusions, randomly scattered. More sand to silt composition, about 60% sand to silt.	0.30–0.40
14003		Natural	Sandy clay composition, rare, rounded stone inclusions, poorly sorted.	0.40–0.42
14004		Natural	Peat. Seen in sondage.	0.42–1.10

Trench No 141		**Length 30 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14101		Topsoil	Dark greyish brown in colour, infrequent poorly sorted inclusions of rounded stone. Silty clay composition, about 70% silt to clay.	0.00–0.30
14102		Subsoil	Sandy clay composition, slightly lighter in colour than the overlaying topsoil. Rare, small, rounded stone inclusions, randomly scattered. More sand to silt composition, about 60% sand to silt.	0.30–0.40
14103		Natural	Sandy clay composition, rare rounded stone inclusions, poorly sorted.	0.40–0.45+
14104		Natural	Possible peat seen in sondage	0.35–0.4

Trench No 142		**Length 30 m**	**Width 1.8 m**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 142		Length 30 m	Width 1.8 m	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14201		Topsoil	Mid greyish brown sandy silty clay, sparse light rooting concentrated near surface, 1% rare sub-rounded gravel 2-60mm, moderate compaction, diffuse horizon with 14202.	0.00–0.33
14202		Natural	Alluvium. Mid greyish brown with a yellow hue sandy silt, diffuse horizon with 14201, moderately clear horizon with 14203, moderate to loose compaction, likely flood plain activity.	0.33–0.54
14203		Natural	Alluvium. Dark greyish brown sand, moderately clear horizon with 14202 and 14204, no inclusions, moderate to loose compaction likely flood plain activity.	0.54–0.70
14204		Natural	Alluvium. Light greyish brown with a yellow hue sand, moderately clear horizon with 14203, clear horizon with 14205, no inclusions, likely flood plain activity.	0.70–0.86
14205		Natural	Peat layer. Very dark grey silty clay, moderate rooting and plant material throughout layer, loose compaction, clear horizon with 14204 and 14206.	0.86–1.03
14206		Natural	Alluvium. Mid to dark brown sand, no inclusions, clear horizon with 14205 and 14207, loose compaction, likely flood plain activity, layer is patchy across trench.	1.03–1.10
14207		Natural	Dark whiteish grey with a brown hue sand, no inclusions, clear horizon with 14206, moderate to loose compaction.	1.10+

Trench No 143		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14301		Topsoil	Dark greyish brown sandy silty clay, sparse light rooting concentrated near surface, 1% rare sub-rounded gravel 2-60mm, moderate compaction, diffuse horizon with 14302.	0.00–0.33
14302		Natural	Alluvium. Mid greyish brown with a yellow hue sandy silty clay, diffuse horizon with 14301, clear horizon with 14203, moderate to loose compaction, likely flood plain activity.	0.33–0.70
14303		Natural	Peat layer. Very dark grey silty clay, moderate rooting and plant material throughout layer, loose compaction, clear horizon with 14302 and 14304.	0.70–0.80
14304		Natural	Alluvium. Mid to dark brown sand, no inclusions, clear horizon with 14303 and 14305 loose compaction, likely flood plain activity.	0.80–1.10

Trench No 143		**Length 30 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14305		Natural	Alluvium. Mid yellowish brown with a grey hue sand, no inclusions, clear horizon with 14304 and 14306, moderate compaction, likely flood plain activity.	1.10–1.25
14306		Natural	Alluvium. Light yellowish brown with a grey hue sand, no inclusions, diffuse horizon with 14305, only visible in sondages.	1.25+
14307		Natural	Alluvium. Mid blueish grey sand, no inclusions, only visible in sondage.	2.00+

Trench No 144		**Length 30 m**	**Width 1.8**	**Depth 1.10 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14401		Topsoil	Dark greyish brown sandy silty clay, sparse light rooting concentrated near surface, 1% rare sub-rounded gravel 2-60mm, moderate compaction, moderately diffuse horizon with 14402.	0.00–0.25
14402		Natural	Alluvium. Mid brownish grey sandy silty clay, no inclusions, moderately diffuse horizon with 14401, moderately clear horizon with 14403, moderate compaction, likely flood plain activity.	0.25–0.45
14403		Natural	Peat. Very dark grey silty sand, no inclusions, moderate compaction, moderately clear horizon with 14402 and 14404.	0.45–0.56
14404		Natural	Alluvium. Mid whiteish grey sand, no inclusions, moderate compaction, moderately clear horizon with 14403 and 14405. Likely flood plain activity.	0.56–0.63
14405		Natural	Alluvium. Mid brown sand, no inclusions, moderate compaction, moderately clear horizon with 14404 and 14406, likely flood plain activity.	0.63–0.81
14406		Natural	Alluvium. Mid yellow sand, no inclusions, moderate compaction, moderately clear horizon with 14405 and 14407, likely flood plain activity.	0.81–1.00
14407		Natural	Light whiteish grey with a yellow hue sand, moderate compaction, no inclusions, moderately clear horizon with 14406.	1.00+

Trench No 145		**Length 50 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14501		Topsoil	Dark greyish brown sandy silty clay, sparse light rooting concentrated near surface, 1% rare sub-rounded gravel 2-60mm, moderate compaction, clear horizon with 14502.	0.00–0.36

Trench No 145		Length 50 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14502		Natural	Alluvium. Light brownish grey with a yellow hue sand, no inclusions, moderate compaction, clear horizon with 14501 and 14503, likely flood plain activity, only present in S end of trench.	0.36–0.55
14503		Natural	Peat. Very dark grey silty sand, no inclusions, moderate compaction, moderately clear horizon with 14502 and 14504, only present in S end of trench.	0.55–0.65
14504		Natural	Alluvium. Light whiteish grey sand, no inclusions, moderate compaction, clear horizon with 14503 and 14505, likely flood plain activity, only present in S end of trench.	0.65–0.80
14505		Natural	Alluvium. Mid brownish grey sand, no inclusions, moderate compaction, clear horizon with 14504 and 14506, likely flood plain activity, only present in S end of trench.	0.80–0.96
14506		Natural	Light pinkish brown sand, no inclusions, loose compaction, clear horizon with 14505. Shares a clear horizon with 14501 in all but the S end of the trench where there are more layers in section. Changes to a slightly darker variation in the N half of trench.	0.96+

Trench No 146		Length 50 m	Width Unknown	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14601		Topsoil	Mid brown silty sand, no coarse components, very minor rooting, loosely compacted.	0.00–0.20
14602		Natural	Alluvium. Light yellowish brown silty sand, no coarse components, no rooting, loosely compacted.	0.20–0.98
14603		Natural	Alluvium. Dark yellowish brown clay sand, no coarse components, no rooting, loosely compacted.	0.98–1.20
14604		Natural	Peat layer. Very dark brown peat, no coarse components, no rooting, moderately compacted.	0.83–1.20
14605		Natural	Alluvium. Very light yellowish brown sand, no coarse components, no rooting, loosely compacted.	0.20–0.99
14606		Natural	Alluvium. Dark reddish brown sand, no coarse components, no rooting, loosely compacted.	0.20–1.20
14607		Natural	Alluvium. Light yellowish brown sand, no coarse components, no rooting, loosely compacted.	0.20–1.20
14608		Natural	Alluvium. Mid grey silty sand, no coarse components, no rooting, loosely compacted.	1.20–1.60

14609		Natural	Alluvium. Mid greyish brown, no coarse components, no rooting, loosely compacted.	1.60–2.40

Trench No 147		Length 50 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14701		Topsoil	Mid brown silty sand, rare coarse components (<5%), small sub-rounded and sub-angular stones (6mm to 30mm), very minor rooting, moderately compacted.	0.00–0.31
14702		Natural	Alluvium. Light brown sandy clay, no coarse components, no rooting, moderately compacted.	0.31–1.03
14703		Natural	Alluvium. Light grey sandy clay with iron panning, no coarse components, no rooting, moderately compacted.	1.03–1.25
14704		Natural	Peat. Dark black sandy clay, no coarse components, no rooting, moderately compacted.	1.25–1.35
14705		Natural	Alluvium. Light white sand, no coarse components, no rooting, loosely compacted.	1.35–1.90
14706		Natural	Alluvium. Mid brown sandy clay, no coarse components, no rooting, loosely compacted.	1.90–2.60
14707		Natural	Alluvium. Light yellowish brown sandy clay, no coarse components, no rooting, loosely compacted.	2.60–2.80

Trench No 148		Length 60 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14801		Topsoil	Dark brown silty sand, rare coarse components (<5%), small sub-rounded and sub-angular stones (7mm to 30mm), minor rooting, moderately compacted.	0.00–0.29
14802		Natural	Alluvium. Light brown sandy clay, no coarse components, no rooting, moderately compacted.	0.29–0.96
14803		Natural	Alluvium. Dark black silty sand, peaty layer, no coarse components, no rooting, moderately compacted.	0.96–1.25
14804		Natural	Alluvium. Light white sand, no coarse components, no rooting, loosely compacted.	1.25–2.70
14805		Natural	Alluvium. Light yellowish brown sand, no coarse components, no rooting, loosely compacted.	0.40–1.20+

Trench No 149		Length 60 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 149		**Length 60 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
14901		Topsoil	Mid brown silty sand, rare coarse components (<5%), small sub-rounded and sub-angular stones (7mm to 30mm), minor rooting, moderately compacted.	0.00–0.39
14902		Natural	Alluvium. Light brown silty clay, no coarse components, no rooting, moderately compacted.	0.39–1.05
14903		Natural	Alluvium. Mid grey clay, no coarse components, no rooting moderately compacted.	1.05–1.18
14904		Natural	Alluvium. Dark black silty sand, peaty layer, no coarse components, no rooting, moderately compacted.	1.18–1.35
14905		Natural	Alluvium. Mid greyish brown sand, no coarse components, no rooting, loosely compacted.	1.35–2.40+

Trench No 150		**Length 60 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15001		Topsoil	Dark brown silty sand, no coarse components, minor rooting, moderately compacted.	0.00–0.23
15002		Natural	Alluvium. Mid brown sandy clay, no coarse components, no rooting, moderately compacted.	0.23–0.96
15003		Natural	Alluvium. Mid grey clay, no coarse components, no rooting moderately compacted.	0.96–1.10
15004		Natural	Alluvium. Dark black silty sand, peaty layer, no coarse components, no rooting, moderately compacted.	1.10–1.25
15005		Natural	Alluvium. Light yellow brown sand, no coarse components, no rooting, loosely compacted.	1.25–1.70
15006		Natural	Alluvium. Light white sand, no coarse components, no rooting, loosely compacted.	1.70–2.40+

Trench No 151		**Length 30 m**	**Width 1.8**	**Depth 1.20 m**
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15101		Topsoil	Dark brown silty sand, rare coarse components (<5%), small sub-rounded and sub-angular stones (7mm to 30mm), minor rooting, moderately compacted.	0.00–0.38
15102		Natural	Alluvium. Dark orangey brown silty sand mottled with patches of dark brown silty sand and light brown silty sand, no coarse components, no rooting, moderately compacted.	0.38–0.94

Trench No 151		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15103		Natural	Alluvium. Light brown silty sand, no coarse components, no rooting, loosely compacted.	0.94–1.40
15104		Natural	Alluvium. Light white sand, no coarse components, no rooting, loosely compacted.	1.40–2.70
15105		Natural	Alluvium. Dark black silty sand, peaty layer, no coarse components, no rooting, moderately compacted.	2.70–2.80
15106		Natural	Alluvium. Light white sand, no coarse components, no rooting, loosely compacted.	2.80–3.00+

Trench No 152		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15201		Topsoil	Dark brown silty sand, no coarse components, minor rooting, moderately compacted.	0.00–0.22
15202		Natural	Alluvium. Light yellowish brown silty sand, no coarse components, no rooting, loosely compacted.	0.22–0.99
15203		Natural	Alluvium. Dark black silty sand, peaty layer, no coarse components, no rooting, loosely compacted.	0.99–1.30
15204		Natural	Alluvium. Light yellowish brown sand, no coarse components, no rooting, loosely compacted.	1.30–1.70
15205		Natural	Alluvium. Light white sand, no coarse components, no rooting, loosely compacted.	1.20–3.00

Trench No 153		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15301		Topsoil	Dark brown silty sand, no coarse components, minor rooting, moderately compacted.	0.00–0.49
15302		Natural	Alluvium. Mid orangey brown silty sand, no coarse components, no rooting, loosely compacted.	0.49–0.76
15303		Natural	Light yellowish brown silty sand, no coarse components, no rooting, loosely compacted.	0.76–2.00+
15304	15305, 15306	Ditch	Possible linear drainage ditch aligned NE-SW with moderate, concave sides. Length: >2.00 m. Width: 0.96 m. Depth: >0.43 m.	0.71 – 1.14+
15305	15304	Primary fill	Mid-grey silty sand.	0.74 – 1.14+
15306	15304	Secondary fill	Mid-grey with yellow mottling silty sand.	0.71 – 1.09

Trench No 154	Length 30 m	Width 1.8	Depth 1.20 m

Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
15401		Topsoil	Topsoil. Dark brownish grey loose compaction silty sand 10% moderate small to medium sub-rounded stones poorly sorted.	0.00–0.36
15402		Natural	Mid brown silty sand loose compaction 10% moderate small to medium sub-rounded and sub-angular stones poorly sorted.	0.36–0.68
15403		Natural	Holocene sand. Light yellow sand loose compaction 5% rare sub-rounded stones poorly sorted.	0.68 +
15404	15405	Pit	Pit with shallow, concave sides. Diameter: 0.56 m. Depth: 0.17 m.	0.68–0.85
15405	15404	Secondary fill	Greyish black silty sand.	0.68-0.85

Trench No 155	Length 30 m		Width 1.8	Depth 0.36 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15501		Topsoil	Topsoil. Mid greyish brown silty sand 10% moderate small to medium sub-rounded and sub-angular stones poorly sorted.	0.00–0.27
15502		Natural	Mid yellow sand loose compaction 5% rare small to medium sub-rounded stones poorly sorted.	0.36m+
15503	15504	Furrow	Linear furrow aligned NNW - SSE with shallow, concave sides and a concave base. Length: >1.00 m. Width: 1.10 m. Depth: 0.14 m.	0.27–0.41
15504	15503	Secondary fill	Dark greyish black silty sand with (≤2%) small spherical stone inclusions.	0.27–0.41
15505	15506, 15507, 15508, 15509	Ditch	Linear ditch aligned N-S with moderate, concave sides and a V-shaped base. Length: >1.00 m. Width: 0.44 m. Depth: 0.28 m.	0.27–0.55
15506	15506	Secondary fill	Light yellow with white mottling silty sand with ≤2% spherical stones.	0.45–0.55
15507	15505	Secondary fill	Mid brownish grey silty sand with 3% sparse sub-rounded stones.	0.35–0.49
15508	15505	Secondary fill	White-yellow silty sand with 3% sub-rounded stones.	0.27–0.40
15509	15505	Secondary fill	Dark greyish-black sandy silt.	0.27–0.38
15510	15511, 15512, 15513, 15514	Ditch	Linear ditch aligned NW-SE with moderate, concave sides and a V-shaped base. Length: >1.00 m. Width: >0.32 m. Depth: 0.20 m.	0.27–0.47
15511	15510	Secondary fill	Mid grey silty sand with 3% sub-rounded stones.	0.40–0.47
15512	15510	Secondary fill	Mid greyish-black sandy silt.	0.27–0.43
15513	15510	Secondary fill	Mid orange yellow silty sand with 3% sub-rounded stones.	0.31–0.39
15514	15510	Secondary fill	Dark-grey black sandy silt.	0.27–0.34

Trench No 155		Length 30 m	Width 1.8	Depth 0.36 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15515	15516	Hedgerow	Linear hedgerow aligned E-W with shallow, irregular sides and a flat base. Length: 2.40 m. Width: 1.90 m. Depth: 0.48 m.	0.27–0.48
15516	15515	Secondary fill	Mid brownish grey silty sand moderate compaction with 3% sparse small sub-rounded stones poorly sorted.	0.27–0.48
15517	-	Void	-	-
15518	-	Void	-	-
15519	-	Void	-	-
15520	15521, 15522, 15523, 15524	Gully	Possible drainage or boundary function.	0.27–0.63
15521	15520	Secondary fill	Mid brownish grey silty sand loose compaction with 3% sparse small sub-rounded stones poorly sorted.	0.27–0.46
15522	15520	Secondary fill	Mid yellow sand, possibly wind- blown, loose compaction with 3% sparse small sub-rounded stones poorly sorted.	0.29–0.50
15523	15520	Secondary fill	Mid grey silty sand with 3% sparse small sub-rounded stones poorly sorted.	0.42–0.55
15524	15520	Secondary fill	Mid orangish yellow sand, possibly wind-blown, loose compaction with 3% sparse small sub-rounded stones poorly sorted.	0.49–0.63

Trench No 156		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15601		Topsoil	Mid greyish brown silty sand moderate compaction small to medium sub-rounded and sub-angular stones poorly sorted.	0.00–0.43
15602		Natural	Mid reddish brown sand loosely compacted 7% rare sub-rounded stones poorly sorted.	0.43–0.64
15603		Natural	Light yellow sand loosely compacted with 5% rare sub-rounded stones poorly sorted.	0.64+
15604		Natural	Light pale yellowish blue sand.	0.89+

Trench No 157		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15701		Topsoil	Mid brown silty sand moderate compaction 10% moderate small to medium sub-rounded stones poorly sorted.	0.00–0.35
15702		Natural	Mid yellowish brown silty sand loosely compact 5% rare small to medium sub-rounded stones poorly sorted.	0.35–0.44

Trench No 157		Length 30 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
15703		Natural	Wind-blown sand. Mid yellow sand loosely compact 5% rare small to medium sub-rounded stones poorly sorted.	0.44–0.60
15704		Natural	Peat layer. Mid brownish grey peaty sand loosely compact 7% rare small to medium sub-rounded and sub-angular stones poorly sorted.	0.60–0.78
15705		Natural	Yellow sand loosely compacted 5% rare small to medium sub-rounded stones poorly sorted.	0.78+

Area 2

Trench No 199		Length 50 m	Width 1.8	Depth 0.78 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
19901		Topsoil	Mid orangey brown, silty clay, rooting inclusions.	0.00–0.29
19902		Subsoil	Light orangey brown, sandy silt, light compaction.	0.29–0.48
19903		Natural	Mid orangey brown with grey blue mottling, silty clay, no inclusions.	0.48–0.78+

Trench No 200		Length 50 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20001		Topsoil	Moderately compact brownish grey silty clay.	0.00–0.40
20002		Subsoil	Compact yellow brown clay silt (40 / 60) frequent waterlogged mottled blue clay.	0.40–0.90
20003		Natural	Peat. Dark brownish black.	0.90–1.05
20004		Natural	Soft light yellowish grey silty clay (30 / 70).	1.05–1.20

Trench No 201		Length 50 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20101		Topsoil	Moderately compact light yellowish grey silty clay (40 / 60) with frequent bioturbation on upper layer.	0.00–0.40
20102		Subsoil	Very compact light greyish yellow silty clay (20 / 80) with frequent veins of waterlogged blue clay.	0.40–0.90
20103		Natural	Peat layer, dark brownish black, compact, waterlogged peat.	0.90–1.20+

Trench No 202		Length 50 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**

Trench No 202		Length 50 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20201		Topsoil	Moderately compact light yellowish grey silty clay (40 / 60) with frequent bioturbation on upper layer.	0.00–0.45
20202		Subsoil	Very compact light greyish yellow silty clay (20 / 80) with frequent veins of waterlogged blue clay.	0.45–0.80
20203		Natural	Peat layer, dark brownish black, compact, waterlogged peat.	0.80–1.20+

Trench No 203		Length 50 m	Width 1.8	Depth 1.20 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20301		Topsoil	Light greyish brown, silty clay, moderate compaction, rooting.	0.00–0.43
20302		Subsoil	Light orangey brown, silty clay, compact, no inclusions.	0.43–0.61
20303		Natural	Orangey brown with blue mottling, Silty clay, very compact, no inclusions.	0.61–1.10
20304		Natural	Peat layer. Dark brownish black, compact, heavily waterlogged.	1.10–1.20+

Trench No 204		Length 50 m	Width 1.8	Depth 0.55 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20401		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 3% sparse sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose compaction, moderately diffuse horizon with 20402.	0.00–0.36
20402		Natural	Mid yellowish grey with an orange hue clay, 1% rare sub-rounded gravel 2-40mm, moderate to loose compaction, moderately diffuse horizon with 20401. Changes to a whiteish sand at NE end of trench.	0.36+

Trench No 205		Length 50 m	Width 1.8	Depth 0.67 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20501		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 3% sparse sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose compaction, moderately diffuse horizon with 20502.	0.00–0.46
20502		Natural	Mid yellowish grey with an orange hue clay, 1% rare sub-rounded gravel 2-40mm, moderate to loose compaction, moderately diffuse horizon with 20501.	0.46+

Trench No 206	Length 30 m	Width 1.8	Depth 0.70 m

Context Number	Fill Of/Filled With	Interpretative Category	Description	Depth (m) BGL
2061		Topsoil	Mid-greyish brown silty clay. Moderate compaction with fine rooting throughout.	0.00–0.25
2062		Natural	Peat. Blackish brown peat layer.	0.25–0.32
2063		Natural	Alluvium. Mid greyish brown sandy clay with moderate compaction and mottled appearance. Likely alluvium deposit.	0.32–0.42
2064		Natural	Mid yellowish-brown sandy clay. Moderately compacted.	0.42–0.70+

Trench No 207	Length 30 m	Width 1.8	Depth 0.72 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
2071		Topsoil	Mid-greyish brown silty clay. Moderate compaction with fine rooting throughout.	0.00–0.28
2072		Natural	Mix of light greyish-brown silty clay, light yellowish-brown sandy clay, and dark blackish brown peat. Moderate compaction with rooting throughout.	0.28– 0.72+

Trench No 208	Length 50 m	Width 1.8	Depth 0.93 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20801		Topsoil	Mid greyish brown, sandy silty clay, 3% sparse sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose compaction, moderately clear horizon with 20802.	0.00–0.39
20802		Natural	Colluvium. Mid yellowish grey with a brown hue, sandy silty clay, 1% sparse sub-rounded gravel 2-30mm, moderate compaction, moderately clear horizon with 20801, diffuse horizon with 20803.	0.39–0.77
20803		Natural	Mid yellowish grey with a brown hue, silty clay, 1% rare sub-rounded gravel 2-40mm, moderate compaction, diffuse horizon with 20802.	0.77–0.93+

Trench No 209	Length 50 m	Width 1.8	Depth 1.13 m	
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20901		Topsoil	Topsoil. Mid greyish brown sandy silty clay, 3% sparse sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose compaction, moderately clear horizon with 20902.	0.00–0.39
20902		Natural	Colluvium. Mid yellowish grey with a brown hue, sandy silt clay, 1% sparse sub-rounded gravel 2-30mm, moderate compaction, moderately clear horizon with 20901, diffuse horizon with 20903.	0.39–0.98

Trench No 209		Length 50 m	Width 1.8	Depth 1.13 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
20903		Natural	Mid yellowish grey with a brown hue silty clay, 1% rare sub-rounded gravel 2-40mm, moderate compaction, diffuse horizon with 20902.	0.98+
20904	20905	Ditch	Linear ditch aligned N-S with shallow, concave sides and a concave base. Length: 1.80 m. Width: 0.60 m. Depth: 0.30 m.	1.13-1.23
20905	20904	Secondary fill	Mid greyish brown sandy clay.	1.13-1.23

Trench No 210		Length 50 m	Width 1.8	Depth 0.93 m
Context Number	**Fill Of/Filled With**	**Interpretative Category**	**Description**	**Depth (m) BGL**
21001		Topsoil	Topsoil. Mid greyish brown, sandy silty clay, 3% sparse sub-rounded gravel 2-50mm, sparse light rooting concentrated near surface, loose compaction, moderately clear horizon with 21002.	0.00–0.33
21002		Natural	Colluvium. Mid yellowish grey with a brown hue, sandy silty clay, 1% sparse sub-rounded gravel 2-30mm, moderate compaction, moderately clear horizon with 21001, diffuse horizon with 21003.	0.33–0.64
21003		Natural	Mid yellowish grey with a brown hue, silty clay, 1% rare sub-rounded gravel 2-40mm, moderate compaction, diffuse horizon with 21002.	0.64–0.93+

Appendix 2 Assessment of the environmental evidence

Area	Feature Type	Feature	Context	Sample Code	Sample Vol. (l)	Flot vol. (ml)	Bioturbation proxies	Charred and mineralised plant remains	Charcoal >2mm (ml)	Charcoal notes	Uncharred wood and plant remains	Preservation	Other
4	Pit	2406	2413	261860 _2401	27	30	75%, A*** abundant modern cereal chaff, CA (A)	Charred: A* - Polygonaceae (incl. *Polygonum aviculare*), Trifolieae, *Stellaria* cf. *media, Silene* sp., cf. Asteraceae, Poaceae (incl. fragmented), *Chenopodium* sp., monocot stems, tubers/rhizomes. Mineralised: A - Seeds, ?plant remains, and amorphous fragments	<1	Well-preserved fragments.	C - small fragments of uncharred wood, seeds A - *Juncus* sp., Characeae ospores Invertebrate eggs (C), fungal sclerotia (A*)	Good	Moll-t (A*), Clinker/cinder and coal/coal shale (incl. >4mm frags) (A*)
3	Gully	5808	5807	261860 _5801	39	14	40%, A* modern cereal chaff	-	2	Scraps of fragmented *Quercus* sp. and non-*Quercus* sp. Poor condition, mineral-stained.	C - small fragments of uncharred wood A - *Juncus* sp., *Betula* sp. seeds and bracts Invertebrate eggs (incl. earthworm) (B), fungal sclerotia (A**)	Poor	Highly fragmented clinker/cinder (B)
3	Ditch	10105	10106	261860 _10101	25	150	75% modern roots, A*** abundant modern cereal chaff	C - *Triticum aestivum/turgidum* grain	Trace	Fragmented <2mm	A** - *Fallopia convolvulus, Veronica hederifolia, Viola* sp., *Carduus/Cirsium, Betula* sp., Chenopodiaceae, Caryophyllaceae seeds Invertebrate eggs (incl. earthworm) (A), fungal sclerotia (A)	Poor	Moll-t (C), Clinker/cinder and coal/coal shale (incl. >4mm frags) (A**)
3	Ditch	10303	10305	261860 _10301	40	50	<5% modern roots, A modern cereal chaff	A** - Tubers/rhizomes, monocot stems, *Danthonia decumbens*, Cyperaceae, *Cladium mariscus, Plantago lanceolata,* Chenopodiaceae, Asteraceae, indet seeds	18	Incl. roundwood/twigs. Very heavy mineral-staining obscured any attempt at identification	B - Cyperaceae, *Sambucus* sp. Invertebrate eggs (incl. earthworm) (B), fungal sclerotia (A)	Very poor	-

Area	Feature Type	Feature	Context	Sample Code	Sample Vol. (l)	Flot vol. (ml)	Bioturbation proxies	Charred and mineralised plant remains	Charcoal >2mm (ml)	Charcoal notes	Uncharred wood and plant remains	Preservation	Other
3	Posthole	11505	11504	261860 _11502	2	4	?waterlogged	-	<1	Scraps of fragmented charcoal, mineral-stained.	A* - highly fragmented wood, incl. small twigs, seeds A - *Juncus* sp. Invertebrate eggs (C), fungal sclerotia (A*)	Poor	Very heavily mineral-stained concretions (A)
3	Posthole	11507	11506	261860 _11503	2	7	?waterlogged but incl. fragments of modern cereal chaff (C)	-	<1	Scraps of fragmented charcoal, mineral-stained.	A* - degraded vegetative material, highly fragmented wood, incl. very small twigs, seeds A - *Juncus* sp., *Betula* sp. seeds, indet seed Invertebrate eggs (C), fungal sclerotia (A*)	Poor	-
3	Posthole	11509	11508	261860 _11504	2	16	?waterlogged but incl. fragments of modern cereal chaff (A*)	-	<1	Scraps of fragmented charcoal, mineral-stained.	A* - mostly degraded vegetative material, highly fragmented wood/twigs, seeds A - *Juncus* sp., *Betula* sp. seeds and bracts, *Viola* sp. Invertebrate eggs (C), fungal sclerotia (A*)	Poor	-
3	Posthole	11511	11510	261860 _11505	2	6	?waterlogged but incl. fragments of modern cereal chaff (C)	-	<1	Scraps of fragmented charcoal, mineral-stained.	A* - degraded vegetative material, highly fragmented wood, seeds B - *Juncus* sp. Invertebrate eggs (C), fungal sclerotia (A*)	Poor	Moll-t (C)

Area	Feature Type	Feature	Context	Sample Code	Sample Vol. (l)	Flot vol. (ml)	Bioturbation proxies	Charred and mineralised plant remains	Charcoal >2mm (ml)	Charcoal notes	Uncharred wood and plant remains	Preservation	Other
3	Ditch	11804	11805	261860 _11801	13	400	?waterlogged	-	<5	Fragments of fragmented charcoal, mostly roundwood. Some fragments were partially charred.	A*** - degraded vegetative material, likely deciduous leaf litter, seeds B - *Sambucus* sp., *Sparganium erectum, Euphorbia helioscopia, Stellaria* sp., *Carduus/Cirsium* sp., Chenopodiaceae, *Fallopia convolvulus* Invertebrate eggs (C), fungal sclerotia (A*)	Poor	Moll-t (C)
3	Peat Layer	-	14104	261860 _14101	3.5	25	70% modern roots	-	1	Scraps of fragmented charcoal, some fragments were partially charred.	A** - *Juncus* sp.	Poor	-
3	Ditch	15304	15305	261860 _15301	9	80	?waterlogged	C - *Triticum aestivum/turgidum* grains, *Hordeum* sp. grain. C - *T. aestivum* rachis node. C - *Plantago lanceolata,* Polygonaceae (crushed), *Galium* sp. (fragment)	<1	Scraps of fragmented charcoal, mineral-stained.	A* - mostly degraded vegetative material incl. herbaceous stems, seeds A - Chenopodiaceae, *Rubus* sp., *Fallopia convolvulus,* Apiaceae, *Silene* sp., *Euphorbia helioscopia*, *Betula* sp., Polygonaceae, *Lamium* sp., *Juncus* sp. indet Invertebrate eggs (C), and fragmented insect/invertebrates (C), fungal sclerotia (A*)	Poor	SAB/F (C), Moll-t (C), Clinker/cinder and coal/coal shale (B)

Area	Feature Type	Feature	Context	Sample Code	Sample Vol. (l)	Flot vol. (ml)	Bioturbation proxies	Charred and mineralised plant remains	Charcoal >2mm (ml)	Charcoal notes	Uncharred wood and plant remains	Preservation	Other
3	Gully	15510	15514	261860 _15501	10	30	?waterlogged	C - Tubers/rhizomes, monocot stems	1	Scraps of fragmented non-*Quercus* sp. incl. cf. *Calluna vulgaris* tp. stems. Poor condition, mineral-stained.	B - fragments of uncharred wood C - *Sambucus* sp., *Stellaria* sp., Chenopodiaeae Invertebrate eggs (incl. earthworm) (A*)	Poor	-
3	Hedgerow	15515	15516	261860 _15502	12	70	?waterlogged	C - Monocot stem	<1	Scraps of fragmented charcoal, incl. some small-diameter roundwood, mineral-stained.	A*** - fragments of uncharred wood, seeds B - Chenopodiaceae, *Sambucus* sp., *Montia fontana, Veronica hederifolia*	Poor	Moll-t (C), Clinker/cinder and coal/coal shale (C)
3	Furrow	15503	15504	261860 _15503	32	30	30% modern roots and modern cereal chaff	B - Tubers/rhizomes, monocot stems, *Danthonia decumbens*	<5	Fragmented non-Quercus sp. charcoal, incl. some cf. *Calluna vulgaris* tp. stems, mineral-stained.	A* - Chenopodiaceae, *Veronica hederifolia, Viola* sp., *Montia fontana, Isolepis* sp., *Betula* sp.	Poor	-
3	Ditch	20904	20905	261860 _20901	26	5	-	-	Trace	-	C - fragments of uncharred wood, seeds A - Chenopodiaceae, *Ranunculus* subg. *Batrachium, Juncus* sp. Invertebrate eggs (incl. earthworm) (C)	Poor	Moll-t (C), Clinker/cinder and coal/coal shale (C), mineral-stained concretions (A*)

Scale of abundance: C = <5, B = 5–10, A = 10–30, A* = 30–100, A** = 100–500, A*** = >500; Bioturbation proxies: Roots (%), Uncharred seeds (scale of abundance, SAB/F = small animal/fish bone, Moll-t = terrestrial molluscs.

Appendix 3 OASIS summary

OASIS ID (UID): wessexar1-514465
Project Name: Evaluation at North Lincolnshire Green Energy Park
Activity type: Evaluation
Project Identifier(s): North Lincolnshire Green Energy Park
Planning Id: [no data]
Reason for Investigation: Planning requirement
Organisation Responsible for work: Wessex Archaeology
Project Dates: 05-Dec-2022 - 17-Feb-2023
HER: North Lincolnshire HER
HER Identifiers: [no data]
Project Methodology: 168 trial trenches across a 5.5km long linear scheme
Project Results: Project Results: A total of 168 trial trenches were excavated, 17 of which contained archaeological features. The uncovered features comprised ditches and gullies, a small number of postholes and pits, one animal burial, a furrow and a hedgerow. The majority of the remains are likely to be associated with post-medieval or modern agricultural drainage practices or warping activities. There is potential for settlement of an earlier date, represented by ditches, gullies and pits, three of which are sealed by peat deposits. Previous geoarchaeological investigations undertaken within the vicinity of the scheme area have indicated a Mesolithic to Early Iron Age date for similar deposits of peat. The finds assemblage is small but it ranges in date from the Early/Middle Mesolithic to the modern period. The three pits which produced dateable material were all post-medieval or modern in date, and any earlier material was residual or recovered from alluvial deposits. The range of the assemblage suggests that some degree of nearby occupation occurred in the Mesolithic and medieval periods, but this cannot be linked to any specific features. The relatively small size of the assemblage indicates occupation was neither intensive nor sustained. The environmental assemblage produced evidence for medieval to post-medieval arable farming regimes through the presence of free-threshing wheat and barley. Coal/coal shale and clinker/cinder, which was widely used as a fuel in the medieval and post-medieval periods, was present in most of the samples. The investigation has met the majority of its aims and objectives: the extent and quality of the archaeological remains have been determined; however, the lack of datable artefacts has hindered the dating of the majority of the excavated features. Little correlation was observed between the results of the geophysical survey and the evaluation trenching programme. Fifty-one of the excavated trenches targeted anomalies from the preceding geophysical survey, but archaeological features were only revealed in nine of these trenches. The remainder of the archaeological remains recorded in the evaluation were not detected through geophysical survey. The sequence of natural deposits encountered in the trial trenching reflected the deposit model produced during geoarchaeological analysis. Seven trenches confirmed archaeological activity in the vicinity of heritage assets listed in the DBA.
Keywords:
Subject/Period: Land Improvement Drain: POST MEDIEVAL
FISH Thesaurus of Monument Types
Subject/Period: Field Boundary: POST MEDIEVAL
FISH Thesaurus of Monument Types
Subject/Period: Animal Burial: 20TH CENTURY
FISH Thesaurus of Monument Types
Subject/Period: Water Channel: POST MEDIEVAL
FISH Thesaurus of Monument Types
Archive:
Digital Archive - to be deposited with Archaeology Data Service Archive;
Physical Archive - to be deposited with North Lincolnshire Museum Service;
Reports in OASIS:

Fitzpatrick, K., Hirst, J. and Swann, A., (2023). *The Proposed North Lincolnshire Green Energy Park: Archaeological Evaluation*. 261860.04.

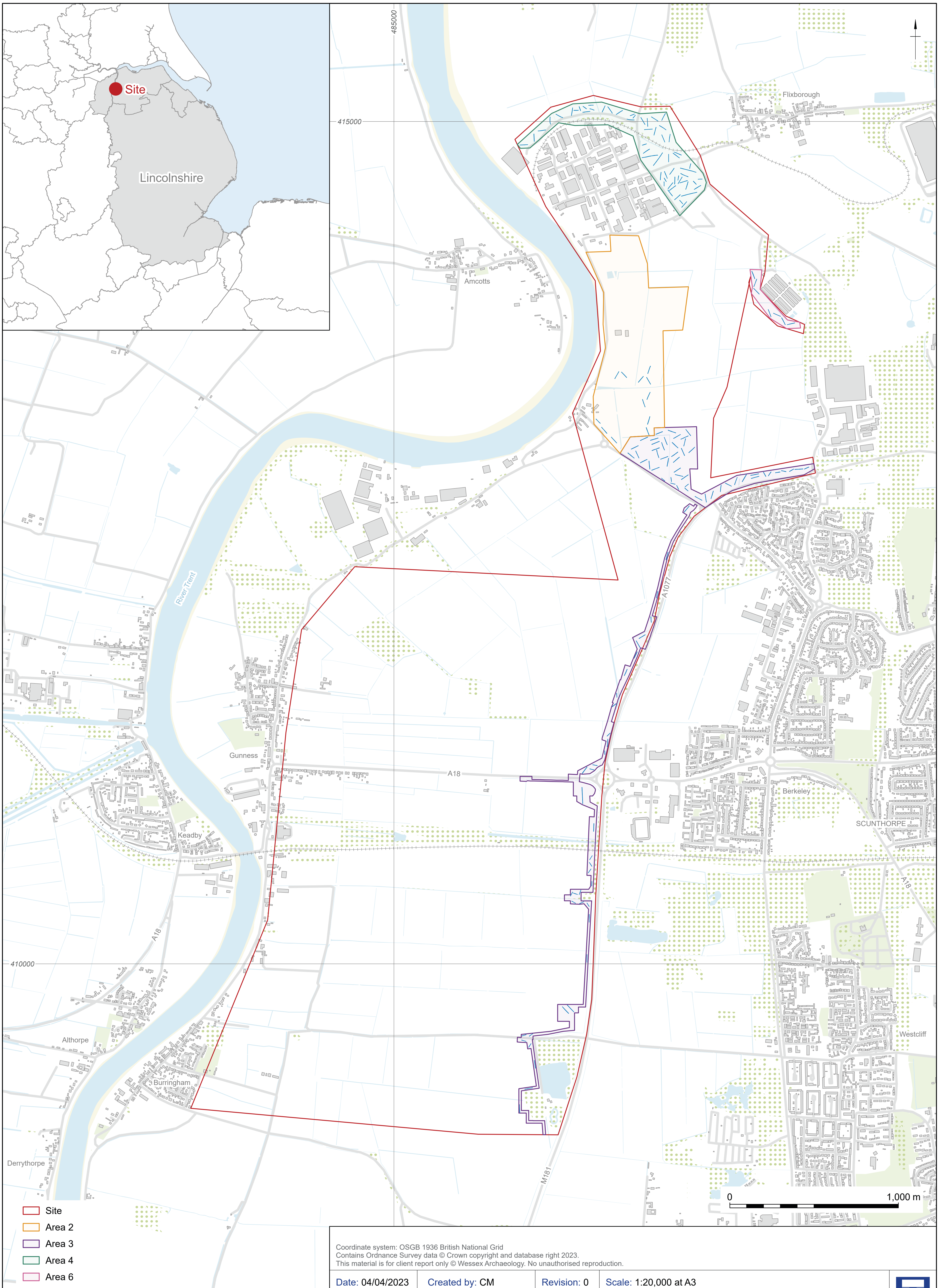

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Figure 1: Site location

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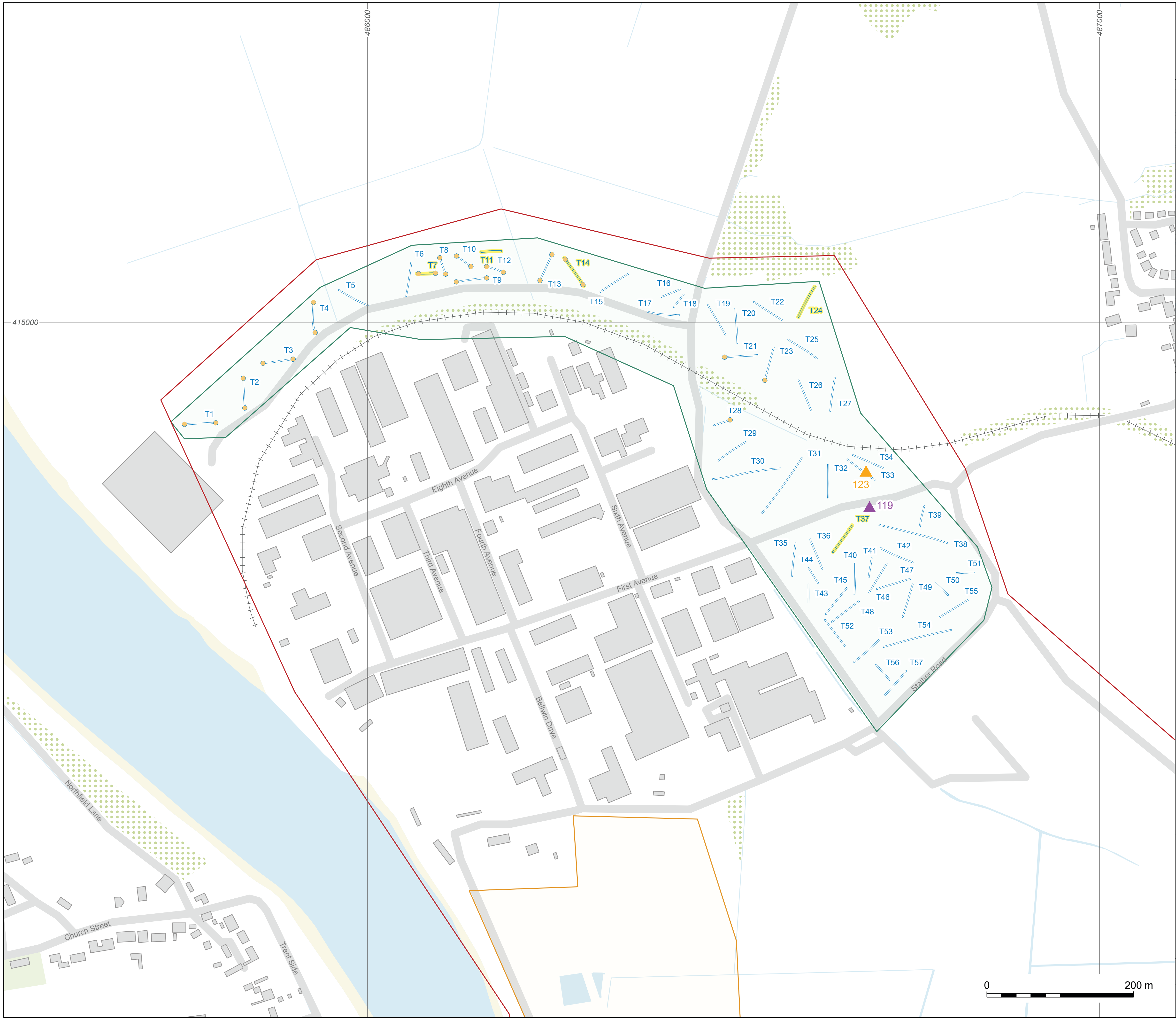

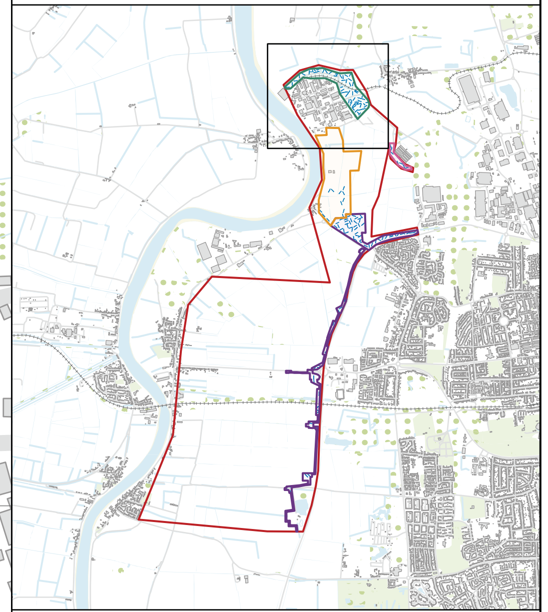

- Site
- Area 2
- Area 4
- Evaluation trench containing archaeology
- Evaluation trench
- Sondage location

Non-designated heritage asset

- Post-medieval quarry and lime kiln site
- Post-medieval lime kiln site

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Figure 2: Trench layout: trenches 1-57

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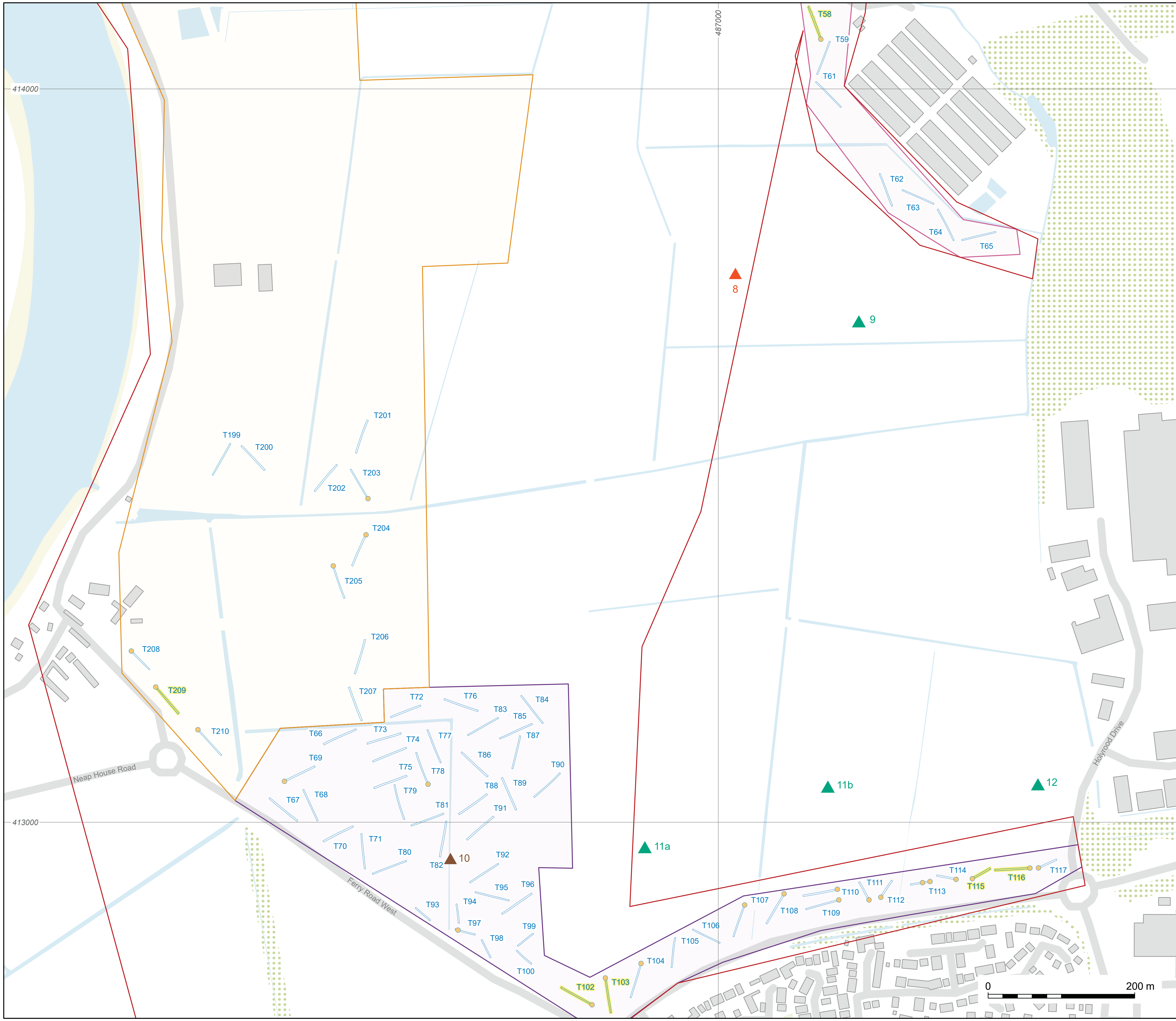

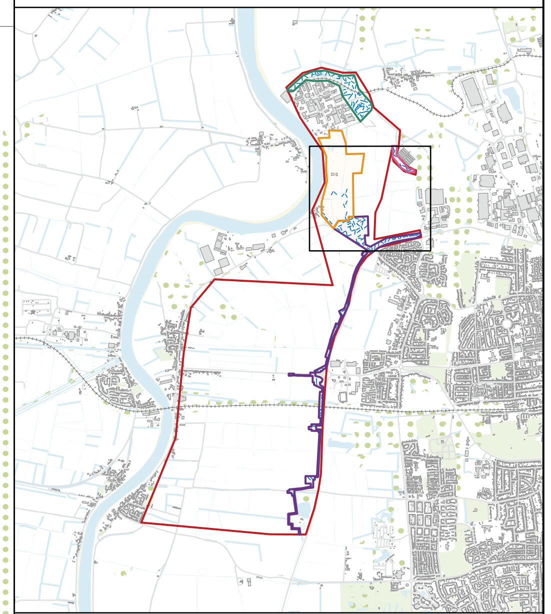

Site

Area 2

Area 3

Area 6

Evaluation trench containing archaeology

Evaluation trench

Sondage location

Non-designated heritage asset

Prehistoric findspot

WWII anti-aircraft battery

Cropmark

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Figure 3: Trench layout: trenches 58, 59, 61-100, 102-117 and 199-210

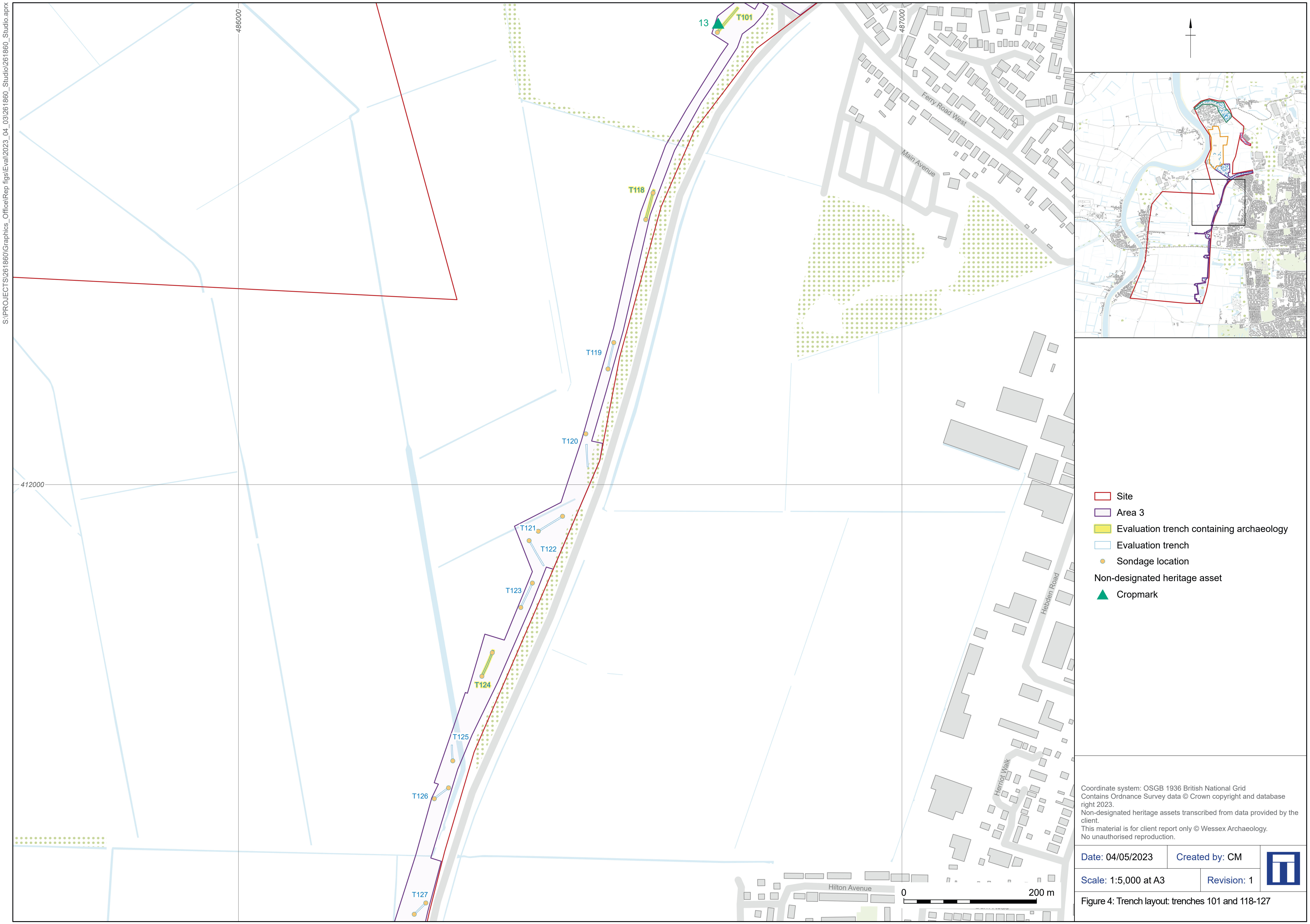

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Figure 4: Trench layout: trenches 101 and 118-127

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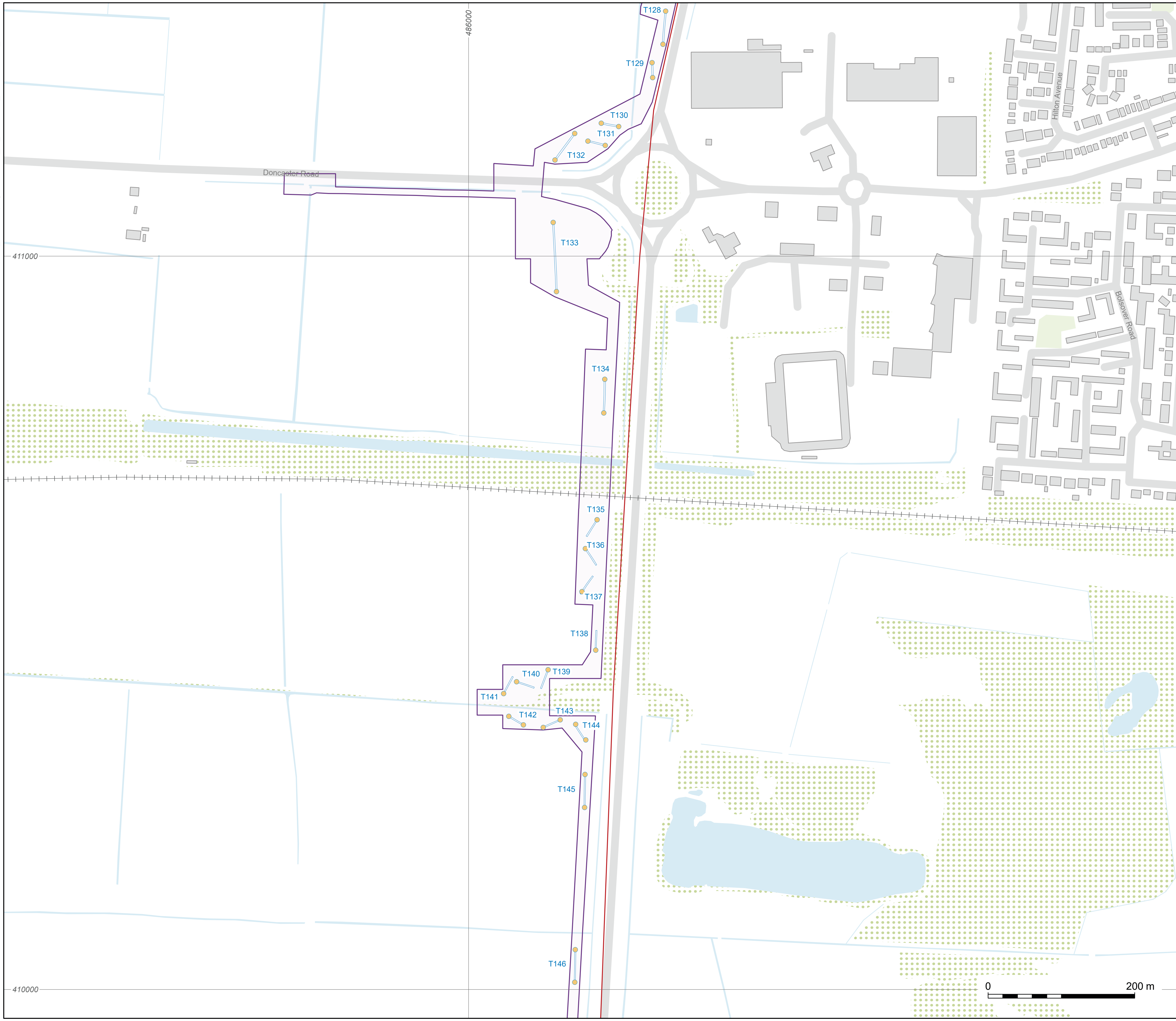

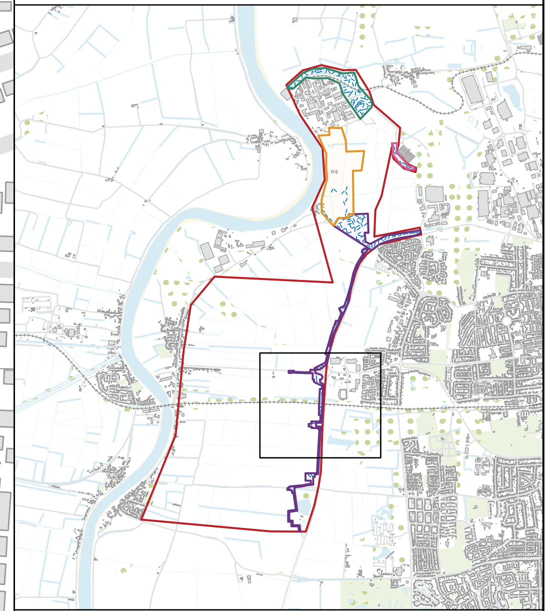

Site
Area 3
Evaluation trench
Sondage location

Date: 03/05/2023 | Created by: CM

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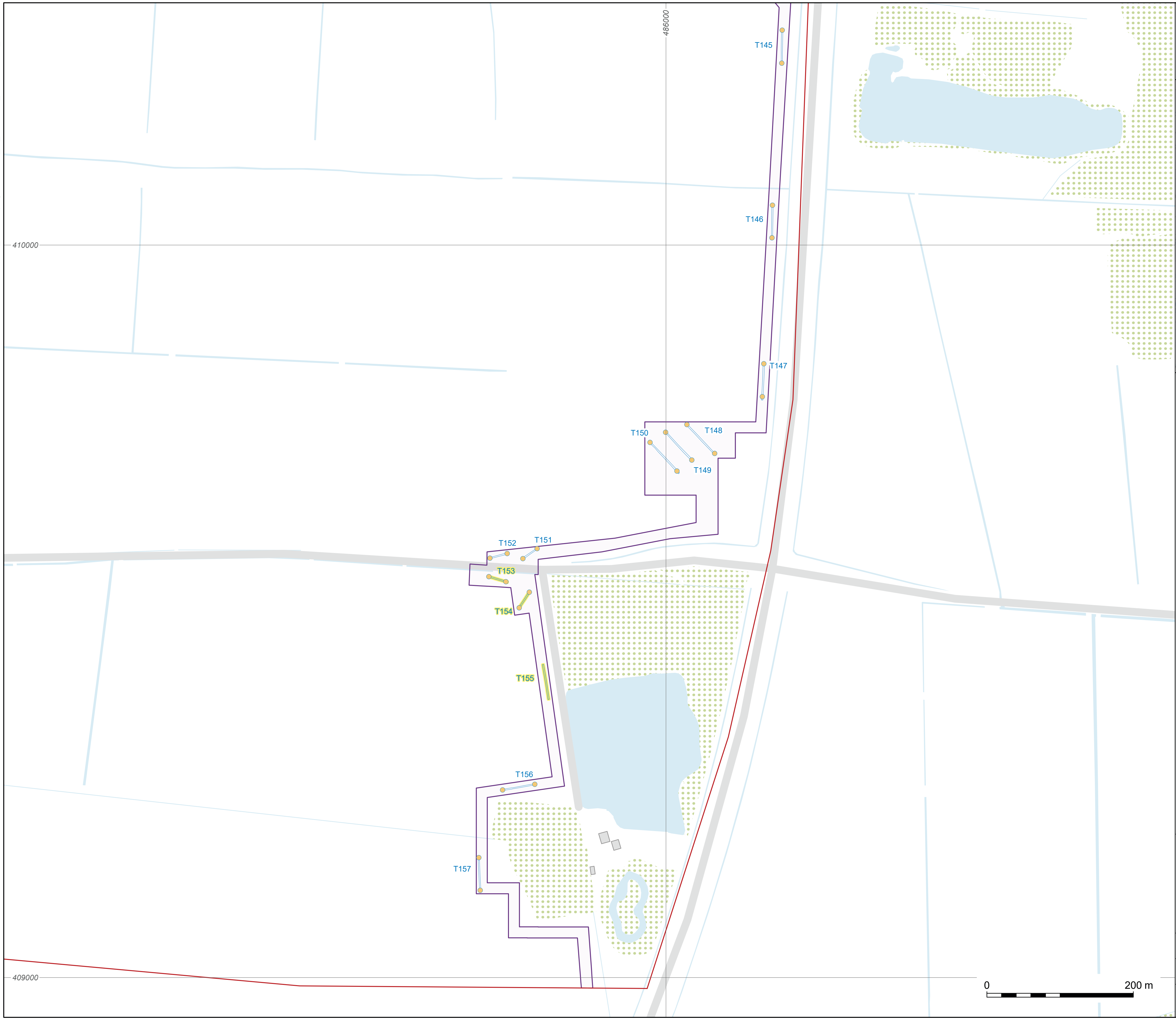
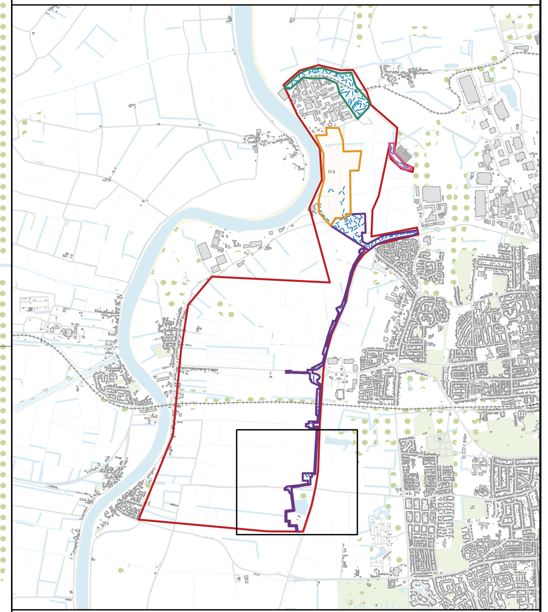
Figure 5: Trench layout: trenches 128-146





Site
Area 3
Evaluation trench containing archaeology
Evaluation trench
Sondage location

Coordinate system: OSGB 1936 British National Grid

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Figure 6: Trench layout: trenches 145-157

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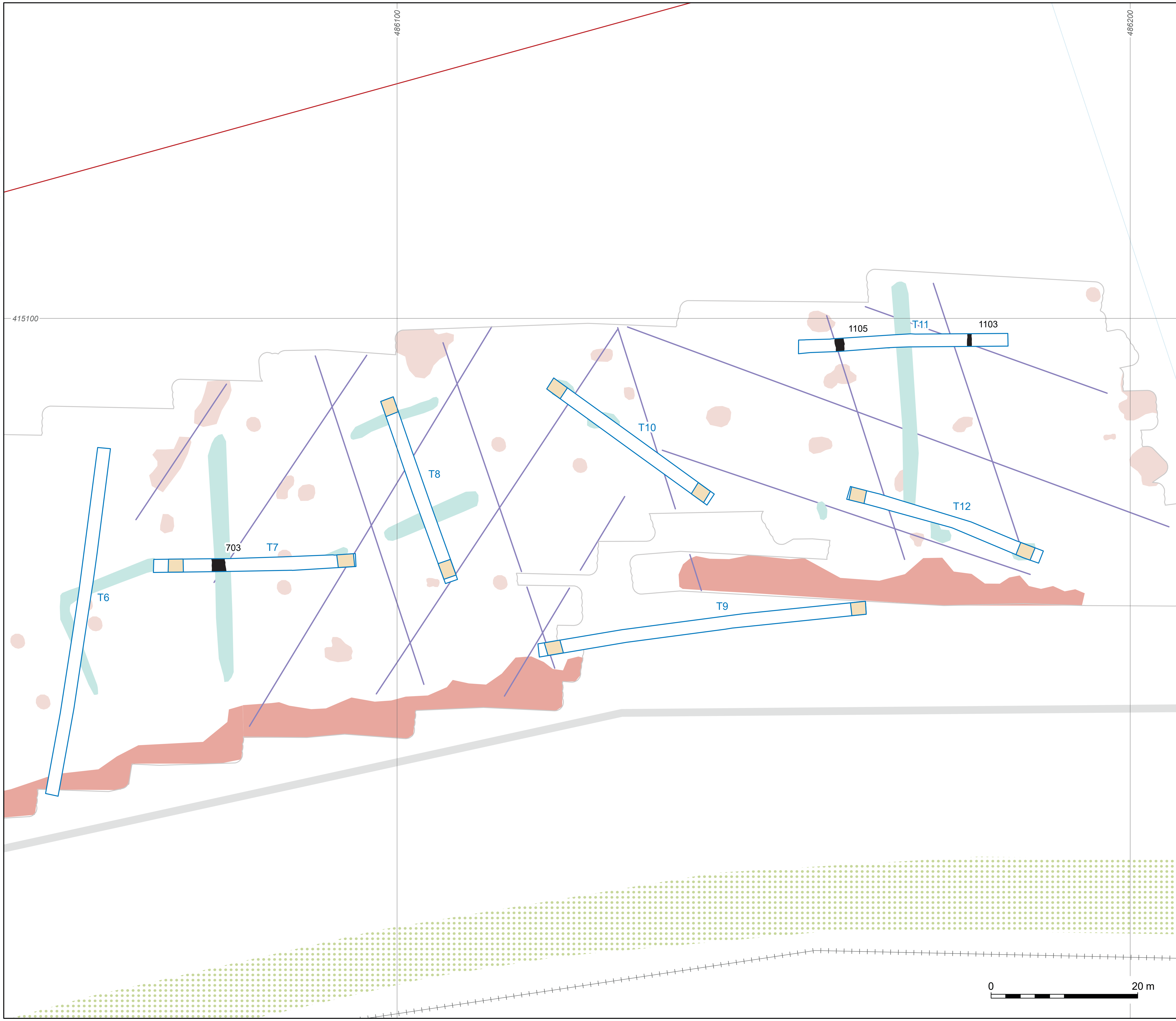

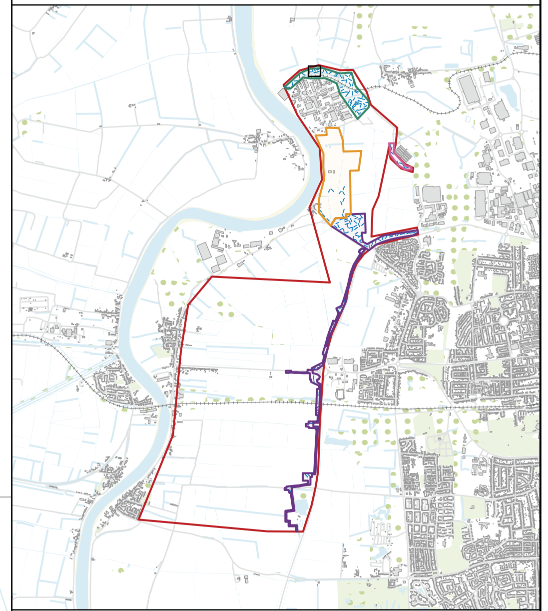

Site
Evaluation trench
Sondage
Archaeology
Geophysical survey interpretation
Survey extents
Possible archaeology
Drainage
Ferrous
Increased magnetic response

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Figure 7: Archaeological results with geophysical survey interpretation, trenches 7 and 11

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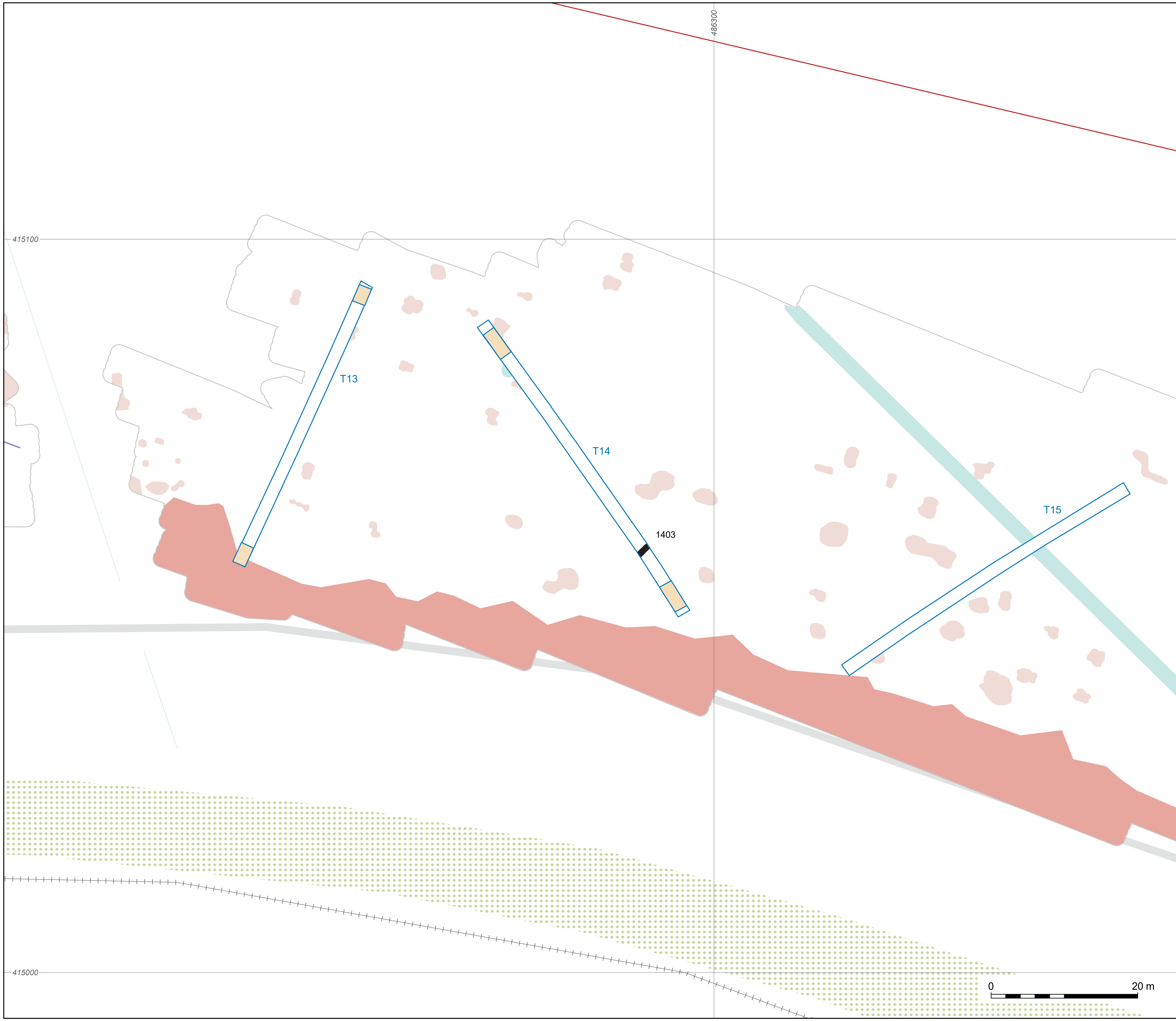
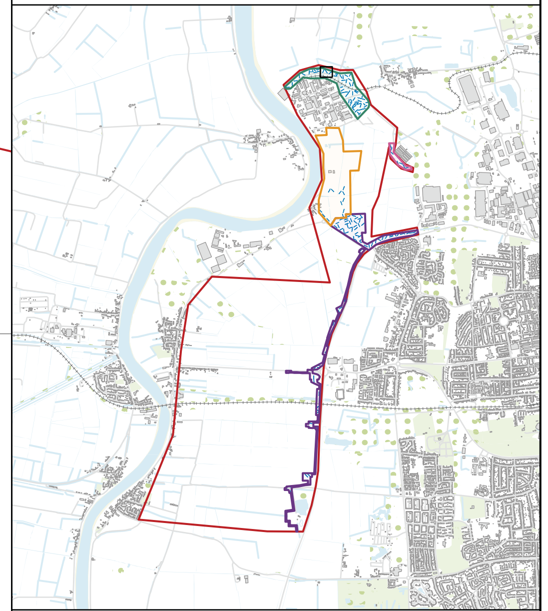
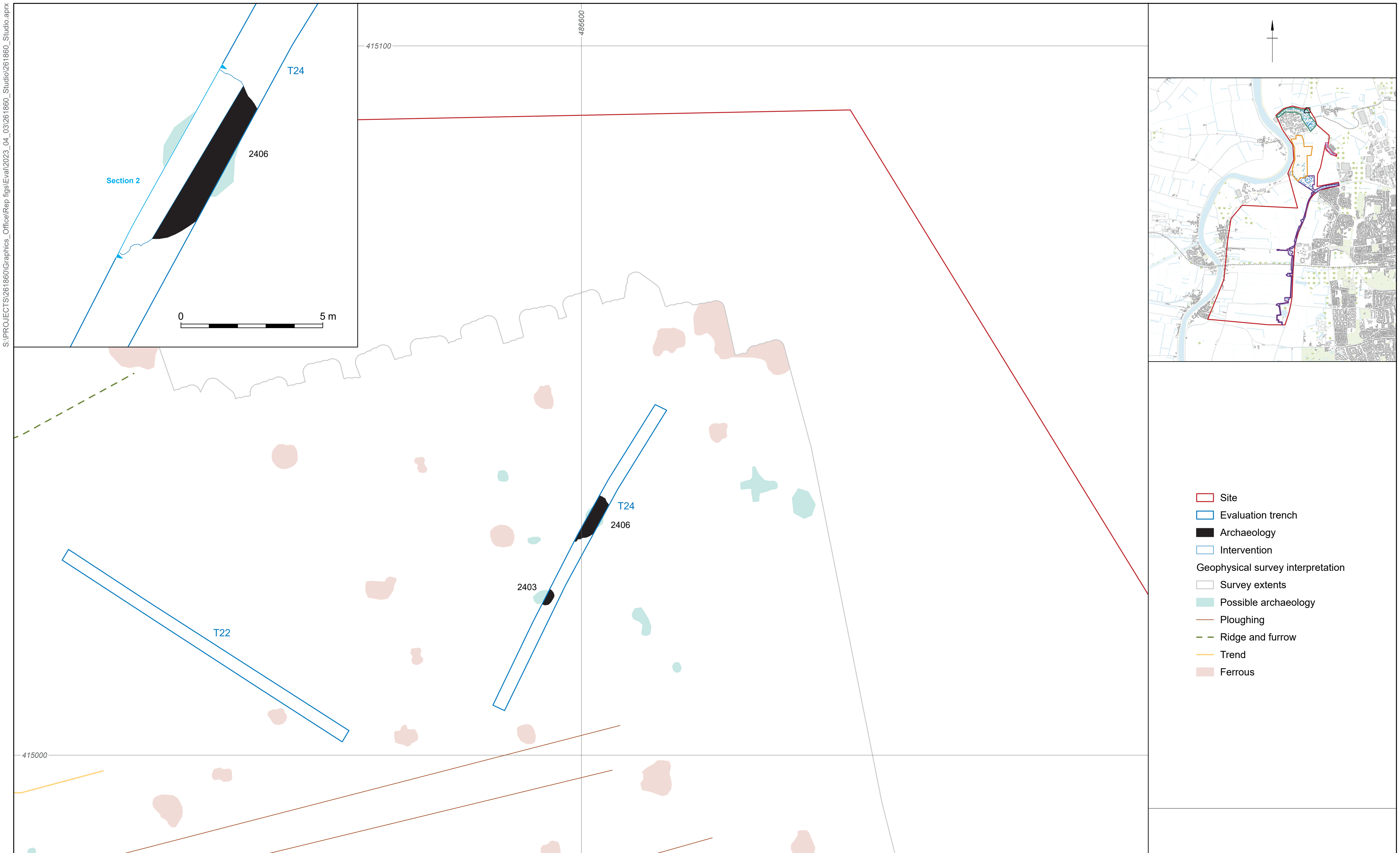




Site
Evaluation trench
Sondage
Archaeology
Geophysical survey interpretation
Survey extents
Possible archaeology
Drainage
Ferrous
Increased magnetic response

Date: 03/05/2023	Created by: CM
Scale: 1:500 at A3	Revision: 1

Figure 8: Archaeological results with geophysical survey interpretation, trench 14



Date: 09/05/2023 | Created by: CM
Scale: 1:500 at A3 | Revision: 0

Figure 9: Archaeological results with geophysical survey interpretation, trench 24

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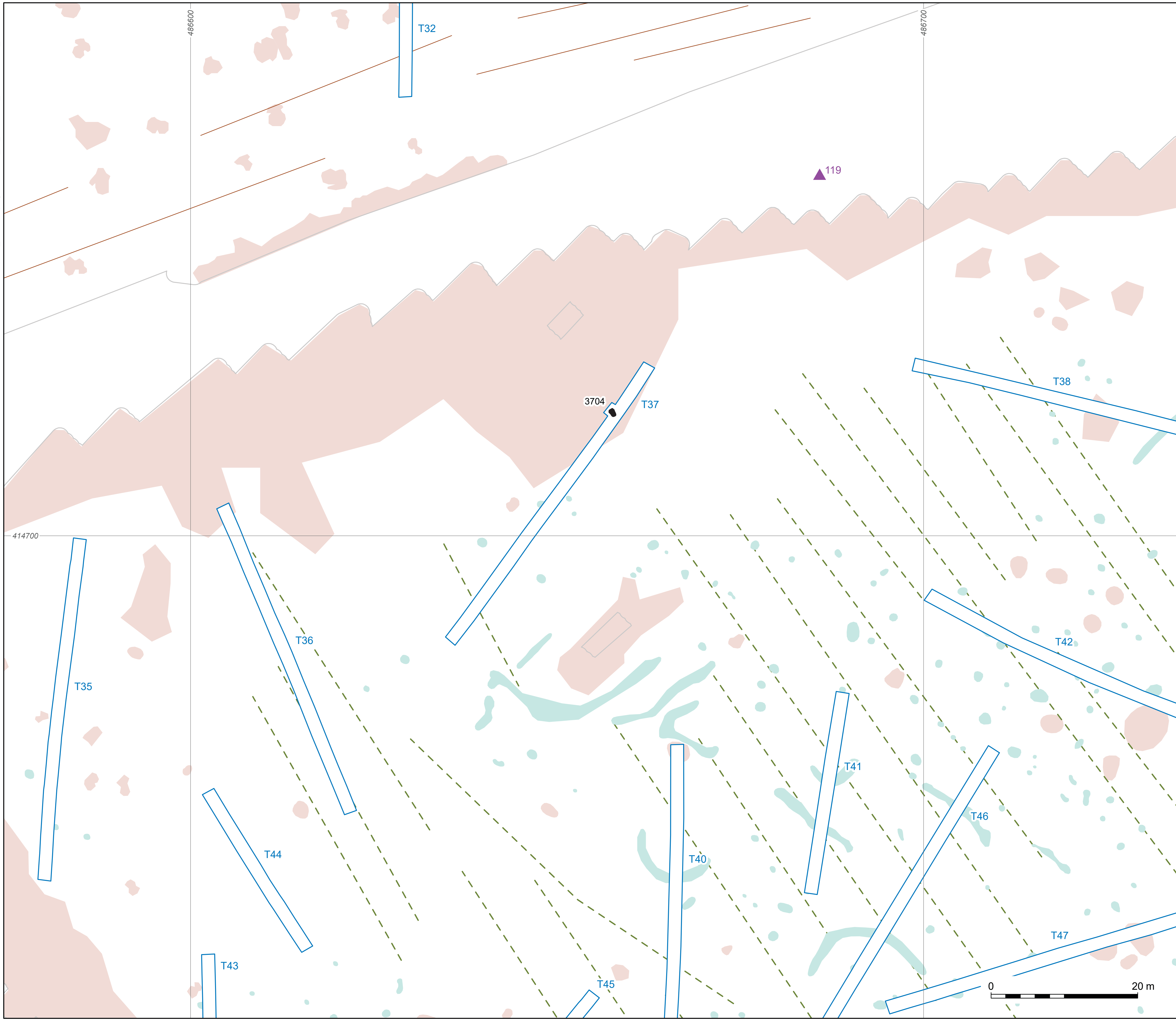
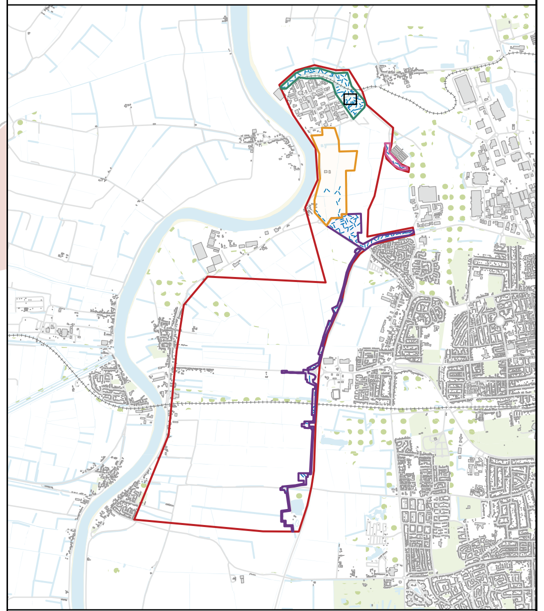




- Evaluation trench
- Archaeology

Non-designated heritage asset

- Post-medieval lime kiln site

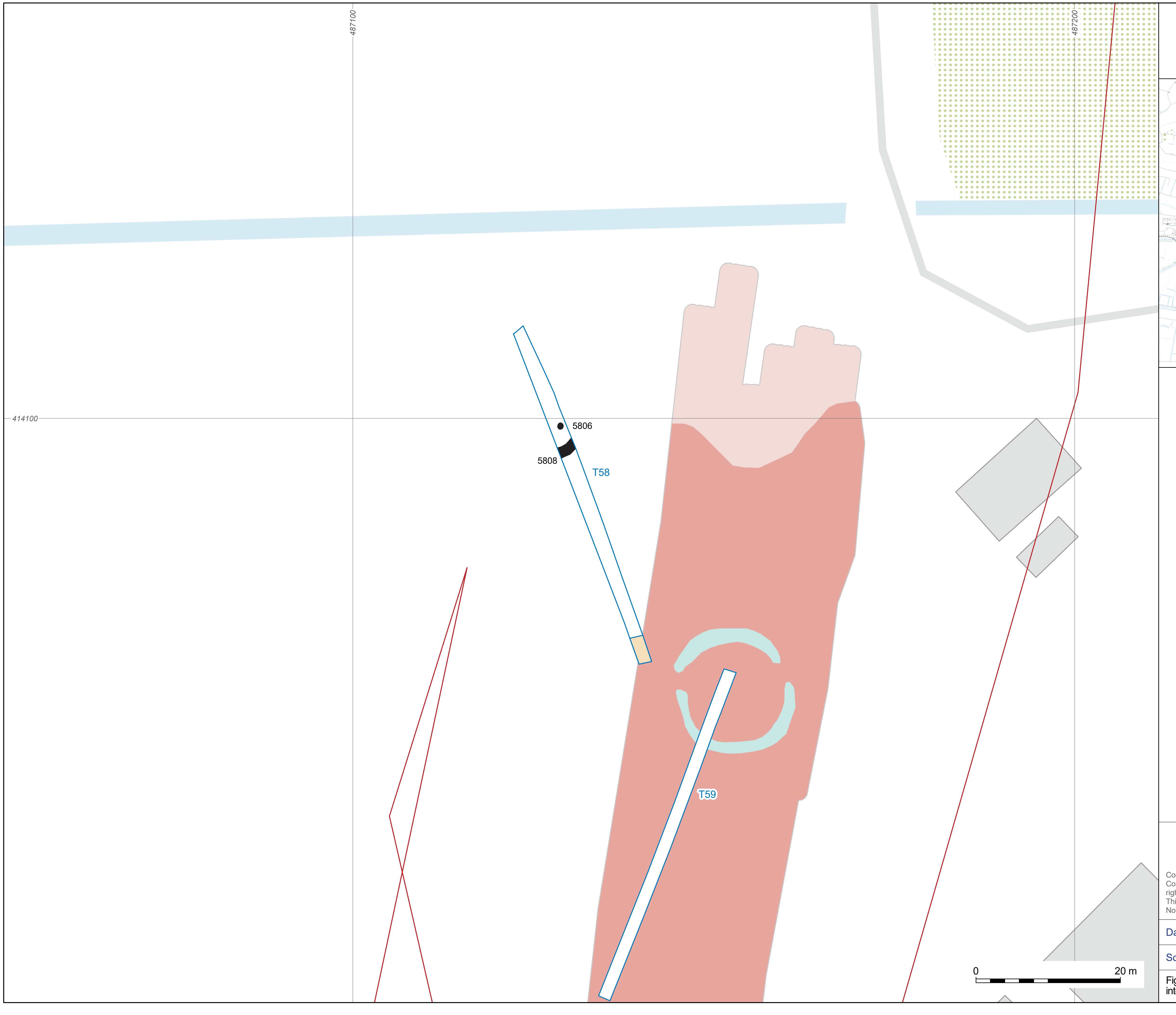
Geophysical survey interpretation

- Survey extents
- Possible archaeology
- Ploughing
- Ridge and furrow
- Ferrous

Coordinate system: OSGB 1936 British National Grid

Date: 09/05/2023 | Created by: CM
Scale: 1:500 at A3 | Revision: 1

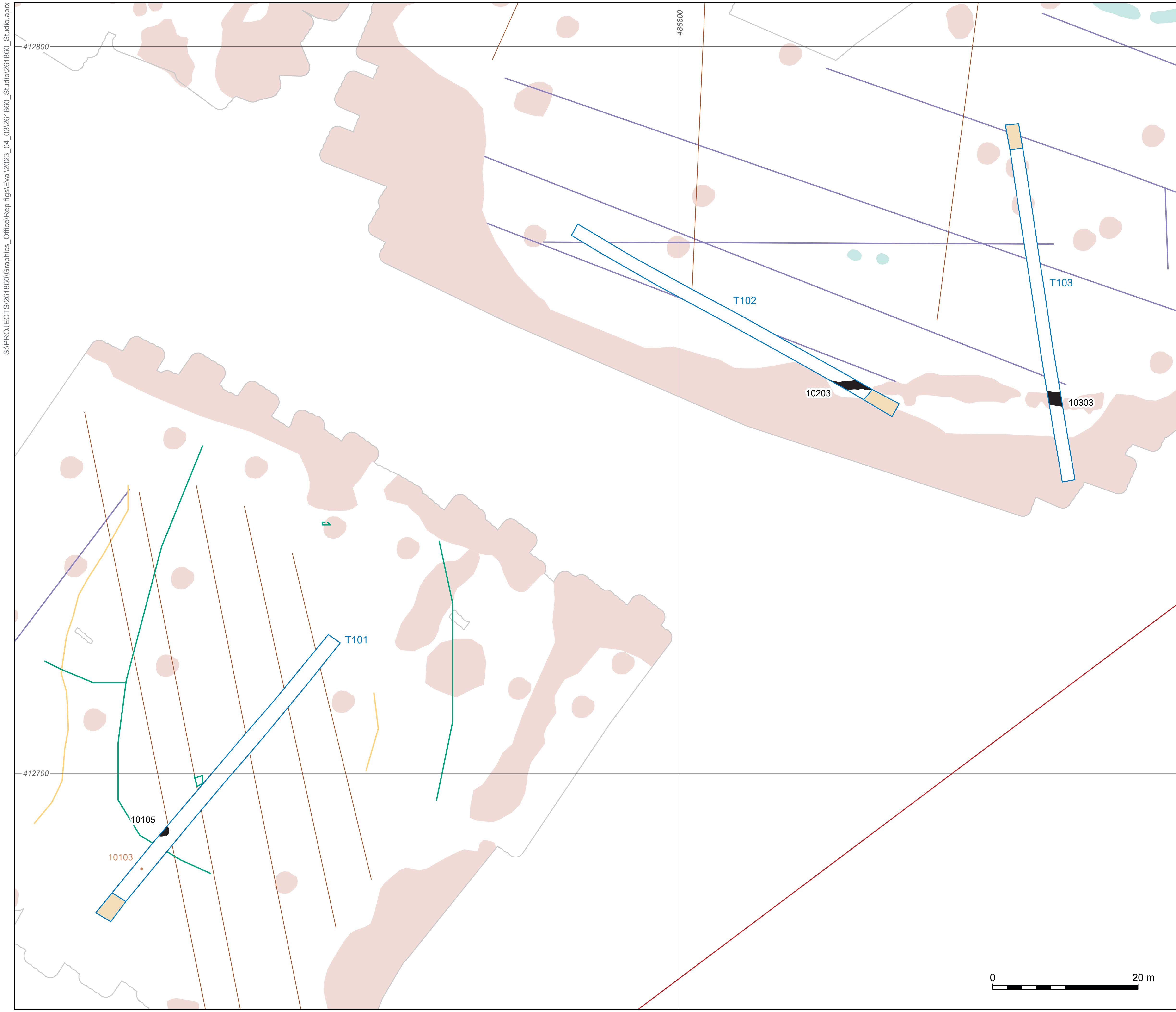
Figure 10: Archaeological results with geophysical survey interpretation, trench 37

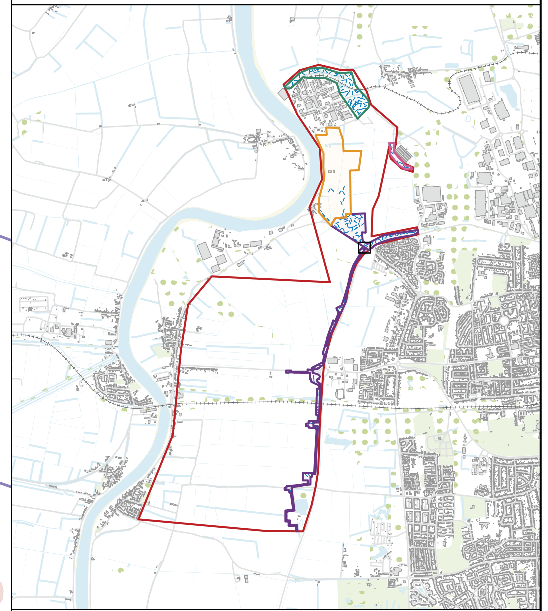


Site
Evaluation trench
Sondage
Archaeology
Geophysical survey interpretation
Survey extents
Possible archaeology
Ferrous
Increased magnetic response

Date: 03/05/2023 Created by: CM
Scale: 1:500 at A3 Revision: 1

Figure 11: Archaeological results with geophysical survey interpretation, trench 58

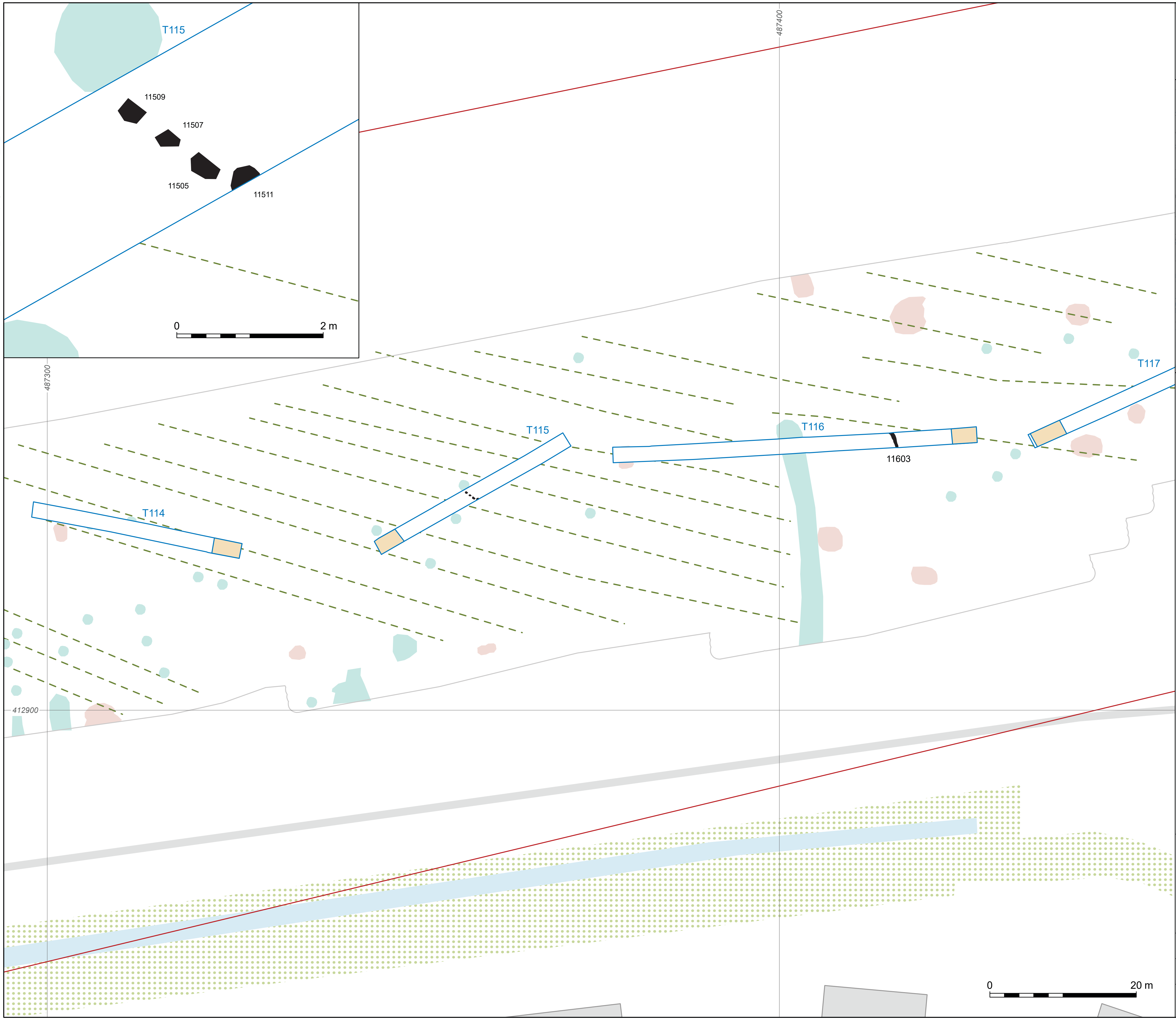


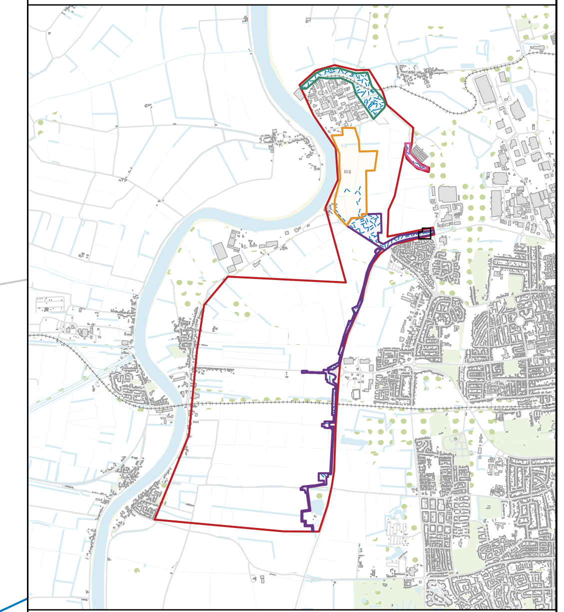


Site
Evaluation trench
Sondage
Archaeology
Shrub bowl
Non-designated heritage asset
Cropmark (13)
Geophysical survey interpretation
Survey extents
Possible archaeology
Ploughing
Trend
Drainage
Ferrous

Date: 04/05/2023 | Created by: CM
Scale: 1:500 at A3 | Revision: 1

Figure 12: Archaeological results with geophysical survey interpretation, trenches 101-103





Site
Evaluation trench
Sondage
Archaeology
Geophysical survey interpretation
Survey extents
Possible archaeology
Ridge and furrow
Ferrous

Coordinate system: OSGB 1936 British National Grid

Date: 03/05/2023	Created by: CM
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Figure 13: Archaeological results with geophysical survey interpretation, trenches 115 and 116

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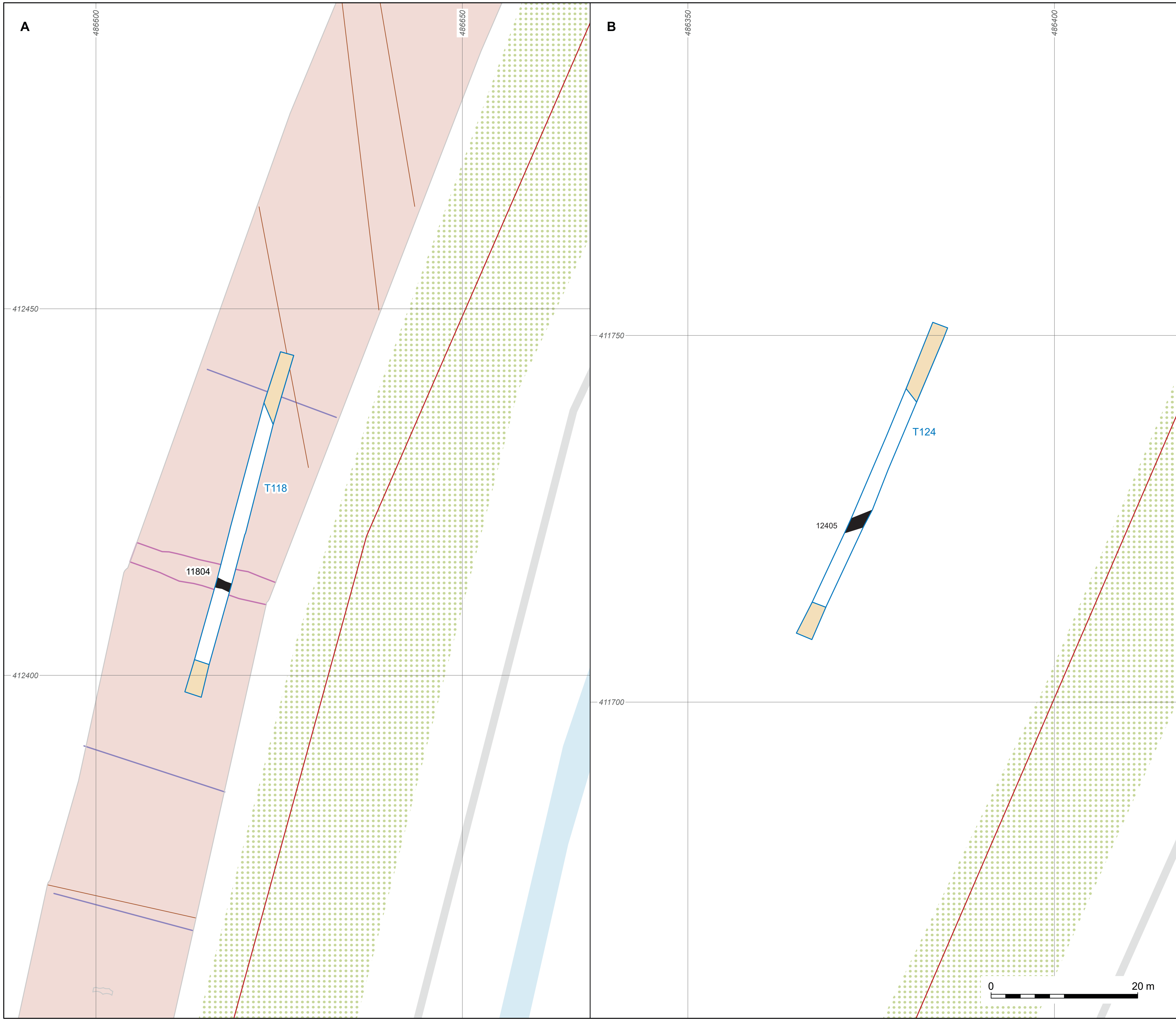

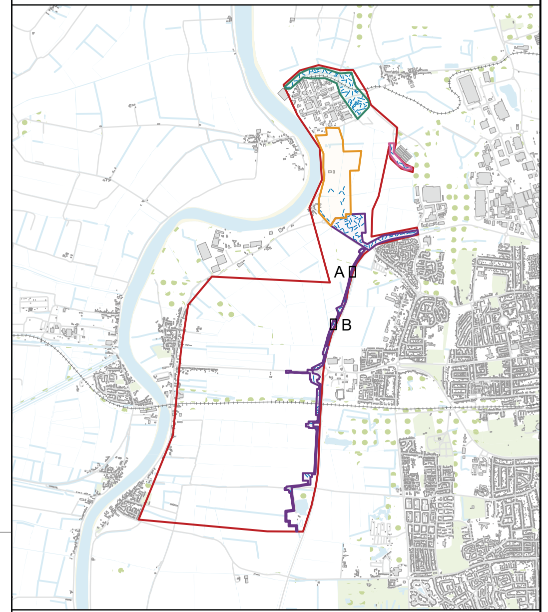

Site
Evaluation trench
Sondage
Archaeology
Geophysical survey interpretation
Survey extents
Former field boundary
Ploughing
Drainage
Ferrous

Coordinate system: OSGB 1936 British National Grid

Date: 03/05/2023	Created by: CM
Scale: 1:500 at A3	Revision: 1

Figure 14: Archaeological results with geophysical survey interpretation, trenches 118 and 124

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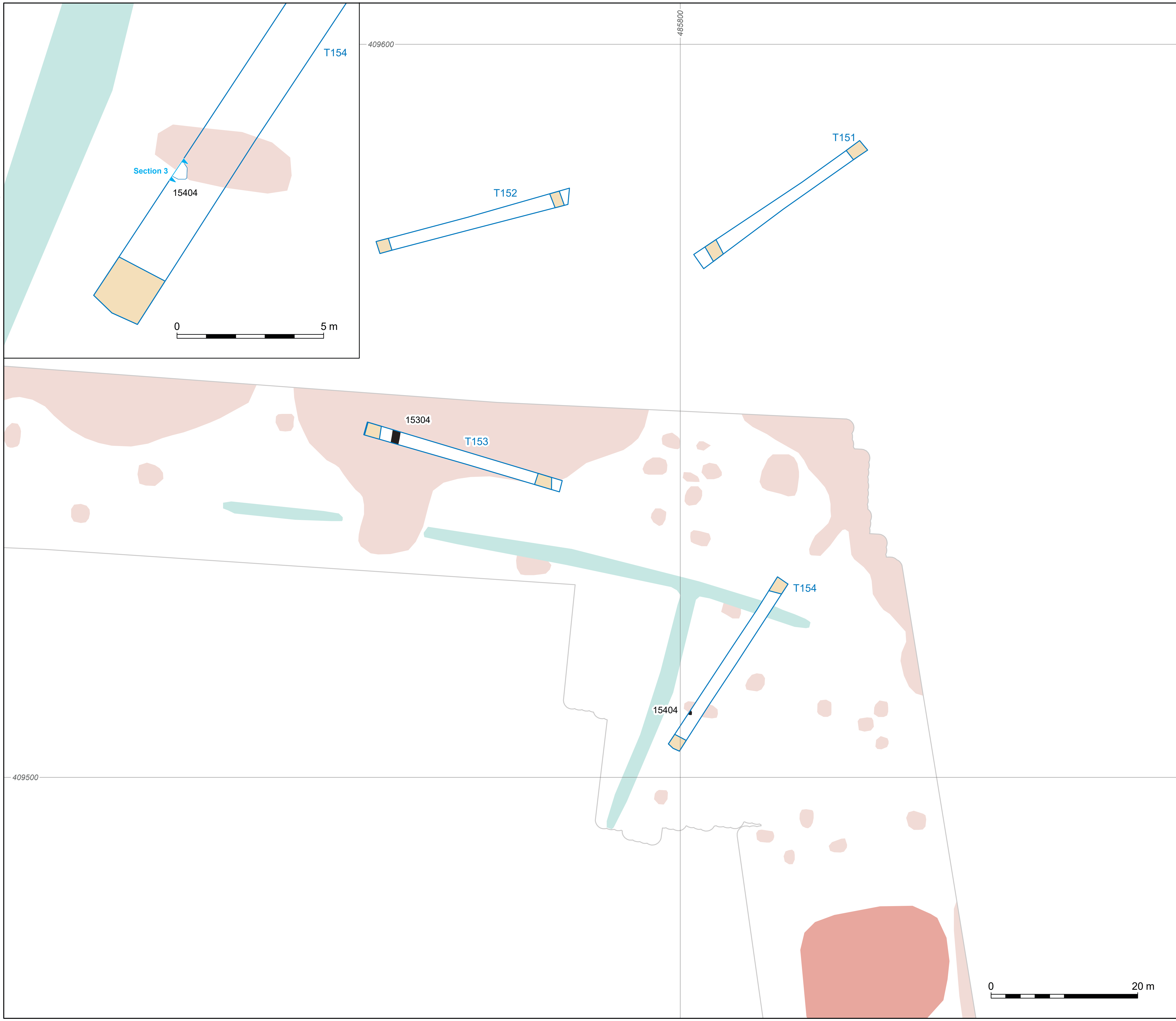
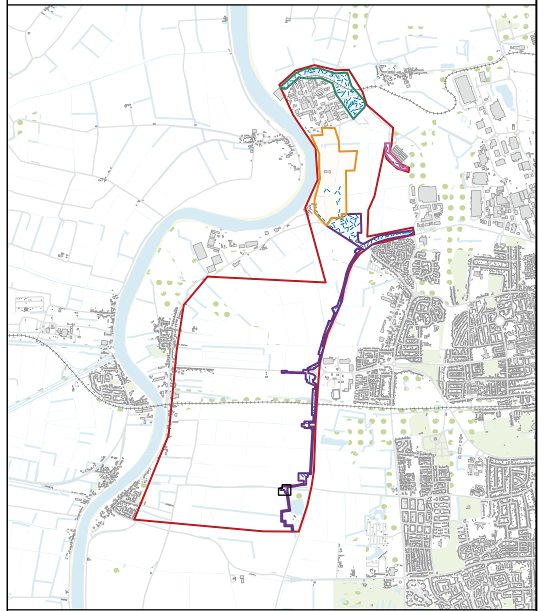


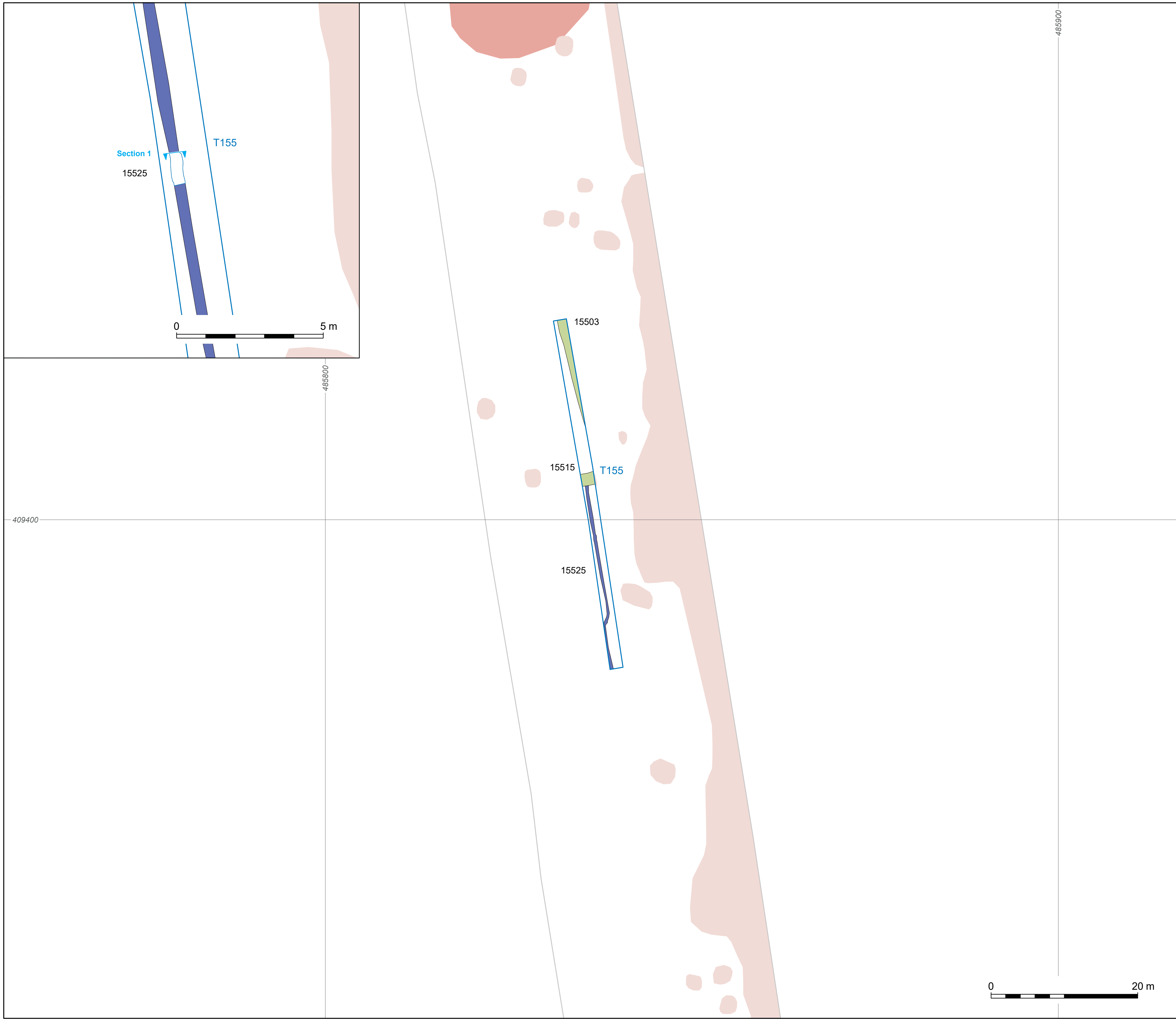


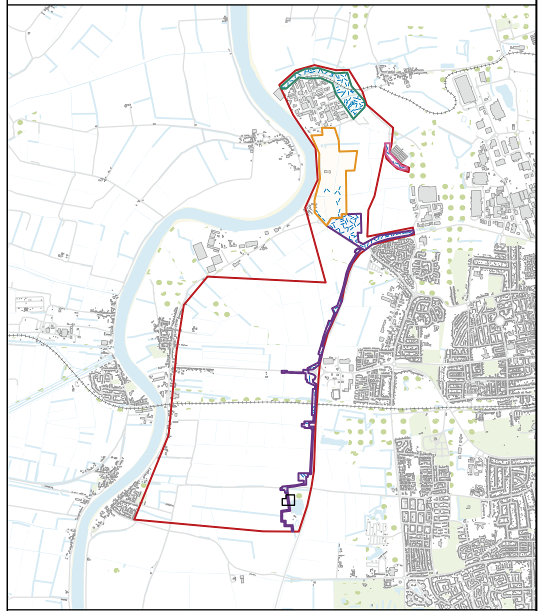
Evaluation trench
Sondage
Archaeology
Intervention
Geophysical survey interpretation
Survey extents
Possible archaeology
Ferrous
Increased magnetic response

Coordinate system: OSGB 1936 British National Grid

Date: 09/05/2023 | Created by: CM
Scale: 1:500 at A3 | Revision: 1

Figure 15: Archaeological results with geophysical survey interpretation, trenches 153 and 154





- Evaluation trench
- Pre-post-medieval
- Post-medieval
- Intervention

Geophysical survey interpretation

- Survey extents
- Ferrous
- Increased magnetic response

Coordinate system: OSGB 1936 British National Grid

Date: 09/05/2023	Created by: CM
Scale: 1:500 at A3	Revision: 1

Figure 16: Archaeological results with geophysical survey interpretation, trench 155

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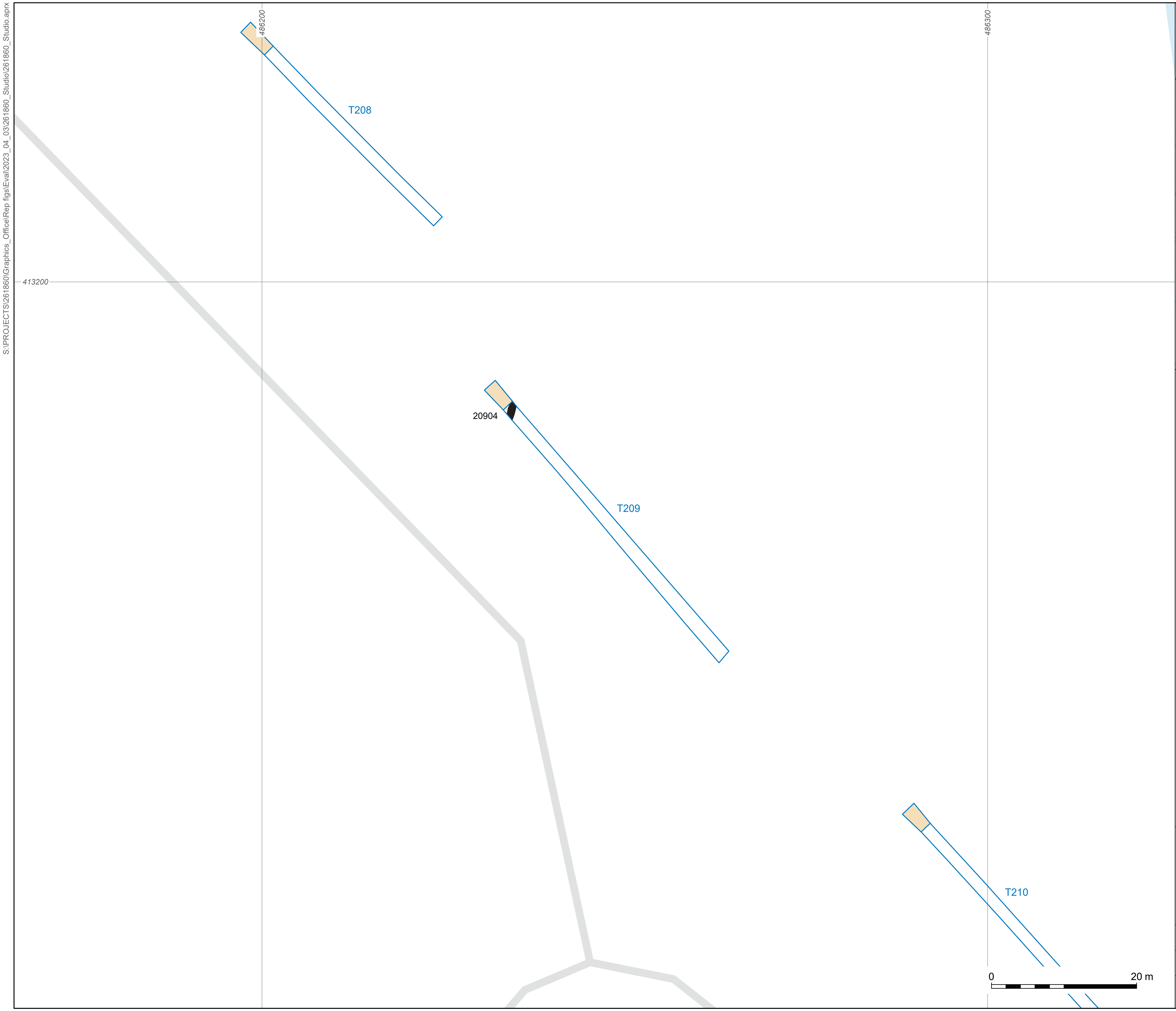
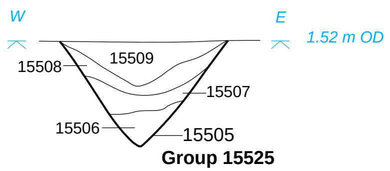


Evaluation trench
Archaeology
Sondage

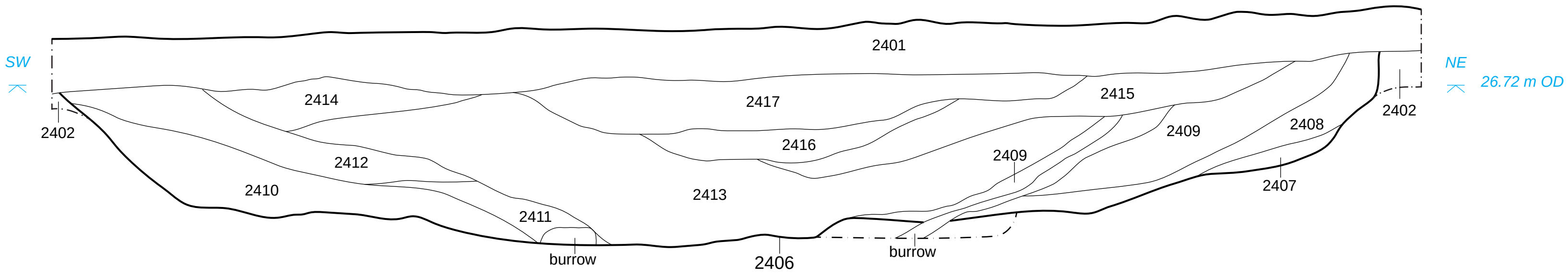
Date: 03/05/2023 | Created by: CM
Scale: 1:500 at A3 | Revision: 1

Figure 17: Archaeological results, trench 209

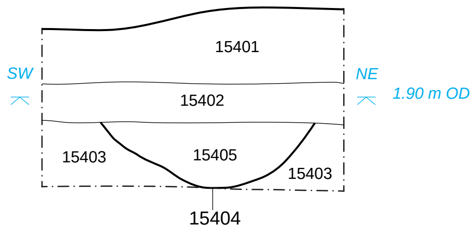
Section 1: South facing
section of gully 15505

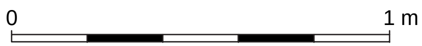


Section 2: South-east facing section through pit 2406



Section 3: South-east facing section
through pit 15404





Date: 09/05/2023	Created by: ND / CM	Revision: 1	Scale: 1:20 at A4

Figure 18: Sections through gully 15525, pit 2406 and pit 15404

Figure 19: Trench 31, view from the north-east, 2 x 1 m scales

Figure 20: Trench 32, view from the south, 2 x 1 m scales

Figure 21: Trench 61, representative section, view from the south-west, 1 m scale

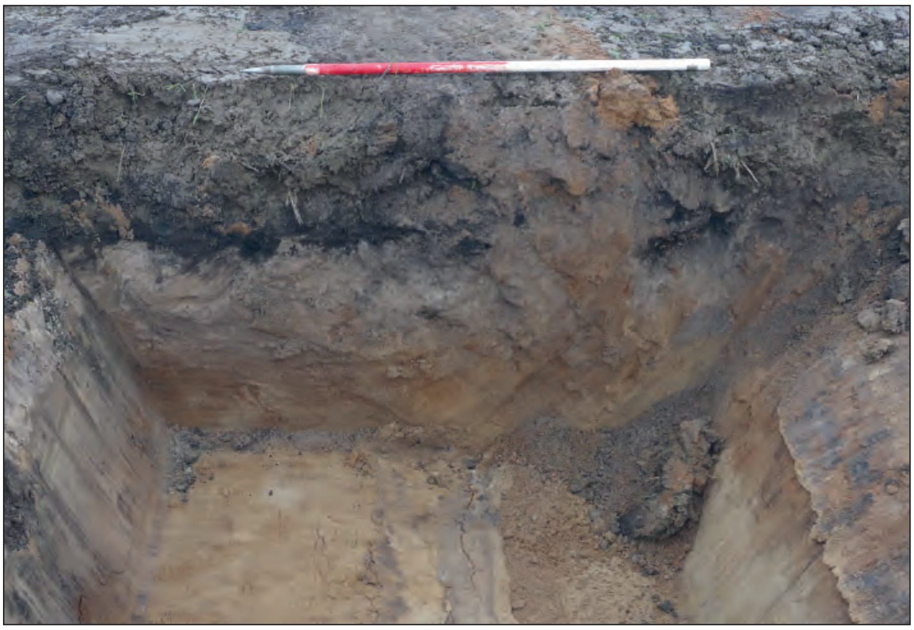


Figure 22: Trench 69 sondage, view from the north-west, 1 m scale

Figure 23: Trench 72, representative section, view from the north-west, 1 m scale

Figure 24: Trench 97, view from the west, 2 x 1 m scales

Figure 25: Trench 99, representative section, view from the north-west, 1 m scale

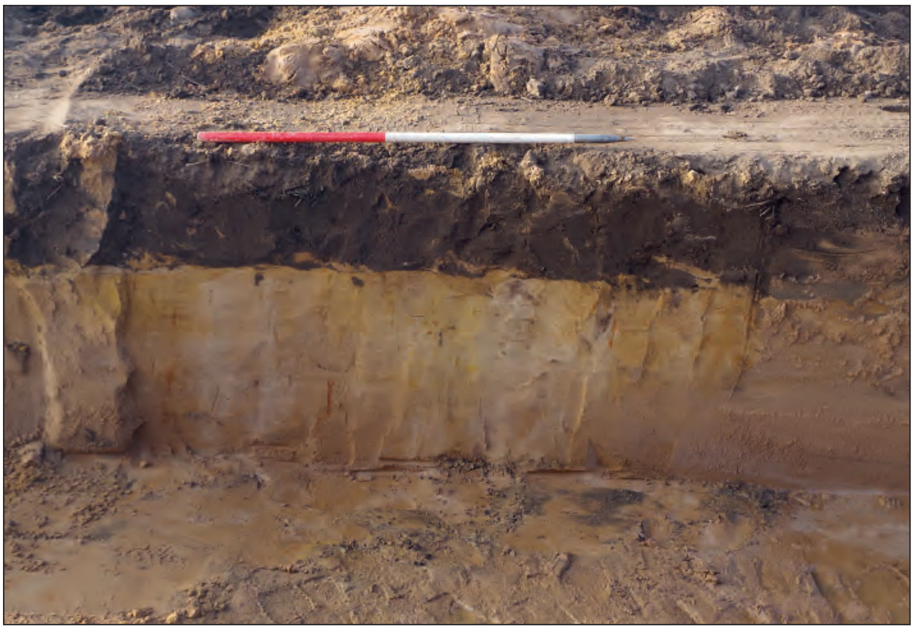


Figure 26: Trench 154, representative section, view from the south-east, 1 m scale

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Figure 27: Gully 15525, view from the south, 1 m scale

Figure 28: Ditch 10105, view from the south, 1 m scale

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Figure 29: Plan of burial 3704, 1 m scale

Figure 30: Postholes 11505-11509, view from the north-east, 1 m scale

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