MYTHE FLOOD ALLEVIATION SCHEME, TEWKESBURY, GLOUCESTERSHIRE

GEOPHYSICAL SURVEY REPORT

ST11597

12/09/2011

NP ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

NP ARCHAEOLOGY LTD

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Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by NP Archaeology Ltd on the preparation of reports.

REVISION SCHEDULE			
	01	**02**	**03**
PREPARED BY: **DATE:**	Martin Railton Project Manager 08/09/2011		
EDITED BY: **POSITION:** **DATE:**	Frank Giecco Technical Director 08/09/2011		
APPROVED BY: **POSITION:** **DATE:**			

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SUMMARY

In July 2011 NP Archaeology Ltd were commissioned by Wardell Armstrong LLP, on behalf of their clients Severn Trent Water Ltd, to undertake a geophysical survey of land to the north-west of Tewkesbury, situated on the left bank of the River Severn (centred on NGR SO 89202, 33606). This work was carried out to in order to provide information to determine a planning application and inform upon potential mitigation works as a consequence of planning consent. The work is required as the site lies within an area that has received little previous fieldwork but has significant archaeological potential.

The objective of the geophysical survey was to determine the presence/absence, nature and extent of potential archaeological features within the study area, and the presence/absence of any known modern features within the survey area, which may affect the results. The results of the geophysical survey were to be used to inform the locations of trenches in the subsequent trial trench evaluation of the site.

The geomagnetic surveys detected number of modern service pipes and a possible former road or railway track bed. A number of potential archaeological features were also detected, which were interpreted as possible former field boundaries or other soil-filled features. It was recommended that these were targeted in the subsequent trial trench evaluation at the site, which will involve the excavation of 20 trenches across the site, totalling 1000m^2 of excavation.

The first stage of evaluation subsequently commenced in August 2011, and involved the excavation of 16 trenches. Of these trenches, 12 trenches were devoid of any archaeological features or deposits, whilst 4 trenches contained archaeological features which consisted of pits, post holes, gullies and ditches. The recorded features were concentrated in the western part of the site, corresponding to the area of the soil-filled features detected during the geophysical survey. Finds dating from the Iron Age, and Romano-British periods were recovered from the study area, suggesting this was an area of late prehistoric and Romano-British settlement. The remaining 4 trenches are due to be excavated in September 2011. The final results of the trial trenching are to be presented in a separate report.

ACKNOWLEDGEMENTS

NP Archaeology Ltd would like to thank Charlotte Dawson and Helen Martin-Bacon of Wardell Armstrong LLP for commissioning the project, and for all assistance throughout the work. NPA Ltd would also like to thank Charles Parry, Senior Archaeological Officer, Gloucestershire County Council, for his assistance throughout the project.

The geophysical survey was undertaken by Angus Clark and Kevin Mounsey under the direction of Martin Railton BA (Hons) MA MIfA, Project Manager, NP Archaeology Ltd. The report was written and illustrated by Martin Railton. The report was edited by Frank Giecco, Technical Director.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In July 2011, NP Archaeology were invited by Wardell Armstrong LLP, on behalf of their clients Severn Trent Water Ltd, to undertake a geophysical survey of land to the north-west of Tewkesbury, situated on the left bank of the River Severn at Mythe, Gloucestershire (Figure 1). The work was undertaken prior to groundworks for a flood compensation scheme at the site, which would include the removal of a nineteenth century railway embankment.

1.1.2 The proposed works lie partially within the Tewkesbury Conservation Area. In addition, a number of heritage assets within the vicinity of the site indicated a moderate potential for archaeological remains to be present beneath the railway embankment, and within the land to the north-east where associated works are proposed. As a result, Charles Parry, Senior Archaeological Officer at Gloucestershire County Council requested that all ground works be subject to a programme of archaeological investigation. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16), and its successor Planning Policy Statement 5 (Planning for the Historic Environment).

1.1.3 The study area comprised 2 fields of pasture land, measuring *c.*5.5ha in total. The area was bounded by the A38 to the south and west, the river Avon to the east, and further pastureland to the north. The site is centred on Ordnance Survey grid reference NGR SO 8920 3360.

1.1.4 This report outlines the geophysical survey work undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works. A further report will present the results of the subsequent trial trench evaluation at the site (Churchill forthcoming).

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by Wardell Armstrong LLP, on behalf of Severn Trent Water, in response to a request by Charles Parry, Senior Archaeological Officer at Gloucestershire County Council for an archaeological evaluation of the study area. Following acceptance of the project design, NP Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA 2010), English Heritage Guidelines (English Heritage 2008), and generally accepted best practice.

2.2 GEOPHYSICAL SURVEY

2.2.1 ***Technique Selection:*** geomagnetic survey was selected as the most appropriate technique, given the non-igneous environment, and the expected presence of cut archaeological features at depths of no more than 1.5m. This technique involves the use of hand-held gradiometers, which measure variations in the vertical component of the earth's magnetic field. These variations can be due to the presence of sub-surface archaeological features.

2.2.2 ***Field Methods:*** the geophysical study area measured *c*.5.5ha divided into several separate fields, located either side of the disused railway embankment. Parts of the study area were unsuitable for geophysical survey due to the presence of modern structures, fences, farm machinery and woodland, but two fields of pasture were surveyed to the north and south of the embankment (Areas 1 & 2). A 30m grid was established in each area, and tied-in to known Ordnance Survey points using a Trimble 3605DR Geodimeter total station with datalogger.

2.2.3 Geomagnetic measurements were determined using a Bartington Grad601-2 dual gradiometer system, with twin sensors set 1m apart. It was expected that significant archaeological features at a depth of up to 1.5m would be detected using this arrangement. The survey was undertaken using a zig-zag traverse scheme, with data being logged in 30m grid units. A sample interval of 0.25m was used, with a traverse interval of 1m, providing 3600 sample measurements per grid unit.

2.2.4 ***Data Processing:*** geophysical survey data were processed using ArchaeoSurveyor II software, which was used to produce 'grey-scale' images of the raw data. Positive magnetic anomalies are displayed as dark

grey, and negative magnetic anomalies are displayed as light grey. A palette bar shows the relationship between the grey shades and geomagnetic values in nT.

2.2.5 Raw data were processed in order to further define and highlight the archaeological features detected. The following basic data processing functions were used:

Despike: to locate and suppress random iron spikes in the gradiometer data.

Clip: to clip data to specified maximum and minimum values, in order to limit large noise spikes in the geophysical data.

Destagger: to reduce the effect of staggered gradiometer data, sometimes caused by difficult working conditions, topography, or operator error.

Interpolate: to match the traverse and sample intervals in the gradiometer data.

2.2.6 ***Interpretation:*** three types of geophysical anomaly were detected in the gradiometer data:

positive magnetic: regions of anomalously high or positive magnetic data, which may be associated with the presence of high magnetic susceptibility soil-filled features, such as pits or ditches.

negative magnetic: regions of anomalously low or negative magnetic data, which may be associated with features of low magnetic susceptibility, such as stone-built features, geological features, land-drains or sub-surface voids.

dipolar magnetic: regions of paired positive and negative magnetic anomalies, which typically reflect ferrous or fired materials, including fired/ferrous debris in the topsoil, modern services, metallic structures, or fired structures, such as kilns or hearths.

2.2.7 ***Presentation:*** the grey-scale images were combined with site survey data and Ordnance Survey data to produce the geophysical survey plans. Colour-coded geophysical interpretation diagrams are provided, showing the locations and extent of positive, negative, dipolar, geomagnetic anomalies.

2.2.8 Archaeological interpretation diagrams are provided, which are based on the interpretation of the geophysical survey results, in light of the archaeological and historical background of the site.

2.2.9 Trace plots of the unprocessed geophysical data are available if required.

2.3 THE ARCHIVE

2.4.1 The data archive for the geophysical survey has been created in accordance with the recommendations of the Archaeology Data Service (ADS 2001). This archive is currently held at the company offices at Nenthead, Cumbria.

2.4.2 One copy of the geophysical survey report will be submitted to the Gloucester County Council HER, where viewing will be available upon request. A digital version will also be made available.

2.4.3 NP Archaeology Ltd and Gloucestershire County Council support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by NP Archaeology, as a part of this national project. The OASIS reference for the geophysical survey is nparchae1-109620.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The study area at Mythe, lies within the floodplain between the Rivers Severn and Avon, approximately 300m north of the river confluence and is situated *c*.0.6km North of Tewkesbury, in The Severn Vale, Gloucestershire. The Severn Vale lies between the Cotswolds to the southeast and the Royal Forest of Dean to the northwest.

3.1.2 The underlying geology of the area comprises Triassic and Lias groups overlain by layers of colluvial and alluvial build up (BGS 2001). The area is flat and reaches a height of 10m AOD. A northwest to southeast aligned embankment marking the line of the disused line of the Birmingham to Gloucester railway (HER 11268) is located within the site boundary.

3.2 HISTORICAL CONTEXT

3.2.1 *Introduction:* the historical background of the site was compiled by Wardell Armstrong LLP, a summary of which is presented here (Martin-Bacon 2011). It is compiled mostly from secondary sources, and is intended only as a brief summary of historical developments specific to the study area.

3.2.2 Given the site's location on a floodplain it is likely that historically the area was marshland and subject to frequent flooding and not subject to permanent settlement, apart from possibly on gravel islands within the floodplain. The site has the potential to contain preserved organic deposits of both the prehistoric and later periods which could offer information on the past environments and human activity in the area. Deposits within the proposed site might therefore, typically contain preserved wood, both natural and worked within waterlogged and peaty layers.

3.2.3 *Prehistoric:* no evidence of prehistoric activity has previously been observed within the boundaries of the site. As the site is located within a floodplain, it is possible for prehistoric evidence to be overlain by alluvial deposits, or even within the deposits when artefacts are displaced through flooding events.

3.2.4 *Roman:* no evidence of Romano- British activity has been noted within the site boundaries. However, Roman activity is well documented locally with a Roman road, Icknield Street, located close to the western boundary of the site. Archaeological watching briefs and evaluations have recovered evidence of Roman activity, including pottery scatters, coins and cremation urns in association with this road. A number of inhumations were

uncovered to the southeast of the site, along with a "ritual" well containing human and animal skulls nearby (Martin-Bacon 2011).

3.2.5 *Anglo- Saxon*: no evidence for Anglo- Saxon activity has been recorded within the site boundaries, although pottery sherds have been recorded in Tewkesbury, and ditches dating to this period are recorded 350-400m to the south of the site.

3.2.6 *Medieval:* a motte and bailey castle has been recorded 115m to the northwest of the site, and the medieval settlement of Tewkesbury was located 200m south of the study area. It is possible that the study area was utilized as agricultural land during this period.

3.2.7 *Post-medieval and Modern:* the disused Birmingham to Gloucester railway is located within the site boundary (opened 1840). Concentrations of brick, clay pipe, roof tiles and pottery sherds have been recorded within the site boundary, which are indicative of post-medieval activity.

3.3 PREVIOUS WORK

3.3.1 An archaeological watching brief was undertaken by the Gloucestershire Archaeology Service in 1991, prior to the laying of a water pipeline by Severn Trent Water. Two concentrations of post medieval remains were noted within the study area, with a Roman coin being present within one of the concentrations. A further concentration of post medieval material was observed outside the study area, immediately adjacent to the western boundary of the site. In addition to these three post-medieval scatters, a large quantity of Roman pottery was recovered 40m east of the site boundary.

3.3.2 Prehistoric activity was recorded during an archaeological evaluation in 2004, which included a truncated Bronze Age pit, a gravel island and a palaeochannel, which were recorded 300m east of the site boundary. During excavations undertaken in the 1970s, pottery dating from the Late Neolithic and Iron Age were recovered 300m southeast of the site.

4 THE GEOPHYSICAL SURVEYS

4.1 INTRODUCTION

4.1.1 The geophysical surveys were undertaken between 26th and 27th July 2011. Geomagnetic survey was undertaken over two separate fields of pasture (Areas 1 & 2) within the study area, which were located either side of the disused railway embankment (Figure 2). Each area was subdivided by field boundaries, some of which incorporated post and wire fences. These fences produced strong dipolar magnetic anomalies around the periphery of the survey areas. The results of the geophysical surveys and the geophysical and archaeological interpretations are shown in Figures 3-8.

4.1.2 Small discrete dipolar magnetic anomalies were detected across the whole of the study area. These are almost certainly caused by fired/ferrous litter in the topsoil, which is typical for modern agricultural land. These anomalies are indicated on the geophysical interpretation drawings, but not referred to again in the subsequent interpretations.

4.2 AREA 1

4.2.1 Area 1 measured *c*.1.1ha and was situated to the north of the railway embankment. A farm track and cattle grid bound the north side of the survey area and these produced strong dipolar geomagnetic anomalies along the northern edge of Area 1.

4.2.2 A very strong linear dipolar geomagnetic anomaly was detected crossing the east side of the survey area, aligned approximately north to south. This was almost certainly due to the presence of a modern service pipe. Another very strong dipolar magnetic anomaly was detected at the east end of Area 1, which is probably also due to a modern service or ferrous object.

4.2.3 A strong linear dipolar geomagnetic anomaly was also detected crossing the centre of Area 1, aligned northeast to southwest. This anomaly may indicate the presence of a former road or surfaced track way. It is also possible that the magnetic response is due to the presence of fired bedding material for a former railway track.

4.2.4 A positive linear geomagnetic anomaly was detected at the east end of Area 1, aligned northeast to southwest, which may indicate the presence of a soil-filled feature, such as a former field boundary.

4.2.5 A series of weak linear positive geomagnetic anomalies were detected crossing the west end of the survey area, aligned approximately north to south. These may represent the soil-filled ditches of former field boundaries. They may also possibly represent land drains.

4.2.6 A further series of weak linear and curvilinear positive geomagnetic anomalies were detected on the west side of Area 1, which may represent other soil-filled features, however the nature of these was uncertain.

4.2.7 A weak linear negative geomagnetic anomaly was also detected on the north side of Area 1, aligned northeast to southwest, which may correspond to the location of a land drain.

4.3 AREA 2

4.3.1 Area 2 measured *c.*1.4ha, and was situated within a narrow strip of land to the south of the disused railway embankment. A fenced area, which was overgrown with shrubs, lay to the southwest of Area 2, with a spoil heap to the north and the River Severn to the south. A farm track crossed south side of Area 2, the material from which produced strong dipolar magnetic anomalies in this area.

4.3.2 A very strong linear dipolar geomagnetic anomaly was detected crossing the south side of the survey area, aligned approximately north to south, which was almost certainly due to the presence of a modern service pipe. Two further strong linear dipolar geomagnetic anomalies were detected to the north, which are also interpreted as service pipes.

4.3.3 A very strong linear dipolar geomagnetic anomaly was also detected running along the northern edge of Area 2, aligned northwest to southeast, which may also be due to a modern service pipe.

4.3.4 No potential archaeological features were detected by the geophysical survey in Area 2.

5 CONCLUSIONS

5.1 CONCLUSIONS

5.1.1 Geomagnetic surveys covering *c*.5.5ha of land were undertaken near Tewkesbury, Gloucestershire, covering the proposed location of the Mythe Flood Alleviation Scheme. The surveys were undertaken over two separate fields of pasture within the study area (Area 1 and Area 2), which were located either side of a disused railway embankment.

5.1.2 The geomagnetic surveys detected a number of modern service pipes and a possible former road or railway track bed. A number of potential archaeological features were also detected, which were interpreted as possible former field boundaries or other soil-filled features. These were targeting in the subsequent trial trench evaluation at the site.

5.1.3 The first stage of evaluation subsequently commenced in August 2011, and involved the excavation of 16 trenches. Of these trenches, 12 trenches were devoid of any archaeological features or deposits, whilst 4 trenches contained archaeological features which consisted of pits, post holes, gullies and ditches. The recorded features were concentrated in the western part of the site, corresponding to the area of the soiled-filled features detected by the geophysical survey in Area 1. Finds dating from the Iron Age, and Romano-British periods were recovered from the study area. A further 4 trenches are due to be excavated in September 2011.

5.1.4 The results obtained during the present evaluation, and from previous archaeological investigations suggest that part of the study area may have been an area of late prehistoric and Roman-British settlement. The final results of the trial trenching are to be presented in a separate report.

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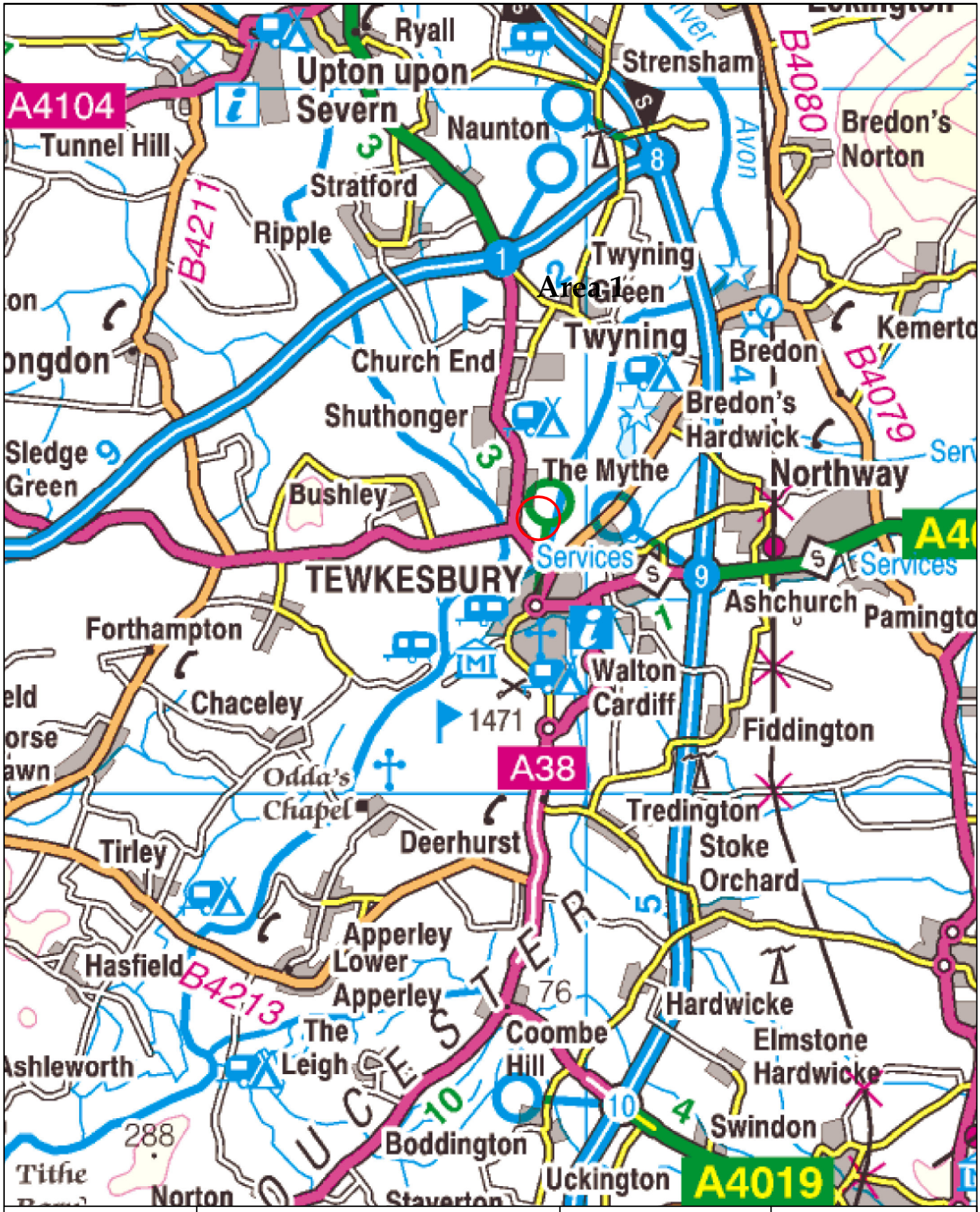
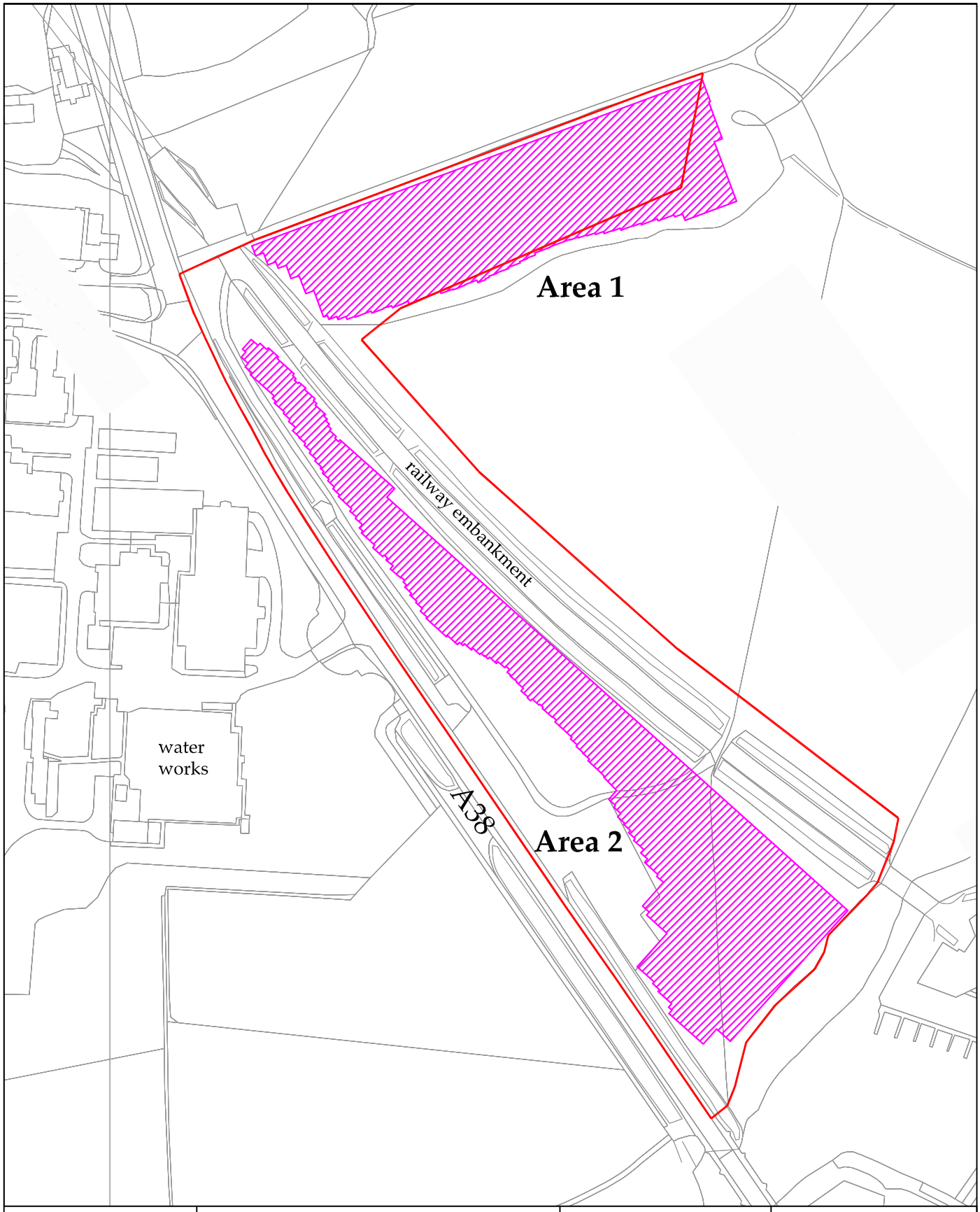
APPENDIX 1: FIGURES



NPArchaeology Ltd 2011	PROJECT: Mythe Flood Alleviation Scheme SCALE: 1:7500 at A4 REPORT No: ST11597 CLIENT Severn Trent Water Ltd DRAWN BY: MDR DATE: August 2011 FIGURE No: 1	site location	Reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright. All rights reserved. Licence number 100014732

Figure 1 : Site location



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PROJECT:	Mythe Flood Alleviation Scheme
SCALE:	1:2500 at A4
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FIGURE No:	2

outline of proposed development area

geophysical survey area

Figure 2 : Location of the geophysical survey areas (Area 1 and Area 2)

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Mythe Flood Alleviation Scheme
Tewkesbury, Gloucestershire

CLIENT: Severn Trent Water Ltd

SCALE: 1:1000 at A3

DRAWN BY: MDR

DATE: August 2011

outline of proposed development area

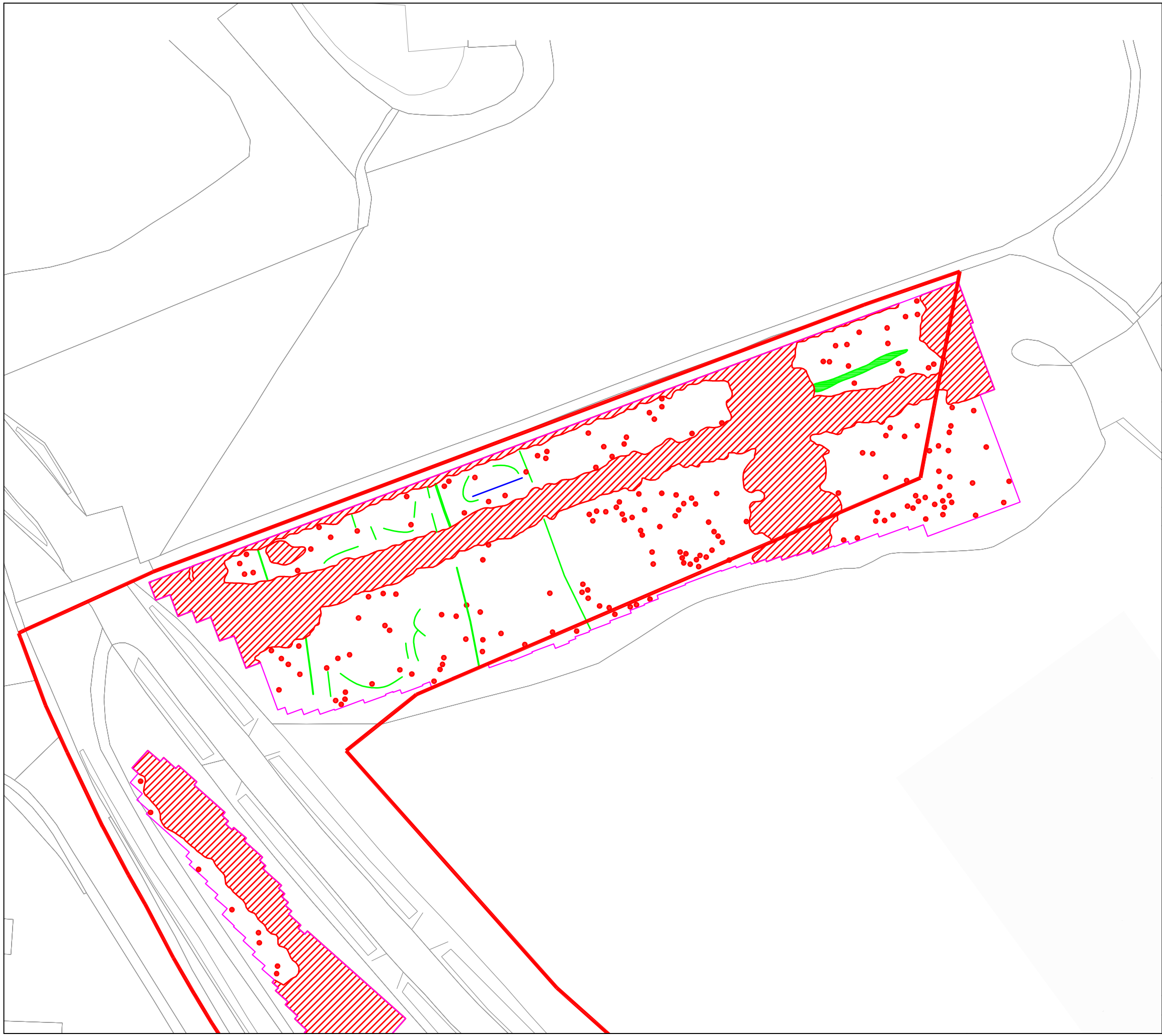
outline of geophysical survey area

7 nT
5.6
4.2
2.8
1.4
0
-1.4
-2.8
-4.2
-5.6
-7 nT

Report No: ST11597

Figure No: 3

Figure 3 : Geophysical survey of Area 1



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Mythe Flood Alleviation Scheme
Tewkesbury, Gloucestershire

CLIENT: Severn Trent Water Ltd

SCALE: 1:1000 at A3

DRAWN BY: MDR

DATE: August 2011

- outline of proposed development area
- outline of geophysical survey area
- negative magnetic anomaly
- positive magnetic anomaly
- dipolar magnetic anomaly

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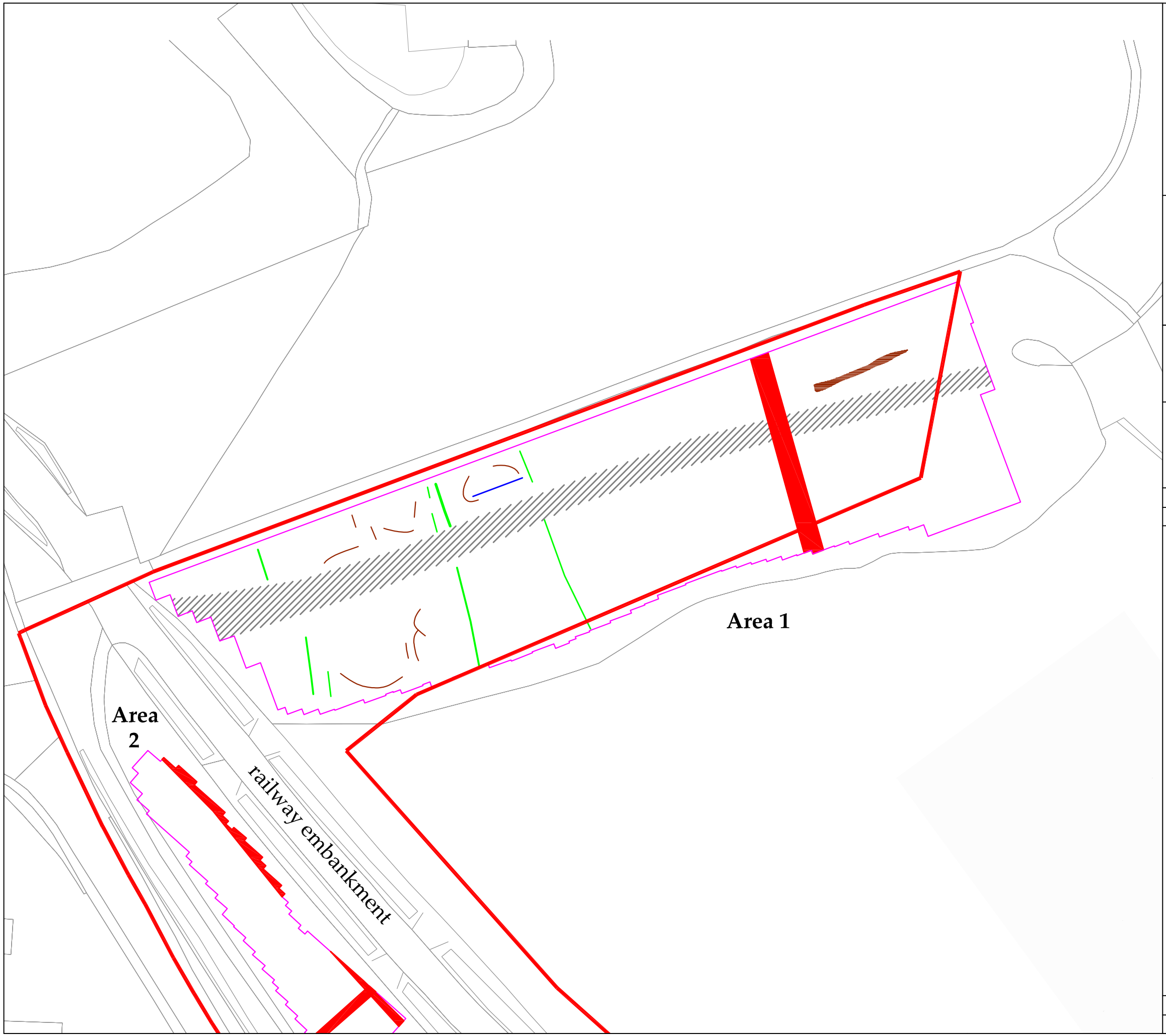
Figure No: 4

Figure 4 : Geophysical interpretation of Area 1



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2011

Mythe Flood Alleviation Scheme
Tewkesbury, Gloucestershire

CLIENT: Severn Trent Water Ltd

SCALE: 1:1000 at A3

DRAWN BY: MDR

DATE: August 2011

- outline of proposed development area
- outline of geophysical survey area
- possible land drain
- former field boundary (?)
- service pipe
- possible soil-filled features
- former trackway

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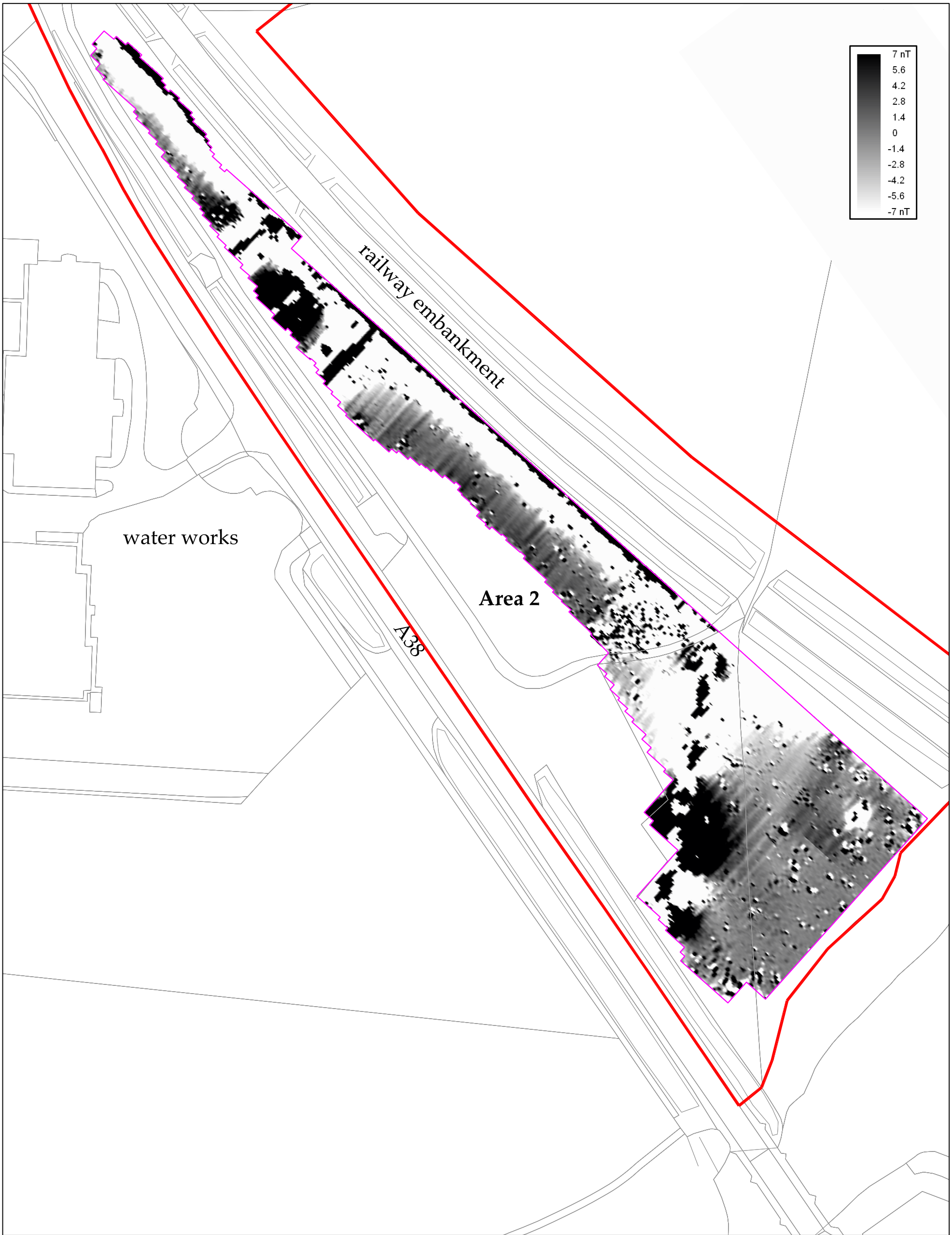
Figure No: 5

Figure 5 : Archaeological interpretation of Area 1



NP Archaeology Ltd 2011	PROJECT: Mythe Flood Alleviation Scheme SCALE: 1:1250 at A3 REPORT No: ST11597 CLIENT Severn Trent Water Ltd DRAWN BY: MDR DATE: August 2011 FIGURE NO: 6	outline of proposed development area outline of geophysical survey area	Reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright. All rights reserved. Licence number 100014732.

Figure 6 : Geophysical survey of Area 3

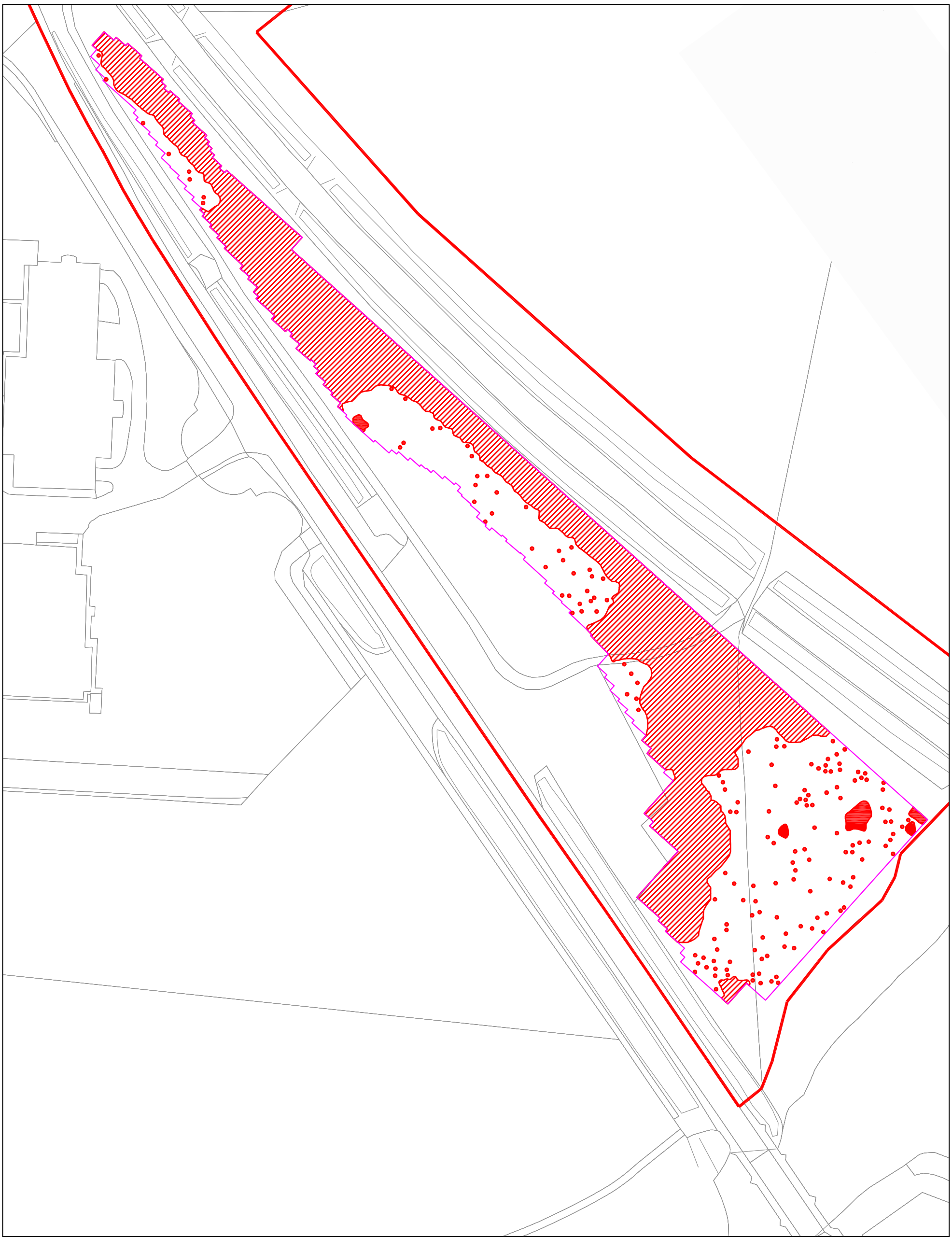


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FIGURE NO:	7

outline of proposed development area
outline of geophysical survey area
dipolar magnetic anomaly

Figure 7 : Geophysical interpretation of Area 3

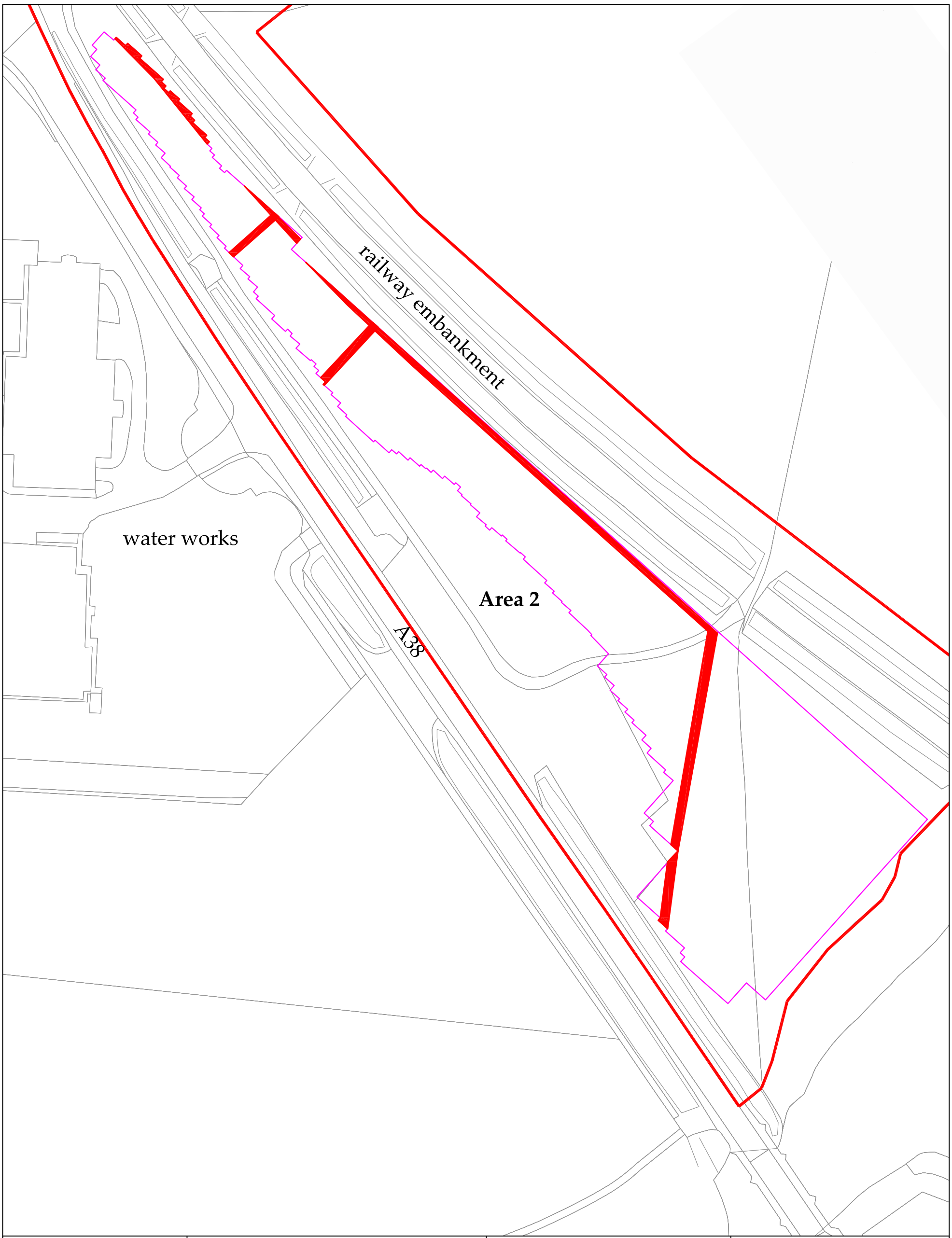

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FIGURE NO:	8

outline of proposed development area
outline of geophysical survey area
service pipes

Figure 8 : Archaeological interpretation of Area 3