Suffolk County Council

POST-EXCAVATION ASSESSMENT REPORT

SCCAS REPORT No. 2009/269

Cedars Park, Stowmarket to Baylham Pumping Station, Anglian Water pipeline (phase 2)

CRM 058
CDD 068
BAY 037

Appendices

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HER information

Planning Application No:	**n/a**
Dates of Fieldwork:	**02 July 2007 – 05 March 2008**
Grid Reference:	**TM 0654 5812 – TM 1169 5210**
Funding Body:	**Anglian Water plc**
Curatorial Officer:	**Jess Tipper**
Project Officer:	**Kieron Heard**
Oasis Reference:	**suffolkc1-36016**

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Appendix 1. Brief and Specification – CRM 058

SUFFOLK COUNTY COUNCIL
ARCHAEOLOGICAL SERVICE - CONSERVATION TEAM

Brief and Specification for Archaeological Evaluation

IPSWICH TO CEDARS PARK ANGLIAN WATER PIPELINE ROUTE (PHASE 2)

The commissioning body should be aware that it may have Health & Safety responsibilities.

1. Background

1.1 The route of a pipeline has been proposed by Anglian Water between TM 0923 5590 (north) and TM 1169 5210 (south), *c.* 5.00km in length (see accompanying plan).

1.2 The route of the proposed pipeline (Phase 2), orientated north-west to south-east between Creeting St Mary and Baylham Pumping Station, is situated within the central Gipping Valley, crossing the floodplain at TM 1080 5310.

1.3 In general, the route is situated on loam soil over chalk on the eastern side of the river valley with loam and sand, in places over gravel, on the western side with river alluvium over peat within the floodplain.

1.4 The route of the proposed pipeline is situated in an area of outstanding archaeological importance, as shown by a recent desk-based assessment undertaken by Suffolk County Council Archaeological Service Field Team (Report No. 2006/168).

1.5 The section of the route across the nationally important archaeological site (Combretovium Roman settlement) that is statutorily protected as a Scheduled Ancient Monument (SF 89) has been already the subject of both geophysical and topographic surveys by Archaeological Services & Consultancy Ltd (ASC 871/SCP/02, March 2007). The mitigation for this part of the route will comprise total excavation of the stripped easement; a separate brief has been issued for this stage of work.

1.6 On the western side of the Gipping, the line of the route passes through an extensive archaeological landscape, recorded in the County Sites and Monuments Record, with evidence for at least two Bronze Age barrows (BAY 007 and BAY 012) between TM 1086 5299 and TM 1127 5230. This area is the subject of geophysical survey by Archaeological Services & Consultancy Ltd.

1.7 There is a high density of known archaeological sites, of which a number are of national importance, and also preserved palaeo-environmental remains, such as peat deposits, within the immediate area of the proposed route. The landscape setting of the route, above the River Gipping, has high archaeological potential, especially for prehistoric sites (which would not be detected by metal detector users). There is high potential for the identification of further sites along the line of the proposed route.

1.8 In order to establish the full archaeological implications of the proposed route, Anglian Water has been advised that an archaeological field evaluation should take place. Further information concerning the location, extent, survival and significance of the known archaeological remains on the site as well as the potential for further archaeological remains to survive is required.

2. The nature of the development and archaeological requirements

2.1 The principle ground disturbance will involve stripping associated with the easement believed to be 15.00m in width (max.), and also the cutting for the pipe trench, believed to be *c*. 0.40m wide. The pipe will be laid in an open-cut trench with directional drilling at the river crossing.

2.2 As a first stage, and in order to inform an impact assessment and subsequent mitigation, the following staged scheme of evaluation work is required:

- non-intrusive field-walking, where ground conditions permit, and metal-detecting survey.

- linear trial trenching along that part of the route that cannot be fieldwalked across the scrub around Bosmere, which is an area of archaeological importance, between TM 0974 5509 and TM 1019 5475 (shown in red on the accompanying plan).

These will form part of an integrated evaluation strategy for the pipeline route, along with palaeo-environmental and geo-archaeological assessment across the Gipping flood plain and geophysical survey, with reviews subsequent to each stage of work. A separate brief will issued for each stage of the work.

2.3 The surveys will provide information to construct an archaeological conservation strategy, dealing with preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

2.4 Detailed standards, information and advice to supplement this brief are to be found in *Standards for Field Archaeology in the East of England*, East Anglian Archaeology Occasional Papers 14, 2003.

2.5 In accordance with the standards and guidance produced by the Institute of Field Archaeologists this brief should not be considered sufficient to enable the total execution of the project. A detailed Project Design or Written Scheme of Investigation (PD/WSI) based upon this brief and the accompanying outline specification of minimum requirements, is an essential requirement. This must be submitted by the developers, or their agent, to the Conservation Team of the Archaeological Service of Suffolk County Council (Shire Hall, Bury St Edmunds IP33 2AR; telephone/fax: 01284 352443) for approval. The work must not commence until this office has approved both the archaeological contractor as suitable to undertake the work, and the PD/WSI as satisfactory. The PD/WSI will *provide the basis for measurable standards*.

2.6 Any changes to the specifications that the project manager may wish to make after approval by this office should be communicated directly to SCCAS/CT for approval.

2.7 An outline specification, which defines certain minimum criteria, is set out below.

3. Brief for the Archaeological Evaluation

3.1 The surveys should establish whether any archaeological deposit exists in the area, with particular regard to any which are of sufficient importance to merit preservation *in situ*.

3.2 Identify the date, approximate form and purpose of any archaeological deposit within the application area, together with its likely extent, localised depth and quality of preservation.

3.3 Evaluate the likely impact of past land uses, and the possible presence of masking colluvial/alluvial deposits.

3.4 Establish the potential for the survival of environmental evidence.

3.5 The evaluation should provide sufficient information to construct an archaeological conservation strategy, dealing with preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

3.6 This project will be carried through in a manner broadly consistent with English Heritage's *Management of Archaeological Projects,* 1991 (*MAP*2), all stages will follow a process of assessment and justification before proceeding to the next phase of the project. Field evaluation is to be followed by the preparation of a full archive, and an assessment of potential. Each stage will be the subject of a further brief and updated project design; this document covers only the evaluation stage. The mitigation strategy will be the subject of a further archaeological brief, once the results of the evaluation have been reported.

3.7 If the approved evaluation design is not carried through in its entirety the evaluation report may be rejected. Alternatively the presence of an archaeological deposit may be presumed, and untested areas included on this basis when defining the final mitigation strategy.

3.8 An outline specification, which defines certain minimum criteria, is set out below.

4. Specification: Requirements

Field-walking and metal-detecting

4.1 Field-walking and non-ferrous metal-detecting is to be undertaken along the entire route of the pipeline. The route should be field-walked in swathes of *c*. 2.50m, which should allow for total coverage of the impact area. The strategy for assessing the artefact content of the topsoil by field-walking must be presented in the Project Design. A scale plan showing the proposed extent of the field survey should be included in the Project Design.

Trial-trenching

4.3 Trial trenches are to be excavated to cover a minimum 5% by area affected by development and shall be positioned to sample that part of the route around Bosmere (Section 2.2). Linear trenches are thought to be the most appropriate sampling method. Trenches are to be a minimum of 1.8m wide unless special circumstances can be demonstrated. If excavation is mechanised a toothless 'ditching bucket' at least 1.2m wide must be used. A scale plan showing the proposed locations of the trial trenches should be included in the Project Design and the detailed trench design must be approved by the SCCAS/CT before fieldwork begins.

4.4 The topsoil may be mechanically removed using an appropriate machine with a back-acting arm and fitted with a toothless bucket. All machine excavation is to be under the direct control and supervision of an archaeologist. The topsoil should be examined for archaeological material.

4.5 The top of the first archaeological deposit may be cleared by machine, but must then be cleaned off by hand. There is a presumption that excavation of all archaeological deposits will be done by hand unless it can be shown there will not be a loss of evidence by using a machine. The decision as to the proper method of further excavation will be made by the senior project archaeologist with regard to the nature of the deposit.

4.6 In all evaluation excavation there is a presumption of the need to cause the minimum disturbance to the site consistent with adequate evaluation; that significant archaeological features, e.g. solid or bonded structural remains, building slots or post-holes, should be preserved intact even if fills are sampled.

4.7 There must be sufficient excavation to give clear evidence for the period, depth and nature of any archaeological deposit. The depth and nature of colluvial or other masking deposits must be established across the site.

4.8 Archaeological contexts should, where possible, be sampled for palaeoenvironmental remains. Best practice should allow for sampling of interpretable and datable archaeological deposits and provision should be made for this. The contractor shall show what provision has been made for environmental assessment of the site and must provide details of the sampling strategies for retrieving artefacts, biological remains (for palaeoenvironmental and palaeoeconomic investigations), and samples of sediments and/or soils (for micromorphological and other pedological/sedimentological analyses. Advice on the appropriateness of the proposed strategies will be sought from J. Heathcote, English Heritage Regional Adviser for Archaeological Science (East of England). A guide to sampling archaeological deposits (Murphy, P.L. and Wiltshire, P.E.J., 1994, *A guide to sampling archaeological deposits for environmental analysis*) is available for viewing from SCCAS.

4.9 Any natural subsoil surface revealed should be hand cleaned and examined for archaeological deposits and artefacts. Sample excavation of any archaeological features revealed may be necessary in order to gauge their date and character.

4.10 Metal detector searches must take place at all stages of the excavation by an experienced metal detector user.

4.11 All finds will be collected and processed (unless variations in this principle are agreed with SCCAS/CT during the course of the evaluation).

4.12 Human remains must be left *in situ* except in those cases where damage or desecration are to be expected, or in the event that analysis of the remains is shown to be a requirement of satisfactory evaluation of the site. However, the excavator should be aware of, and comply with, the provisions of Section 25 of the Burial Act 1857.

4.13 The data recording methods and conventions used must be consistent with, and approved by, the County Sites and Monuments Record.

4.14 Plans of any archaeological features on the site are to be drawn at 1:20 or 1:50, depending on the complexity of the data to be recorded. Sections should be drawn at 1:10 or 1:20 again depending on the complexity to be recorded. All levels should relate to Ordnance Datum. Any variations from this must be agreed with SCCAS/CT.

4.15 A photographic record of the work is to be made, consisting of both monochrome photographs and colour transparencies.

4.16 Topsoil, subsoil and archaeological deposit to be kept separate during excavation to allow sequential backfilling of excavations.

5. General Management

5.1 A timetable for all stages of the project must be agreed before the first stage of work commences, including monitoring by SSCCAS/CT. The archaeological contractor will give not less than ten days written notice of the commencement of the work so that arrangements for monitoring the project can be made.

5.2 The composition of the project staff must be detailed and agreed by this office, including any subcontractors/specialists. For the site director and other staff likely to have a major responsibility for the post-excavation processing of this evaluation there must also be a statement of their responsibilities or a CV for post-excavation work on other archaeological sites and publication record.

5.3 It is the archaeological contractor's responsibility to ensure that adequate resources are available to fulfill the Brief.

5.4 A general Health and Safety Policy must be provided, with detailed risk assessment and management strategy for this particular project.

5.5 No initial survey to detect public utility or other services has taken place. The responsibility for this rests with the archaeological contractor.

5.6 The Institute of Field Archaeologists' *Standard and Guidance for Archaeological Desk-based Assessments* and for *Field Evaluations* should be used for additional guidance in the execution of the project and in drawing up the report.

6. Report Requirements

6.1 An archive of all records and finds must be prepared consistent with the principles of English Heritage's *Management of Archaeological Projects*, 1991 (particularly Appendix 3.1 and Appendix 4.1).

6.2 The report should reflect the aims of the Project Design.

6.3 The objective account of the archaeological evidence must be clearly distinguished from its archaeological interpretation.

6.4 Reports on specific areas of specialist study must include sufficient detail to permit assessment of potential for analysis, including tabulation of data by context, and must include non-technical summaries.

6.5 The report must include a discussion and an assessment of the archaeological evidence recovered by the surveys. Its conclusions must include a clear statement of the archaeological potential of the site, and the significance of that potential in the context of the Regional Research Framework (*East Anglian Archaeology*, Occasional Papers 3 & 8, 1997 and 2000).

6.6 The results of the surveys should be related to the relevant known archaeological information held in the county SMR.

6.7 The project manager must consult the SMR Officer to obtain an event number for the work. This number will be unique for each project or site and must be clearly marked on any documentation relating to the work.

6.8 Finds must be appropriately conserved and stored in accordance with *UK Institute of Conservators Guidelines*. The finds, as an indissoluble part of the site archive, should be deposited with the County SMR if the landowner can be persuaded to agree to this. If this is not possible for all or any part of the finds archive, then provision must be made for additional recording (e.g. photography, illustration, analysis) as appropriate.

6.9 The project manager should consult the County SMR officer regarding the requirements for the deposition of the archive (conservation, ordering, organisation, labelling, marking and storage) of excavated material and the archive.

6.10 The site archive is to be deposited with the County SMR within three months of the completion of fieldwork. It will then become publicly accessible.

6.11 A digital copy of the air photographic evidence should be supplied with the report for inclusion in the SMR; AutoCAD files should be exported and saved into a format that can be can be imported into MapInfo (for example, as a Drawing Interchange File or .dxf) or already transferred to .TAB files.

6.12 Where positive conclusions are drawn from a project (whether it be evaluation or excavation) a summary report, in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the *Proceedings of the Suffolk Institute for Archaeology*, must be prepared. It should be included in the project report, or submitted to the Conservation Team, by the end of the calendar year in which the evaluation work takes place, whichever is the sooner.

6.13 County SMR sheets must be completed, as per the county SMR manual, for all sites where archaeological finds and/or features are located.

6.14 A digital copy of the air photographic evidence should be supplied with the report for inclusion in the SMR; AutoCAD files should be exported and saved into a format that can be can be imported into MapInfo (for example, as a Drawing Interchange File or .dxf) or already transferred to .TAB files.

6.15 Three copies of the report must be sent to the Conservation Team of Suffolk County Council as well as one copy sent to the English Heritage Inspector of Ancient Monuments for this region (John Ette, Team Leader for Suffolk and Bedfordshire).

6.16 At the start of work (immediately before fieldwork commences) an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms.

6.17 All parts of the OASIS online form must be completed for submission to the SMR. This should include an uploaded .pdf version of the entire report (a paper copy should also be included with the archive).

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Date: 4 May 2007 Reference: / AW/IpswichtoCedarsPark_evalspec

This brief and specification remains valid for six months from the above date. If work is not carried out in full within that time this document will lapse; the authority should be notified and a revised brief and specification may be issued.

Archaeological contractors are strongly advised to forward a detailed Project Design or Written Scheme of Investigation to the Conservation Team of the Archaeological Service of Suffolk County Council for approval before any proposals are submitted to potential clients.

If the work defined by this brief forms a part of a programme of archaeological work required by a Planning Condition, the results must be considered by the Conservation Team of the Archaeological Service of Suffolk County Council, who have the responsibility for advising the appropriate Planning Authority.

Appendix 2. Brief and Specification – CDD 068

S U F F O L K C O U N T Y C O U N C I L
A R C H A E O L O G I C A L S E R V I C E - C O N S E R V A T I O N T E A M

Brief and Specification for an Archaeological Excavation

IPSWICH TO CEDARS PARK ANGLIAN WATER PIPELINE ROUTE (PHASE 2)

Although this document is fundamental to the work of the specialist archaeological contractor the developer should be aware that certain of its requirements are likely to impinge upon the working practices of a general building contractor and may have financial implications

1. The nature of the development and archaeological requirements

1.1 The route of a pipeline has been proposed by Anglian Water between TM 0923 5590 (north) and TM 1169 5210 (south), *c*. 5.00km in length (see accompanying plan).

1.2 The proposed route passes through a nationally important archaeological site (Combretovium Roman settlement) that is statutorily protected as a Scheduled Ancient Monument (SF 89), between TM 1109 5367 and TM 1080 5312 aligned broadly NE to SW for a distance of *c*. 670m.

1.3 The section of the route across the Scheduled Ancient Monument has been already the subject of both geophysical and topographic surveys by Archaeological Services & Consultancy Ltd (ASC 871/SCP/02, March 2007). The survey defined a variety of magnetic anomalies indicative of settlement/funerary activity along the line of the proposed route, although at a slightly lower density than the south-eastern part of the surveyed area.

1.4 There is high potential for further important archaeological features to be located in the area of the proposed route. The proposed works would cause significant ground disturbance that has potential to damage any archaeological deposit that exists.

1.5 The principle ground disturbance will involve stripping associated with the easement believed to be 15.00m in width (max.), and also the cutting for the pipe trench, believed to be *c*. 0.40m wide. The pipe will be laid in an open-cut trench with directional drilling at the river crossing.

1.6 Anglian Water has been advised that a full archaeological excavation should take place prior to commencement of mainline works along this part of the route.

1.7 The topography of this section of the pipeline undulates, although it generally slopes NE to SW from c. 28m AOD to 15m AOD, down to the floodplain of the River Gipping. The underlying drift geology comprises deep loam and sandy soil over gravel.

1.8 In order to comply with the code of practice, Anglian Water has requested a brief and specification for the archaeological recording of archaeological deposits that will be

affected by development. An outline specification, which defines certain minimum criteria, is set out below.

2. Brief for Archaeological Investigation

2.1 An archaeological excavation, as specified in Section 3, is to be carried out prior to development. That part of the pipeline across the SAM - a length of *c*. 670m between TM 1109 5367 (north) and TM 1080 5312 (south) - will require mitigation in the form of full excavation (see attached plan). The stripped easement will measure 15.00m wide (max.). This will comprise a controlled strip under archaeological supervision of the easement down to the archaeological horizon and full excavation before mainline works commence.

2.2 The excavation objective will be to provide a record of all archaeological deposits which would otherwise be damaged or removed by development. Adequate time is to be allowed for archaeological recording of archaeological deposits during excavation.

2.3 The academic objective will centre upon the potential for this site to produce, in particular, evidence for the Roman settlement, and also earlier and later occupation, in the form of finds and features.

2.4 This project will be carried through in a manner broadly consistent with English Heritage's *Management of Archaeological Projects,* 1991 (*MAP2*). Excavation is to be followed by the preparation of a full archive, and an assessment of potential for analysis. Analysis and final report preparation will follow assessment and will be the subject of a further brief and updated project design.

2.5 In accordance with the standards and guidance produced by the Institute of Field Archaeologists this brief should not be considered sufficient to enable the total execution of the project. A Project Design or Written Scheme of Investigation (PD/WSI) based upon this brief and the accompanying outline specification of minimum requirements, is an essential requirement. This must be submitted by the developers, or their agent, to the Conservation Team of the Archaeological Service of Suffolk County Council (Shire Hall, Bury St Edmunds IP33 2AR; telephone/fax: 01284 352443) for approval. The work must not commence until this office has approved both the archaeological contractor as suitable to undertake the work, and the PD/WSI as satisfactory. The PD/WSI will *provide the basis for measurable standards* and will be used to establish whether the requirements of the planning condition will be adequately met; an important aspect of the PD/WSI will be an assessment of the project in relation to the Regional Research Framework (*East Anglian Archaeology* Occasional Papers 3, 1997, 'Research and Archaeology: A Framework for the Eastern Counties, 1. resource assessment', and 8, 2000, 'Research and Archaeology: A Framework for the Eastern Counties, 2. research agenda and strategy').

2.6 Before any archaeological site work can commence it is the responsibility of the developer to provide the archaeological contractor with either the contaminated land report for the site or a written statement that there is no contamination. The developer should be aware that investigative sampling to test for contamination is likely to have an impact on any archaeological deposit which exists; proposals for sampling should be discussed with the Conservation Team of the Archaeological Service of SCC (SCCAS/CT) before execution.

2.7 The responsibility for identifying any restraints on field-work (e.g. Scheduled Monument status, Listed Building status, public utilities or other services, tree preservation orders, SSSIs, wildlife sites &c.) rests with the commissioning body and its archaeological contractor. The existence and content of the archaeological brief does not over-ride such restraints or imply that the target area is freely available.

2.8 All arrangements for the excavation of the site, the timing of the work, access to the site, the definition of the precise area of landholding and area for proposed development are to be defined and negotiated by the archaeological contractor with the commissioning body. In particular, the archaeological contractor must obtain Scheduled Monument Consent from English Heritage before the work can proceed.

2.9 The developer or his archaeologist will give SCCAS/CT ten working days notice of the commencement of ground works on the site, in order that the work of the archaeological contractor may be monitored. The method and form of development will also be monitored to ensure that it conforms to previously agreed locations and techniques upon which this brief is based.

3. Specification for the Archaeological Excavation ***(See also Section 4)***

The excavation methodology is to be agreed in detail before the project commences, certain minimum criteria will be required:

3.1 The topsoil should be examined for archaeological material by non-ferrous metal-detector survey before mechanical stripping.

3.2 Within the section of the easement marked on the accompanying plan (see Section 2.1), topsoil and subsoil deposits must be removed to the top of the first archaeological level by an appropriate machine with a back-acting arm fitted with a toothless bucket. All machine excavation is to be under the direct control and supervision of an archaeologist.

3.3 The top of the first archaeological deposit may be cleared by machine, but must then be cleaned off by hand. There is a presumption that excavation of all archaeological deposits will be done by hand unless it can be shown there will not be a loss of evidence by using a machine. The decision as to the proper method of further excavation will be made by the senior project archaeologist with regard to the nature of the deposit.

3.4 All features which are, or could be interpreted as, structural must be fully excavated. Post-holes and pits must be examined in section and then fully excavated. Fabricated surfaces within the excavation area (e.g. yards and floors) must be fully exposed and cleaned. Any variation from this process can only be made by agreement with SCCAS/CT, and must be confirmed in writing.

3.5 All other features must be sufficiently examined to establish, where possible, their date and function. For guidance:

a) A minimum of 50% of the fills of the general features is be excavated.

b) Between 10% and 20% of the fills of substantial linear features (ditches, etc) are to be excavated, the samples must be representative of the available length of the feature and must take into account any variations in the shape or fill of the feature and any concentrations of artefacts.

Any variation from this process can only be made by agreement [if necessary on site] with a member of SCCAS/CT, and must be confirmed in writing.

3.6 Collect and prepare environmental bulk samples (for flotation and analysis by an environmental specialist). The fills of all archaeological features should be bulk sampled for palaeoenvironmental remains and assessed by an appropriate specialist. The Project Design must provide details of a comprehensive sampling strategy for retrieving and processing biological remains (for palaeoenvironmental and

palaeoeconomic investigations and also for absolute dating), and samples of sediments and/or soils (for micromorphological and other pedological/sedimentological analyses. All samples should be retained until their potential has been assessed. Advice on the appropriateness of the proposed strategies will be sought from J. Heathcote, English Heritage Regional Adviser in Archaeological Science (East of England). A guide to sampling archaeological deposits (Murphy, P.L. and Wiltshire, P.E.J., 1994, *A guide to sampling archaeological deposits for environmental analysis*) is available for viewing from SCCAS.

3.7 A finds recovery policy is to be agreed before the project commences. It should be addressed by the Project Design. Sieving of occupation levels and building fills will be expected.

3.8 Use of a metal detector will form an essential part of finds recovery. Metal detector searches must take place at all stages of the excavation by an experienced metal detector user.

3.9 All finds will be collected and processed. No discard policy will be considered until the whole body of finds has been evaluated.

3.10 All ceramic, bone and stone artefacts to be cleaned and processed concurrently with the excavation to allow immediate evaluation and input into decision making.

3.11 Metal artefacts must be stored and managed on site in accordance with *UK Institute of Conservators Guidelines* and evaluated for significant dating and cultural implications before despatch to a conservation laboratory within 4 weeks of excavation.

3.12 Human remains are to be treated at all stages with care and respect, and are to be dealt with in accordance with the law. They must be recorded *in situ* and subsequently lifted, packed and marked to standards compatible with those described in the Institute of Field Archaeologists' *Technical Paper 13: Excavation and post-excavation treatment of Cremated and Inhumed Human Remains*, by McKinley & Roberts. Proposals for the final disposition of remains following study and analysis will be required in the Project Design.

3.13 Plans of the archaeological features on the site should normally be drawn at 1:20 or 1:50, depending on the complexity of the data to be recorded. Sections should be drawn at 1:10 or 1:20 again depending on the complexity to be recorded. All levels should relate to Ordnance Datum. Any variations from this must be agreed with SCCAS/CT.

3.14 A photographic record of the work is to be made, consisting of both monochrome photographs and colour transparencies/high resolution digital images.

3.15 Excavation record keeping is to be consistent with the requirements Suffolk County Council's Sites and Monuments Record and compatible with its archive. Methods must be agreed with SCCAS/CT.

4. General Management

4.1 A timetable for all stages of the project must be agreed before the first stage of work commences.

4.2 Monitoring of the archaeological work will be undertaken by SCCAS/CT. Where projects require more than a total of two man-days on site monitoring and two man-days post-excavation monitoring, an ‘at-cost’ charge will be made for monitoring (currently at a daily rate of £150, but to be fixed at the time that the project takes place), provision should be made for this in all costings. [A decision on the

monitoring required will be made by SCCAS/CT on submission of the accepted Project Design.]

4.3 The composition of the project staff must be detailed and agreed (this is to include any subcontractors). For the site director and other staff likely to have a major responsibility for the post-excavation processing of this site there must be a statement of their responsibilities for post-excavation work on other archaeological sites.

4.4 It is the archaeological contractor's responsibility to ensure that adequate resources are available to fulfill the Brief.

4.5 A general Health and Safety Policy must be provided, with detailed risk assessment and management strategy for this particular site.

4.6 The Project Design must include proposed security measures to protect the site and both excavated and unexcavated finds from vandalism and theft.

4.7 Provision for the reinstatement of the ground and filling of dangerous holes must be detailed in the Project Design.

4.8 No initial survey to detect public utility or other services has taken place. The responsibility for this rests with the archaeological contractor.

4.9 The Institute of Field Archaeologists' *Standard and Guidance for Archaeological Desk-based Assessments* and for *Field Evaluations* should be used for additional guidance in the execution of the project and in drawing up the report.

5. Archive Requirements

5.1 Within four weeks of the end of field-work a timetable for post-excavation work must be produced. Following this a written statement of progress on post-excavation work whether archive, assessment, analysis or final report writing will be required at three monthly intervals.

5.2 An archive of all records and finds is to be prepared consistent with the principle of English Heritage's *Management of Archaeological Projects*, 1991 (*MAP2*), particularly Appendix 3. However, the detail of the archive is to be fuller than that implied in *MAP2* Appendix 3.2.1. The archive is to be sufficiently detailed to allow comprehension and further interpretation of the site should the project not proceed to detailed analysis and final report preparation. It must be adequate to perform the function of a final archive for lodgement in the County SMR or museum.

5.3 The project manager must consult the SMR Officer to obtain an event number for the work. This number will be unique for each project or site and must be clearly marked on any documentation relating to the work.

5.4 The project manager should consult the County SMR officer regarding the requirements for the deposition of the archive (conservation, ordering, organisation, labelling, marking and storage) of excavated material and the archive.

5.5 A clear statement of the form, intended content, and standards of the archive is to be submitted for approval as an essential requirement of the Project Design.

5.6 The site archive quoted at *MAP2* Appendix 3, must satisfy the standard set by the "Guideline for the preparation of site archives and assessments of all finds other than fired clay vessels" of the Roman Finds Group and the Finds Research Group AD700-1700 (1993).

5.7 Pottery should be recorded and archived to a standard comparable with 6.3 above, i.e. *The Study of Later Prehistoric Pottery: General Policies and Guidelines for Analysis and Publication,* Prehistoric Ceramics Research Group Occ Paper 1 (1991, rev 1997), the *Guidelines for the archiving of Roman Pottery*, Study Group Roman Pottery (ed M G Darling 1994) and the *Guidelines of the Medieval Pottery Group* (in draft).

5.8 All coins must be identified and listed as a minimum archive requirement.

5.9 The data recording methods and conventions used must be consistent with, and approved by, the County Sites and Monuments Record. All record drawings of excavated evidence are to be presented in drawn up form, with overall site plans. All records must be on an archivally stable and suitable base.

5.10 A complete copy of the site record archive must be deposited with the County Sites and Monuments Record within 12 months of the completion of fieldwork. It will then become publicly accessible.

5.11 Finds must be appropriately conserved and stored in accordance with UK Institute Conservators Guidelines.

5.12 Every effort must be made to get the agreement of the landowner/developer to the deposition of the finds with the County SMR or a museum in Suffolk which satisfies Museum and Galleries Commission requirements, as an indissoluble part of the full site archive. If this is not achievable for all or parts of the finds archive then provision must be made for additional recording (e.g. photography, illustration, analysis) as appropriate. If the County SMR is the repository for finds there will be a charge made for storage, and it is presumed that this will also be true for storage of the archive in a museum.

5.13 Where appropriate, a digital vector trench plan should be included with the report, which must be compatible with MapInfo GIS software, for integration in the County Sites and Monuments Record. AutoCAD files should be also exported and saved into a format that can be can be imported into MapInfo (for example, as a Drawing Interchange File or .dxf) or already transferred to .TAB files.

5.14 Where positive conclusions are drawn from a project, a summary report in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the Proceedings of the Suffolk Institute for Archaeology journal, must be prepared and included in the project report, or submitted to SCCAS/CT by the end of the calendar year in which the evaluation work takes place, whichever is the sooner.

5.15 At the start of work (immediately before fieldwork commences) an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms.

5.16 All parts of the OASIS online form must be completed for submission to the SMR. This should include an uploaded .pdf version of the entire report (a paper copy should also be included with the archive).

6. Report Requirements

6.1 A report on the fieldwork and archive must be provided consistent with the principle of *MAP2*, particularly Appendix 4. The report must be integrated with the archive.

6.2 The objective account of the archaeological evidence must be clearly distinguished from its archaeological interpretation.

6.3 An important element of the report will be a description of the methodology.

6.4 Reports on specific areas of specialist study must include sufficient detail to permit assessment of potential for analysis, including tabulation of data by context, and must include non-technical summaries.

6.5 Provision should be made to assess the potential of scientific dating techniques for establishing the date range of significant artefact or ecofact assemblages, features or structures.

6.6 The results should be related to the relevant known archaeological information held in the county SMR.

6.7 The report will give an opinion as to the potential and necessity for further analysis of the excavation data beyond the archive stage, and the suggested requirement for publication; it will refer to the Regional Research Framework (see above, 2.5). Further analysis will not be embarked upon until the primary fieldwork results are assessed and the need for further work is established. Analysis and publication can be neither developed in detail or costed in detail until this brief and specification is satisfied, however, the developer should be aware that there may be a responsibility to provide a publication of the results of the programme of work.

6.8 An unbound copy of the assessment report, clearly marked DRAFT, must be presented to SCCAS/CT and to the English Heritage Inspector of Ancient Monuments for this region (John Ette, Team Leader for Suffolk and Bedfordshire) for approval within six months of the completion of fieldwork unless other arrangements are negotiated with the project sponsor and SCCAS/CT.

6.9 Following acceptance, two copies of the assessment report should be submitted to SCCAS/CT and also a single hard copy to the English Heritage Inspector of Ancient Monuments. A single hard copy should be presented to the county SMR as well as a digital copy of the approved report.

6.10 The involvement of SCCAS/CT should be acknowledged in any report or publication generated by this project.

Specification by: Dr Jess Tipper

Date: 2 May 2007 Reference: /AW_IpswichtoCedarsPark_SAMexc_2007

This brief and specification remains valid for 12 months from the above date. If work is not carried out in full within that time this document will lapse; the authority should be notified and a revised brief and specification may be issued.

If the work defined by this brief forms a part of a programme of archaeological work required by a Planning Condition, the results must be considered by the Conservation Team of the Archaeological Service of Suffolk County Council, who have the responsibility for advising the appropriate Planning Authority.

Appendix 3. Brief and Specification – BAY 037

S U F F O L K C O U N T Y C O U N C I L
A R C H A E O L O G I C A L S E R V I C E - C O N S E R V A T I O N T E A M

Brief and Specification for an Archaeological Excavation

IPSWICH TO CEDARS PARK ANGLIAN WATER PIPELINE ROUTE (PHASE 2)

Although this document is fundamental to the work of the specialist archaeological contractor the developer should be aware that certain of its requirements are likely to impinge upon the working practices of a general building contractor and may have financial implications

1. The nature of the development and archaeological requirements

1.1 The route of a pipeline has been proposed by Anglian Water between TM 0923 5590 (north) and TM 1169 5210 (south), *c*. 5.00km in length (see accompanying plan).

1.2 On the western side of the Gipping, the line of the route passes through an extensive archaeological landscape, recorded in the County Sites and Monuments Record between TM 1076 5309 and TM 1131 5231. In particular, the route passes along the eastern edge of a linear barrow cemetery that is aligned N to S along the river terrace for *c*. 1.15km. Although the area is currently unscheduled it is considered to have the potential for containing nationally important archaeological features and remains. In addition, the area is immediately opposite Combretovium Roman settlement that is statutorily protected as a Scheduled Ancient Monument (SF 89).

1.3 The section of the route has been already the subject of a geophysical survey by Archaeological Services & Consultancy Ltd. The geophysical survey defined a variety of magnetic anomalies, including the eastern part of a large circular ring ditch (recorded in the County SMR, BAY 007) and also a small rectangular ditched enclosure (also recorded in the County SMR, BAY 012, but previously thought to be a ring ditch), immediately to the west of the (revised) route.

1.4 There is high potential for further important archaeological features to be located in the area of the proposed route. The proposed works would cause significant ground disturbance that has potential to damage any archaeological deposit that exists.

1.5 The principle ground disturbance will involve stripping associated with the easement believed to be 15.00m in width (max.), and also the cutting for the pipe trench, believed to be *c*. 0.40m wide. The pipe will be laid in an open-cut trench with directional drilling at the river crossing.

1.6 Anglian Water has been advised that a full archaeological excavation should take place prior to commencement of mainline works along this part of the route.

1.7 The site is located at approximately 15 metres OD, on the western side of the River Gipping. The site slopes down at the north and south ends into the flood plain of the river. The underlying drift geology comprises loam and sand, in places over gravel.

1.8 In order to comply with the code of practice, Anglian Water has requested a brief and specification for the archaeological recording of archaeological deposits that will be affected by development. An outline specification, which defines certain minimum criteria, is set out below.

2. **Brief for Archaeological Investigation**

2.1 An archaeological excavation, as specified in Section 3, is to be carried out prior to development. That part of the pipeline - a length of *c*. 950m between TM 1076 5309 (north) and TM 1131 5231 (south) - will require mitigation in the form of full excavation (see attached plan). The stripped easement will measure 15.00m wide (max.). This will comprise a controlled strip under archaeological supervision of the easement down to the archaeological horizon and full excavation before mainline works commence.

2.2 The excavation objective will be to provide a record of all archaeological deposits which would otherwise be damaged or removed by development. Adequate time is to be allowed for archaeological recording of archaeological deposits during excavation.

2.3 The academic objective will centre upon the potential for this site to produce, in particular, evidence for the prehistoric, and also later, occupation, in the form of finds and features.

2.4 This project will be carried through in a manner broadly consistent with English Heritage's *Management of Archaeological Projects,* 1991 (*MAP2*). Excavation is to be followed by the preparation of a full archive, and an assessment of potential for analysis. Analysis and final report preparation will follow assessment and will be the subject of a further brief and updated project design.

2.5 In accordance with the standards and guidance produced by the Institute of Field Archaeologists this brief should not be considered sufficient to enable the total execution of the project. A Project Design or Written Scheme of Investigation (PD/WSI) based upon this brief and the accompanying outline specification of minimum requirements, is an essential requirement. This must be submitted by the developers, or their agent, to the Conservation Team of the Archaeological Service of Suffolk County Council (Shire Hall, Bury St Edmunds IP33 2AR; telephone/fax: 01284 352443) for approval. The work must not commence until this office has approved both the archaeological contractor as suitable to undertake the work, and the PD/WSI as satisfactory. The PD/WSI will *provide the basis for measurable standards* and will be used to establish whether the requirements of the planning condition will be adequately met; an important aspect of the PD/WSI will be an assessment of the project in relation to the Regional Research Framework (*East Anglian Archaeology* Occasional Papers 3, 1997, 'Research and Archaeology: A Framework for the Eastern Counties, 1. resource assessment', and 8, 2000, 'Research and Archaeology: A Framework for the Eastern Counties, 2. research agenda and strategy').

2.6 Before any archaeological site work can commence it is the responsibility of the developer to provide the archaeological contractor with either the contaminated land report for the site or a written statement that there is no contamination. The developer should be aware that investigative sampling to test for contamination is likely to have an impact on any archaeological deposit which exists; proposals for sampling should be discussed with the Conservation Team of the Archaeological Service of SCC (SCCAS/CT) before execution.

2.7 The responsibility for identifying any restraints on field-work (e.g. Scheduled Monument status, Listed Building status, public utilities or other services, tree preservation orders, SSSIs, wildlife sites &c.) rests with the commissioning body and its archaeological contractor. The existence and content of the archaeological brief does not over-ride such restraints or imply that the target area is freely available.

2.8 All arrangements for the excavation of the site, the timing of the work, access to the site, the definition of the precise area of landholding and area for proposed

development are to be defined and negotiated by the archaeological contractor with the commissioning body.

2.9 The developer or his archaeologist will give SCCAS/CT ten working days notice of the commencement of ground works on the site, in order that the work of the archaeological contractor may be monitored. The method and form of development will also be monitored to ensure that it conforms to previously agreed locations and techniques upon which this brief is based.

3. Specification for the Archaeological Excavation *(See also Section 4)*

The excavation methodology is to be agreed in detail before the project commences, certain minimum criteria will be required:

3.1 The topsoil should be examined for archaeological material by non-ferrous metal-detector survey before mechanical stripping.

3.2 Within the section of the easement marked on the accompanying plan (see Section 2.1), topsoil and subsoil deposits must be removed to the top of the first archaeological level by an appropriate machine with a back-acting arm fitted with a toothless bucket. All machine excavation is to be under the direct control and supervision of an archaeologist.

3.3 The top of the first archaeological deposit may be cleared by machine, but must then be cleaned off by hand. There is a presumption that excavation of all archaeological deposits will be done by hand unless it can be shown there will not be a loss of evidence by using a machine. The decision as to the proper method of further excavation will be made by the senior project archaeologist with regard to the nature of the deposit.

3.4 All features which are, or could be interpreted as, structural must be fully excavated. Post-holes and pits must be examined in section and then fully excavated. Fabricated surfaces within the excavation area (e.g. yards and floors) must be fully exposed and cleaned. Any variation from this process can only be made by agreement with SCCAS/CT, and must be confirmed in writing.

3.5 All other features must be sufficiently examined to establish, where possible, their date and function. For guidance:

a) A minimum of 50% of the fills of the general features is be excavated.

b) Between 10% and 20% of the fills of substantial linear features (ditches, etc) are to be excavated, the samples must be representative of the available length of the feature and must take into account any variations in the shape or fill of the feature and any concentrations of artefacts.

Any variation from this process can only be made by agreement [if necessary on site] with a member of SCCAS/CT, and must be confirmed in writing.

3.6 Collect and prepare environmental bulk samples (for flotation and analysis by an environmental specialist). The fills of all archaeological features should be bulk sampled for palaeoenvironmental remains and assessed by an appropriate specialist. The Project Design must provide details of a comprehensive sampling strategy for retrieving and processing biological remains (for palaeoenvironmental and palaeoeconomic investigations and also for absolute dating), and samples of sediments and/or soils (for micromorphological and other pedological/sedimentological analyses. All samples should be retained until their potential has been assessed. Advice on the appropriateness of the proposed strategies will be sought from J. Heathcote, English Heritage Regional Adviser in

Archaeological Science (East of England). A guide to sampling archaeological deposits (Murphy, P.L. and Wiltshire, P.E.J., 1994, *A guide to sampling archaeological deposits for environmental analysis*) is available for viewing from SCCAS.

3.7 A finds recovery policy is to be agreed before the project commences. It should be addressed by the Project Design. Sieving of occupation levels and building fills will be expected.

3.8 Use of a metal detector will form an essential part of finds recovery. Metal detector searches must take place at all stages of the excavation by an experienced metal detector user.

3.9 All finds will be collected and processed. No discard policy will be considered until the whole body of finds has been evaluated.

3.10 All ceramic, bone and stone artefacts to be cleaned and processed concurrently with the excavation to allow immediate evaluation and input into decision making.

3.11 Metal artefacts must be stored and managed on site in accordance with *UK Institute of Conservators Guidelines* and evaluated for significant dating and cultural implications before despatch to a conservation laboratory within 4 weeks of excavation.

3.12 Human remains are to be treated at all stages with care and respect, and are to be dealt with in accordance with the law. They must be recorded *in situ* and subsequently lifted, packed and marked to standards compatible with those described in the Institute of Field Archaeologists' *Technical Paper 13: Excavation and post-excavation treatment of Cremated and Inhumed Human Remains*, by McKinley & Roberts. Proposals for the final disposition of remains following study and analysis will be required in the Project Design.

3.13 Plans of the archaeological features on the site should normally be drawn at 1:20 or 1:50, depending on the complexity of the data to be recorded. Sections should be drawn at 1:10 or 1:20 again depending on the complexity to be recorded. All levels should relate to Ordnance Datum. Any variations from this must be agreed with SCCAS/CT.

3.14 A photographic record of the work is to be made, consisting of both monochrome photographs and colour transparencies/high resolution digital images.

3.15 Excavation record keeping is to be consistent with the requirements Suffolk County Council's Sites and Monuments Record and compatible with its archive. Methods must be agreed with SCCAS/CT.

4. General Management

4.1 A timetable for all stages of the project must be agreed before the first stage of work commences.

4.2 Monitoring of the archaeological work will be undertaken by SCCAS/CT. Where projects require more than a total of two man-days on site monitoring and two man-days post-excavation monitoring, an ‘at-cost’ charge will be made for monitoring (currently at a daily rate of £150, but to be fixed at the time that the project takes place), provision should be made for this in all costings. [A decision on the monitoring required will be made by SCCAS/CT on submission of the accepted Project Design.]

4.3 The composition of the project staff must be detailed and agreed (this is to include any subcontractors). For the site director and other staff likely to have a major

responsibility for the post-excavation processing of this site there must be a statement of their responsibilities for post-excavation work on other archaeological sites.

4.4 It is the archaeological contractor's responsibility to ensure that adequate resources are available to fulfill the Brief.

4.5 A general Health and Safety Policy must be provided, with detailed risk assessment and management strategy for this particular site.

4.6 The Project Design must include proposed security measures to protect the site and both excavated and unexcavated finds from vandalism and theft.

4.7 Provision for the reinstatement of the ground and filling of dangerous holes must be detailed in the Project Design.

4.8 No initial survey to detect public utility or other services has taken place. The responsibility for this rests with the archaeological contractor.

4.9 The Institute of Field Archaeologists' *Standard and Guidance for Archaeological Desk-based Assessments* and for *Field Evaluations* should be used for additional guidance in the execution of the project and in drawing up the report.

5. Archive Requirements

5.1 Within four weeks of the end of field-work a timetable for post-excavation work must be produced. Following this a written statement of progress on post-excavation work whether archive, assessment, analysis or final report writing will be required at three monthly intervals.

5.2 An archive of all records and finds is to be prepared consistent with the principle of English Heritage's *Management of Archaeological Projects*, 1991 (*MAP2*), particularly Appendix 3. However, the detail of the archive is to be fuller than that implied in *MAP2* Appendix 3.2.1. The archive is to be sufficiently detailed to allow comprehension and further interpretation of the site should the project not proceed to detailed analysis and final report preparation. It must be adequate to perform the function of a final archive for lodgement in the County SMR or museum.

5.3 The project manager must consult the SMR Officer to obtain an event number for the work. This number will be unique for each project or site and must be clearly marked on any documentation relating to the work.

5.4 The project manager should consult the County SMR officer regarding the requirements for the deposition of the archive (conservation, ordering, organisation, labelling, marking and storage) of excavated material and the archive.

5.5 A clear statement of the form, intended content, and standards of the archive is to be submitted for approval as an essential requirement of the Project Design.

5.6 The site archive quoted at *MAP2* Appendix 3, must satisfy the standard set by the "Guideline for the preparation of site archives and assessments of all finds other than fired clay vessels" of the Roman Finds Group and the Finds Research Group AD700-1700 (1993).

5.7 Pottery should be recorded and archived to a standard comparable with 6.3 above, i.e. *The Study of Later Prehistoric Pottery: General Policies and Guidelines for Analysis and Publication,* Prehistoric Ceramics Research Group Occ Paper 1 (1991, rev 1997), the *Guidelines for the archiving of Roman Pottery*, Study Group Roman Pottery (ed M G Darling 1994) and the *Guidelines of the Medieval Pottery Group* (in draft).

5.8 All coins must be identified and listed as a minimum archive requirement.

5.9 The data recording methods and conventions used must be consistent with, and approved by, the County Sites and Monuments Record. All record drawings of excavated evidence are to be presented in drawn up form, with overall site plans. All records must be on an archivally stable and suitable base.

5.10 A complete copy of the site record archive must be deposited with the County Sites and Monuments Record within 12 months of the completion of fieldwork. It will then become publicly accessible.

5.11 Finds must be appropriately conserved and stored in accordance with UK Institute Conservators Guidelines.

5.12 Every effort must be made to get the agreement of the landowner/developer to the deposition of the finds with the County SMR or a museum in Suffolk which satisfies Museum and Galleries Commission requirements, as an indissoluble part of the full site archive. If this is not achievable for all or parts of the finds archive then provision must be made for additional recording (e.g. photography, illustration, analysis) as appropriate. If the County SMR is the repository for finds there will be a charge made for storage, and it is presumed that this will also be true for storage of the archive in a museum.

5.13 Where appropriate, a digital vector trench plan should be included with the report, which must be compatible with MapInfo GIS software, for integration in the County Sites and Monuments Record. AutoCAD files should be also exported and saved into a format that can be can be imported into MapInfo (for example, as a Drawing Interchange File or .dxf) or already transferred to .TAB files.

5.14 Where positive conclusions are drawn from a project, a summary report in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the Proceedings of the Suffolk Institute for Archaeology journal, must be prepared and included in the project report, or submitted to SCCAS/CT by the end of the calendar year in which the evaluation work takes place, whichever is the sooner.

5.15 At the start of work (immediately before fieldwork commences) an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms.

5.16 All parts of the OASIS online form must be completed for submission to the SMR. This should include an uploaded .pdf version of the entire report (a paper copy should also be included with the archive).

6. Report Requirements

6.1 A report on the fieldwork and archive must be provided consistent with the principle of *MAP2*, particularly Appendix 4. The report must be integrated with the archive.

6.2 The objective account of the archaeological evidence must be clearly distinguished from its archaeological interpretation.

6.3 An important element of the report will be a description of the methodology.

6.4 Reports on specific areas of specialist study must include sufficient detail to permit assessment of potential for analysis, including tabulation of data by context, and must include non-technical summaries.

6.5 Provision should be made to assess the potential of scientific dating techniques for establishing the date range of significant artefact or ecofact assemblages, features or structures.

6.6 The results should be related to the relevant known archaeological information held in the county SMR.

6.7 The report will give an opinion as to the potential and necessity for further analysis of the excavation data beyond the archive stage, and the suggested requirement for publication; it will refer to the Regional Research Framework (see above, 2.5). Further analysis will not be embarked upon until the primary fieldwork results are assessed and the need for further work is established. Analysis and publication can be neither developed in detail or costed in detail until this brief and specification is satisfied, however, the developer should be aware that there may be a responsibility to provide a publication of the results of the programme of work.

6.8 An unbound copy of the assessment report, clearly marked DRAFT, must be presented to SCCAS/CT for approval within six months of the completion of fieldwork unless other arrangements are negotiated with the project sponsor and SCCAS/CT.

6.9 Following acceptance, two copies of the assessment report should be submitted to SCCAS/CT. A single hard copy should be presented to the county SMR as well as a digital copy of the approved report.

6.10 The involvement of SCCAS/CT should be acknowledged in any report or publication generated by this project.

Specification by: Dr Jess Tipper

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Date: 22 May 2007 Reference: / AW_IpswichtoCedarsPark_BAYexc_2007

This brief and specification remains valid for 12 months from the above date. If work is not carried out in full within that time this document will lapse; the authority should be notified and a revised brief and specification may be issued.

If the work defined by this brief forms a part of a programme of archaeological work required by a Planning Condition, the results must be considered by the Conservation Team of the Archaeological Service of Suffolk County Council, who have the responsibility for advising the appropriate Planning Authority.

Appendix 4. Brief and Specification – Monitoring

SUFFOLK COUNTY COUNCIL
ARCHAEOLOGICAL SERVICE - CONSERVATION TEAM

Brief and Specification for Archaeological Monitoring of Development

IPSWICH TO CEDARS PARK ANGLIAN WATER PIPELINE ROUTE (PHASE 2)

Although this document is fundamental to the work of the specialist archaeological contractor the developer should be aware that certain of its requirements are likely to impinge upon the working practices of a general building contractor and may have financial implications.

1. Background

1.1 The route of a pipeline has been proposed by Anglian Water between TM 0923 5590 (north) and TM 1169 5210 (south), *c*. 5.00km in length (see accompanying plan).

1.2 The route of the proposed pipeline (Phase 2), orientated north-west to south-east between Creeting St Mary and Baylham Pumping Station, is situated within the central Gipping Valley, crossing the floodplain at TM 1080 5310.

1.3 There is a high density of known archaeological sites, of which a number are of national importance, and also preserved palaeo-environmental remains, such as peat deposits, within the immediate area of the proposed route. The landscape setting of the route, above the River Gipping, has high archaeological potential, especially for prehistoric sites (which would not be detected by metal detector users). There is high potential for the identification of further sites along the line of the proposed route.

1.4 A series of 17 test-pits and four bore-holes will be undertaken along the line of the proposed route as part of the ground investigations prior to construction. Anglian Water has been advised that archaeological monitoring of this ground disturbance should take place.

1.5 In accordance with the standards and guidance produced by the Institute of Field Archaeologists this brief should not be considered sufficient to enable the total execution of the project. A Project Design or Written Scheme of Investigation (PD/WSI) based upon this brief and the accompanying outline specification of minimum requirements, is an essential requirement. This must be submitted by the developers, or their agent, to the Conservation Team of the Archaeological Service of Suffolk County Council (Shire Hall, Bury St Edmunds IP33 2AR; telephone/fax: 01284 352443) for approval. The work must not commence until this office has approved both the archaeological contractor as suitable to undertake the work, and the PD/WSI as satisfactory. The PD/WSI will *provide the basis for measurable standards* and will be used to establish whether the requirements of the planning condition will be adequately met.

1.6 Before any archaeological site work can commence it is the responsibility of the developer to provide the archaeological contractor with either the contaminated land report for the site or a written statement that there is no contamination. The developer should be aware that investigative sampling to test for contamination is

likely to have an impact on any archaeological deposit which exists; proposals for sampling should be discussed with the Conservation Team of the Archaeological Service of SCC (SCCAS/CT) before execution.

1.7 The responsibility for identifying any restraints on field-work (e.g. Scheduled Monument status, Listed Building status, public utilities or other services, tree preservation orders, SSSIs, wildlife sites &c.) rests with the commissioning body and its archaeological contractor. The existence and content of the archaeological brief does not over-ride such restraints or imply that the target area is freely available. In particular, three of the proposed test-pits (TP 9, 10 and 11) and one of the bore-holes (BH 3) lies within a Scheduled Ancient Monument (SF 89). Permission must be obtained from English Heritage before the work can proceed within the area of the Scheduled Monument.

1.8 Any changes to the specifications that the project manager may wish to make after approval by this office should be communicated directly to SCCAS/CT for approval.

2. Brief for Archaeological Monitoring

2.1 To provide a record of archaeological deposits which are damaged or removed by any development [including services and landscaping] permitted by the current planning consent.

2.2 The significant archaeologically damaging activity in this proposal is the excavation of the test-pits (each measuring *c*. 3.00 x 1.00m in area) and bore-holes along the line of the proposed route. These, and the upcast soil, are to be closely monitored during and after they have been excavated by the building contractor. Adequate time is to be allowed for archaeological recording of archaeological deposits during excavation, and of soil sections following excavation (see 4.3).

3. Arrangements for Monitoring

3.1 To carry out the monitoring work the developer will appoint an archaeologist (the archaeological contractor) who must be approved by SCCAS/CT - see 1.3 above.

3.2 The developer or his archaeologist will give SCCAS/CT five working days notice of the commencement of ground works on the site, in order that the work of the archaeological contractor may be monitored. The method and form of development will also be monitored to ensure that it conforms to previously agreed locations and techniques upon which this brief is based.

3.3 Allowance must be made to cover archaeological costs incurred in monitoring the development works by the contract archaeologist. The size of the contingency should be estimated by the approved archaeological contractor, based upon the outline works in paragraph 2.3 of the Brief and Specification and the building contractor's programme of works and time-table.

3.4 If unexpected remains are encountered SCCAS/CT must be informed immediately. Amendments to this specification may be made to ensure adequate provision for archaeological recording.

4. Specification

4.1 The developer shall afford access at all reasonable times to both the County Council Conservation Team archaeologist and the contracted archaeologist to allow archaeological monitoring of building and engineering operations which disturb the ground.

4.2 Opportunity must be given to the contracted archaeologist to hand excavate any discrete archaeological features which appear during earth moving operations,

retrieve finds and make measured records as necessary. Where it is necessary to see archaeological detail one of the soil faces is to be trowelled clean.

4.3 All archaeological features exposed must be planned at a minimum scale of 1:50 on a plan showing the proposed layout of the development.

4.4 A photographic record of the work is to be made of any archaeological features, consisting of both monochrome photographs and colour transparencies/high resolution digital images.

4.5 All contexts must be numbered and finds recorded by context. All levels should relate to Ordnance Datum.

4.6 Archaeological contexts should, where possible, be sampled for palaeoenvironmental remains. Best practice should allow for sampling of interpretable and datable archaeological deposits and provision should be made for this. Advice on the appropriateness of the proposed strategies will be sought from J. Heathcote, English Heritage Regional Adviser for Archaeological Science (East of England). A guide to sampling archaeological deposits (Murphy, P.L. and Wiltshire, P.E.J., 1994, *A guide to sampling archaeological deposits for environmental analysis*) is available for viewing from SCCAS.

4.7 All finds will be collected and processed (unless variations in this principle are agreed with SCCAS/CT during the course of the monitoring).

4.8 The data recording methods and conventions used must be consistent with, and approved by, the County Sites and Monuments Record.

5. Report Requirements

5.1 An archive of all records and finds is to be prepared consistent with the principles of *Management of Archaeological Projects* (*MAP2*), particularly Appendix 3.This must be deposited with the County Sites and Monuments Record within three months of the completion of work. It will then become publicly accessible.

5.2 The project manager must consult the SMR Officer to obtain an event number for the work. This number will be unique for each project or site and must be clearly marked on any documentation relating to the work.

5.3 Finds must be appropriately conserved and stored in accordance with *UK Institute of Conservators Guidelines*. The finds, as an indissoluble part of the site archive, should be deposited with the County SMR if the landowner can be persuaded to agree to this. If this is not possible for all or any part of the finds archive, then provision must be made for additional recording (e.g. photography, illustration, analysis) as appropriate. Account must be taken of any requirements the County SMR may have regarding the conservation, ordering, organisation, labelling, marking and storage of excavated material and the archive.

5.4 A report on the fieldwork and archive, consistent with the principles of *MAP2*, particularly Appendix 4, must be provided. The report must summarise the methodology employed, the stratigraphic sequence, and give a period by period description of the contexts recorded, and an inventory of finds. The objective account of the archaeological evidence must be clearly distinguished from its interpretation. The Report must include a discussion and an assessment of the archaeological evidence, including palaeoenvironmental remains recovered from palaeosols and cut features. Its conclusions must include a clear statement of the archaeological value of the results, and their significance in the context of the Regional Research Framework (*East Anglian Archaeology*, Occasional Papers 3 & 8, 1997 and 2000).

5.5 An unbound copy of the report, clearly marked DRAFT, must be presented to SCCAS/CT for approval within six months of the completion of fieldwork unless other arrangements are negotiated with the project sponsor and SCCAS/CT.

5.6 Following acceptance, two copies of the report should be submitted to SCCAS/CT. A single hard copy should be presented to the county SMR as well as a digital copy of the approved report.

5.7 A summary report, in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the *Proceedings of the Suffolk Institute of Archaeology*, must be prepared and included in the project report.

5.8 Where appropriate, a digital vector trench plan should be included with the report, which must be compatible with MapInfo GIS software, for integration in the County Sites and Monuments Record. AutoCAD files should be also exported and saved into a format that can be can be imported into MapInfo (for example, as a Drawing Interchange File or .dxf) or already transferred to .TAB files.

5.9 At the start of work (immediately before fieldwork commences) an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms.

5.10 All parts of the OASIS online form must be completed for submission to the SMR. This should include an uploaded .pdf version of the entire report (a paper copy should also be included with the archive).

Specification by: Dr Jess Tipper

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Date: 22 May 2007

Reference: / AW/IpswichtoCedarsPark200

This brief and specification remains valid for six months from the above date. If work is not carried out in full within that time this document will lapse; the authority should be notified and a revised brief and specification may be issued.

If the work defined by this brief forms a part of a programme of archaeological work required by a Planning Condition, the results must be considered by the Conservation Team of the Archaeological Service of Suffolk County Council, who have the responsibility for advising the appropriate Planning Authority.

Appendix 5. Brief and Specification – Geophysics

S U F F O L K C O U N T Y C O U N C I L
ARCHAEOLOGICAL SERVICE - CONSERVATION TEAM

Brief and Specification for a palaeo-environmental survey and assessment

IPSWICH TO CEDARS PARK ANGLIAN WATER PIPELINE ROUTE (PHASE 2)

Although this document is fundamental to the work of the specialist archaeological contractor the developer should be aware that certain of its requirements are likely to impinge upon the working practices of a general building contractor and may have financial implications.

1. Background

1.1 The route of a pipeline has been proposed by Anglian Water between TM 0923 5590 (north) and TM 1169 5210 (south), *c*. 5.00km in length.

1.2 The route of the proposed pipeline (Phase 2), between Creeting St Mary and Baylham Pumping Station, is situated within the central Gipping Valley, which is an area of outstanding archaeological importance.

1.3 There is a high potential for preserved palaeo-environmental remains, such as peat deposits, within the immediate area of the proposed route as it crosses the floodplain of the River Gipping for *c*. 230m to the west of a nationally important archaeological site (Combretovium Roman settlement) that is statutorily protected as a Scheduled Ancient Monument (SF 89).

1.4 In order to establish the full archaeological implications of the proposed route, Anglian Water has been advised that an archaeological field evaluation should take place. Further information concerning the location, extent, survival and significance of the known archaeological and palaeo-environmental remains, as well as the potential for further remains to survive, is required.

2. The nature of the development and archaeological requirements

2.1 The principle ground disturbance will involve stripping associated with the easement believed to be 15.00m in width (max.), and also the cutting for the pipe trench, believed to be *c*. 0.40m wide. The pipe will be laid in an open-cut trench with directional drilling at the river crossing (a distance of c. 40.00m in total).

2.2 The area of the Gipping floodplain provides considerable potential for the recovery of palaeo-environmental and geoarchaeological deposits, and has the potential for former land surfaces buried by later sedimentation.

2.3 Palaeo-environmental sampling and assessment will be required where the pipeline crosses the Gipping floodplain. Further mitigation may be required as a direct result of this assessment should unusual palaeo-environmental deposits be recovered. This will be at the discretion of the Suffolk County Council Archaeological Service Conservation Team (SCCAS/CT).

2.4 The survey will provide information to construct an archaeological conservation strategy, dealing with preservation, the recording of palaeo-environmental and geoarchaeological deposits, working practices, timetables and orders of cost.

2.5 This work will form the first stage of an integrated evaluation strategy for the pipeline route; separate briefs will issued for non-intrusive field-walking survey, reassessment of aerial photographic evidence, geophysical survey and trial trenching, as part of a wider program of archaeological evaluation.

2.6 In accordance with the standards and guidance produced by the Institute of Field Archaeologists this brief should not be considered sufficient to enable the total execution of the project. A Project Design or Written Scheme of Investigation (PD/WSI) based upon this brief and the accompanying outline specification of minimum requirements, is an essential requirement. This must be submitted by the developers, or their agent, to the Conservation Team of the Archaeological Service of Suffolk County Council (Shire Hall, Bury St Edmunds IP33 2AR; telephone/fax: 01284 352443) for approval. The work must not commence until this office has approved both the archaeological contractors as suitable to undertake the work, and the PD/WSI as satisfactory. The PD/WSI will *provide the basis for measurable standards* and will be used to establish whether the requirements of the planning condition will be adequately met.

2.7 Before commencing work the project manager must carry out a risk assessment and liase with the site owner, client and SCCAS/CT in ensuring that all potential risks are minimised. A copy of this must be given to SCCAS/CT before the commencement of works. It is the responsibility of the developer to provide the archaeological contractor with either the contaminated land report for the site or a written statement that there is no contamination.

2.8 The responsibility for identifying any restraints on field-work (e.g. Scheduled Monument status, Listed Building status, public utilities or other services, tree preservation orders, SSSIs, wildlife sites &c.) rests with the commissioning body and its archaeological contractor. The existence and content of the archaeological brief does not over-ride such restraints or imply that the target area is freely available.

2.9 Any changes to the specifications that the project manager may wish to make after approval by this office should be communicated directly to SCCAS/CT for approval.

2.10 The involvement of SCCAS/CT should be acknowledged in any report or publication generated by this project.

2.11 An outline specification, which defines certain minimum criteria, is set out below.

3. Brief for Auger Survey

3.1 The project will need to consider the following objectives:

- The characterisation of the sequence and patterns of accumulation of palaeo-environmental/geoarchaeological deposits across the development area, including the depth and lateral extent of major stratigraphic units, and the character of any potential land surfaces/buried soils within or pre-dating these sediments.

- Identify significant variations in the deposition sequences indicative of localised features, particularly in relation topographic variation and the presence of features such as palaeo-channels.

- Identify the location and extent of any waterlogged organic deposits and where appropriate and practical, to retrieve suitable samples in order to assess the potential for the preservation of environmental remains and material for scientific dating.

- Clarify the relationship between sediment sequences and other deposit types, including periods of 'soil', peat growth, and archaeological remains.

- To provide for the absolute dating of critical contacts.

- To focus academically upon the high potential for this site to produce palaeo-environmental evidence, with the potential to inform on our understanding of past environments, palaeo-climates, sea-level changes and human interaction.

- To make the results of the investigation available through suitable reportage.

3.2 The survey will comprise of a series of linear transects (minimum of two) in a grid across the site. The location of these transects is dependent on local conditions on the site, the amount of overburden and the ability to access below ground deposits. This will be at the discretion of the contractor.

3.3 Each location will be recorded in three dimensions either with a GPS or total station.

3.4 The equipment will comprise a standard hand operated soil auger. A selection of different auger heads will be employed in order to deal with the variety of sediment types that may be encountered (Bucket, Stoney soil, Gouge, and Screw auger)

3.5 Each location will be augured to a depth of 5.0m or until the underlying glacial tills/boulder clay have been proven, which ever is reached first and providing no obstructions are encountered.

3.6 The profile will be recorded on a summary proforma sheet and significant layers identified. Relative depths will be noted and a description of the deposits using standard quaternary (Late Devensian and Holocene) terminology (colour texture, compaction and inclusions). This will follow the English Heritage Centre for Archaeology Guidelines, *Environmental Archaeology: A guide to the theory and practice of methods, from sampling and recovery to post-excavation* (2002).

3.7 If suitable deposits are identified 3 x 3m cores will be taken with a gouge auger, hand operated Russian-type peat corer or by a terrier rig (windowless samples) for environmental assessment.

4. Brief for Environmental assessment

4.1 Deposits will be sampled and assessed for their potential for palaeoenvironmental analysis. It may be necessary for a representative of the SCCAS/CT to discuss the sampling strategy on site, depending on the deposits, and advice may be requested from English Heritage's Regional Science Advisor (J. Heathcote) if required.

4.2 An assessment of the environmental potential of the site will be undertaken through the examination of suitable deposits by the contractors preferred palaeo-environmental specialist (see Section 4.4), who will examine the potential for further analysis. This will be undertaken in accordance with English Heritage Guidelines (2002).

4.3 The cores/sections will be assessed for pollen and plant macrofossils. In addition, the samples may be assessed for diatoms, foraminifera, insect, and molluscs. It will also consider the potential for the dating of suitable deposits and requirements for any AMS and OSL dating and samples may be submitted to the contractors preferred dating laboratory.

4.4 The assessment must be undertaken by an environmental archaeologist of recognised competence, fully experienced in work of this character and formally acknowledged by the SCCAS/CT. Details, including the name, qualifications and

experience, of the site director and all other key project personnel (including specialist staff) will be communicated to SCCAS/CT as part of a specification of works that conforms to the guidelines contained in English Heritage's MAP 2 publication (Management of Archaeological Projects, specifically, Appendix 2).

5. Arrangements for Auger Survey and/or Palaeoenvironmental Assessment

5.1 To carry out the monitoring work the developer will appoint a specialist who must be approved SCCAS/CT.

5.2 The archaeological contractor will give SCCAS/CT not less than five working days notice of the commencement of the assessment, in order that the work of the specialist may be monitored if required.

5.3 All arrangements for the field evaluation of the site, the timing of the work, access to the site, the definition of the precise area of landholding and area for proposed development are to be defined and negotiated with the commissioning body.

5.4 SCCAS/CT should be kept regularly informed about developments both during the site works and subsequent post-excavation work.

5.5 Allowance must be made to cover costs incurred from the assessment of the development works by the contracted specialist. The size of the contingency should be estimated by the approved contractor, based upon the outline works in the Brief and Specification and the contractor's programme of works and timetable.

5.6 It is the archaeological contractor's responsibility to ensure that adequate resources are available to fulfill the Brief.

5.7 If unexpected remains are encountered SCCAS/CT must be informed immediately. Amendments to this specification may be made to ensure adequate provision for archaeological recording.

5.8 The developer shall afford access at all reasonable times to SCCAS/CT archaeologist and the contracted specialist to allow work to be undertaken.

6. Report Requirements

6.1 An archive of all records is to be prepared consistent with the principles of *Management of Archaeological Projects* (*MAP 2*). This must be deposited with the County Sites and Monuments Record within three months of the completion of work. It will then become publicly accessible.

6.2 A report on the fieldwork and archive, consistent with the principles of *MAP 2*, particularly Appendix 4, must be provided.

6.3 The report should reflect the aims of the Project Design.

6.4 Should be set out carefully, and explained as appropriate. It must include non-technical summaries to make the report intelligible to both specialists and non-specialists.

6.5 There must be an analytical report, integral to the survey, with description and interpretation of the results. The objective record of the evidence for both surveys must be clearly distinguished from its interpretation.

6.6 The report must include a clear statement of the archaeological potential of the site, and the significance of that potential in the context of the Regional Research Framework (*East Anglian Archaeology*, Occasional Papers 3 & 8, 1997 and 2000).

6.7 To assist with the curation of the project's archive, the project manager must contact the SMR officer to obtain an event number. This number will be used as a unique identifier linking all physical and digital components of the archive. The unique event number must be clearly indicated on any specification received for this project and on any ensuing reports.

6.8 The site archive is to be deposited with the County SMR within three months of the completion of fieldwork. It will then become publicly accessible.

6.9 Where positive conclusions are drawn from a project (whether it be evaluation or excavation) a summary report, in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the *Proceedings of the Suffolk Institute for Archaeology*, must be prepared. It should be included in the project report, or submitted to the Conservation Team, by the end of the calendar year in which the evaluation work takes place, whichever is the sooner.

6.10 County SMR sheets must be completed, as per the county SMR manual, for all sites where archaeological finds and/or features are located.

6.11 At the start of work (immediately before fieldwork commences) an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms.

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Date: 23 April 2007

Reference AW/IpswichtoCedarsParkPhase2_geoarchspec

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Archaeological contractors are strongly advised to forward a detailed Project Design or Written Scheme of Investigation to the Conservation Team of the Archaeological Service of Suffolk County Council for approval before any proposals are submitted to potential clients.

Appendix 6. Brief and Specification – Palaeo-environmental

SUFFOLK COUNTY COUNCIL
ARCHAEOLOGICAL SERVICE - CONSERVATION TEAM

Brief and Specification for a palaeo-environmental survey and assessment

IPSWICH TO CEDARS PARK ANGLIAN WATER PIPELINE ROUTE (PHASE 2)

Although this document is fundamental to the work of the specialist archaeological contractor the developer should be aware that certain of its requirements are likely to impinge upon the working practices of a general building contractor and may have financial implications.

1. **Background**

1.5 The route of a pipeline has been proposed by Anglian Water between TM 0923 5590 (north) and TM 1169 5210 (south), *c*. 5.00km in length.

1.6 The route of the proposed pipeline (Phase 2), between Creeting St Mary and Baylham Pumping Station, is situated within the central Gipping Valley, which is an area of outstanding archaeological importance.

1.7 There is a high potential for preserved palaeo-environmental remains, such as peat deposits, within the immediate area of the proposed route as it crosses the floodplain of the River Gipping for *c*. 230m to the west of a nationally important archaeological site (Combretovium Roman settlement) that is statutorily protected as a Scheduled Ancient Monument (SF 89).

1.8 In order to establish the full archaeological implications of the proposed route, Anglian Water has been advised that an archaeological field evaluation should take place. Further information concerning the location, extent, survival and significance of the known archaeological and palaeo-environmental remains, as well as the potential for further remains to survive, is required.

2.0 The nature of the development and archaeological requirements

2.1 The principle ground disturbance will involve stripping associated with the easement believed to be 15.00m in width (max.), and also the cutting for the pipe trench, believed to be *c*. 0.40m wide. The pipe will be laid in an open-cut trench with directional drilling at the river crossing (a distance of c. 40.00m in total).

2.2 The area of the Gipping floodplain provides considerable potential for the recovery of palaeo-environmental and geoarchaeological deposits, and has the potential for former land surfaces buried by later sedimentation.

2.3 Palaeo-environmental sampling and assessment will be required where the pipeline crosses the Gipping floodplain. Further mitigation may be required as a direct result of this assessment should unusual palaeo-environmental deposits be recovered. This will be at the discretion of the Suffolk County Council Archaeological Service Conservation Team (SCCAS/CT).

2.4 The survey will provide information to construct an archaeological conservation strategy, dealing with preservation, the recording of palaeo-environmental and geoarchaeological deposits, working practices, timetables and orders of cost.

2.5 This work will form the first stage of an integrated evaluation strategy for the pipeline route; separate briefs will issued for non-intrusive field-walking survey, reassessment of aerial photographic evidence, geophysical survey and trial trenching, as part of a wider program of archaeological evaluation.

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- Identify significant variations in the deposition sequences indicative of localised features, particularly in relation topographic variation and the presence of features such as palaeo-channels.

- Identify the location and extent of any waterlogged organic deposits and where appropriate and practical, to retrieve suitable samples in order to assess the potential for the preservation of environmental remains and material for scientific dating.

- Clarify the relationship between sediment sequences and other deposit types, including periods of 'soil', peat growth, and archaeological remains.

- To provide for the absolute dating of critical contacts.

- To focus academically upon the high potential for this site to produce palaeo-environmental evidence, with the potential to inform on our understanding of past environments, palaeo-climates, sea-level changes and human interaction.

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5.4 SCCAS/CT should be kept regularly informed about developments both during the site works and subsequent post-excavation work.

5.5 Allowance must be made to cover costs incurred from the assessment of the development works by the contracted specialist. The size of the contingency should be estimated by the approved contractor, based upon the outline works in the Brief and Specification and the contractor's programme of works and timetable.

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6.11 A report on the fieldwork and archive, consistent with the principles of *MAP 2*, particularly Appendix 4, must be provided.

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6.13 ould be set out carefully, and explained as appropriate. It must include non-technical summaries to make the report intelligible to both specialists and non-specialists.

6.14 There must be an analytical report, integral to the survey, with description and interpretation of the results. The objective record of the evidence for both surveys must be clearly distinguished from its interpretation.

6.15 The report must include a clear statement of the archaeological potential of the site, and the significance of that potential in the context of the Regional Research Framework (*East Anglian Archaeology*, Occasional Papers 3 & 8, 1997 and 2000).

6.16 To assist with the curation of the project's archive, the project manager must contact the SMR officer to obtain an event number. This number will be used as a unique identifier linking all physical and digital components of the archive. The unique event number must be clearly indicated on any specification received for this project and on any ensuing reports.

6.17 The site archive is to be deposited with the County SMR within three months of the completion of fieldwork. It will then become publicly accessible.

6.18 Where positive conclusions are drawn from a project (whether it be evaluation or excavation) a summary report, in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the *Proceedings of the Suffolk Institute for Archaeology*, must be prepared. It should be included in the project report, or submitted to the Conservation Team, by the end of the calendar year in which the evaluation work takes place, whichever is the sooner.

6.19 County SMR sheets must be completed, as per the county SMR manual, for all sites where archaeological finds and/or features are located.

6.11 At the start of work (immediately before fieldwork commences) an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms.

6.12 All parts of the OASIS online form must be completed for submission to the SMR. This should include an uploaded .pdf version of the entire report (a paper copy should also be included with the archive).

Specification by: Dr Jess Tipper

Date: 23 April 2007

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Archaeological contractors are strongly advised to forward a detailed Project Design or Written Scheme of Investigation to the Conservation Team of the Archaeological Service of Suffolk County Council for approval before any proposals are submitted to potential clients.

Appendix 7. Palaeoenvironmental assessment

The Cedars Park Anglian Water Pipeline: a palaeoenvironmental assessment of floodplain deposits around the River Gipping

Dr. Tom Hill

Summary

Birmingham Archaeo-Environmental undertook sedimentary coring to complement the geoarchaeological investigations being undertaken along the route of a proposed Anglian Water pipeline.

Fieldwork identified a stratigraphic archive on the River Gipping floodplain that consisted of alluvial fine sands, silts and clays underlain by an organic unit of palaeoenvironmental potential. Coring terminated within basal sands and gravels below the organic deposit. One phase of in-situ organic accumulation is concluded to have occurred since sedimentation began at the site. Although a precise timescale for the development of the sedimentary sequence is unknown, it is suggested that the deposits may date back to the Mid to Late Holocene (c. 2-5,000 yrs BP).

In order to fully understand the palaeoenvironmental history of the site, it is proposed that pollen and beetle assessments are undertaken on the organic unit. AMS radiocarbon dating should also be undertaken on the base and top of the unit to establish the timing of the onset and cessation of organic deposition.

1. Introduction

The route of a pipeline has been proposed by Anglian Water to run between Creeting St Mary and Baylham pumping station, within the central Gipping Valley. The route was shown to cut across the floodplain of the River Gipping, in which there is believed to be a high potential for the preservation of palaeoenvironmental remains. As a consequence, it was concluded that an initial stratigraphic survey of the floodplain deposits associated with the pipeline route was required in order to establish the palaeoenvironmental potential of the sedimentary archive. A programme of sedimentary coring was therefore required.

Birmingham Archaeo-Environmental were subcontracted by SCCAS to collect sedimentary sequences for stratigraphic and palaeoenvironmental assessments. This report presents the results of palaeoenvironmental investigations (sedimentary coring, recording, sampling and stratigraphic assessment) associated with this scheme of work.

The aims of the work were threefold:

- To identify, record, characterise and sample organic deposits, encountered during the stratigraphic survey.
- To assess this material for biological preservation (suitable for pollen and beetle assessments) and identify suitable samples for radiocarbon dating.
- To provide a detailed understanding of the subsurface stratigraphy of any organic-rich deposits and fine grained silts and clays, which might aid in the development of archaeological prospection strategies.

2. Methods

2.1 Borehole Survey
At the time of fieldwork, the majority of the proposed pipeline route along the floodplain of the River Gipping comprised pastoral and arable farm land.

The principle ground disturbance to result from the proposed pipeline route would involve surface stripping associated with the easement (believed to be 15m in width), and the cutting for the pipe trench, believed to be *c*. 0.40m wide. The pipe would be laid in an open-cut trench with directional drilling at the river crossing. As a consequence, the stratigraphic survey was restricted to coring within the 15m wide easement area of the pipeline route.

A site visit was undertaken over a three-day period from 9-11 July 2007, during which sedimentary coring took place along the proposed pipeline route (see Figure 1 for core locations). Core locations were chosen to ensure a clear spatial understanding of the stratigraphy across the pipeline route was gained.

Cores were extracted using a manual gauge 'Eijkelcamp' corer. Coring was continued until bedrock or sands and gravels were encountered. Where sediments of palaeoenvironmental potential were encountered, a sample core was extracted in 1m length sections and transferred into 1m lengths of plastic guttering for storage and transport.

2.2 Stratigraphic Analysis
Whilst an initial assessment of the sedimentary archive was made on-site, detailed stratigraphic analysis of selected cores was undertaken at the Birmingham Archaeo-Environmental laboratory at the University of Birmingham. Each 1.0m section of sample was carefully opened ensuring the enclosed stratigraphy remained intact prior to recording and sampling. Sediments were recorded using the Troels-Smith (1955) classification scheme. The scheme breaks down a sediment sample into four main components and allows the inclusion of extra components that are also present, but that are not dominant. Key physical properties of the sediment layers are also identified according to darkness (Da), stratification (St), elasticity (El), dryness of the sediment (Dr) and the sharpness of the upper sediment boundary (UB). A summary of the sedimentary and physical properties classified by Troels-Smith (1955) and the nomenclature used is provided in Table 1. A full stratigraphic breakdown of the cores is provided in Appendix 1.

3. Preliminary results of the fieldwork

A total of 16 cores were taken along the proposed pipeline route (Fig.1). Whilst there was stratigraphic variation across the site, similarities existed between groups of cores. For example, cores located close to the River Gipping (BH 1-5) were stratigraphically similar, whilst those located near the railway line (BH 6-12) were also similar to one another. The depth at which basal sands and gravels were encountered varied in depth between cores from 0.45m and 3.10m, at which point coring was terminated due to the inability to penetrate the underlying sediments.

The general stratigraphy of cores close to the River Gipping (BH1-5) consisted of up to *c*. 2.50m of light brown and yellow-brown clays, silts and sands, which were underlain by a dark brown-black well-humified peat (increasing in sand content with depth). The peat horizon was found to overlie basal sands and gravels, at which point coring was terminated, typically at a depth of 2.90m. Cores extracted from the north-eastern floodplain of the River Gipping (BH15 and BH16) contained predominantly orange-brown coarse sands and gravels, with no organic deposits evident.

Cores taken near to the railway line (BH6-12) comprised well-sorted fine brown sands underlain by coarse orange-brown sands and gravels. The depth at which the sands and gravels were encountered rarely exceeded 0.70m. The elevation of the land surface near to the railway line is much higher than that close to the River Gipping (where BH1-5 were taken).

Two extra cores were taken further south along the proposed pipeline route (BH13 and BH14), in which light brown clays, silts and sands were evident overlying basal sands and gravels.

4. Conclusions

The stratigraphic archive encountered along the proposed pipeline route suggests considerable palaeoenvironmental variation exists within this section of the Gipping Valley. The upper *c*. 2.00m of fine sands, silts and clays encountered in floodplain cores (BH1-5, BH15-16) are concluded to be alluvium derived from the River Gipping. Variations in grain size are likely to be a reflection of fluctuations in the flow regime of, and proximity to, the River Gipping.

Underlying the alluvial sequence, deposits with palaeoenvironmental potential were encountered. A well-humified peat deposit with varying sand content was evident, commonly at a depth of *c*. 2.00-2.50m. This is indicative of a period of *in-situ* organic accumulation during the floodplain's depositional history. It is suggested that the deposit encountered is likely to represent organic accumulation in a backwater lagoonal environment. The deposits are unlikely to represent a palaeochannel feature (e.g. a meander cut-off) due to the relatively widespread nature of the organic unit across the floodplain, combined with the lack of topographic anomalies (commonly associated with palaeochannels) across the area in question. Although the age of the organic unit is unknown at present, a Mid to Late Holocene timescale is suggested.

Cores extracted near to the railway line were found to be at a considerably higher elevation than those closer to the contemporary River Gipping. Medium brown sands and orange-brown sands and gravels typified the stratigraphy with no evidence of organic remains. The nature and elevation of the deposits suggests that this section of the pipeline route is located on a former river terrace of the River Gipping, in which no deposits of palaeoenvironmental potential are likely to be encountered. The river terrace sands and gravels are likely to date back to either the Devensian glacial or Early Holocene period, whilst the fine sands encountered overlying the sands and gravels are likely to have developed through a combination of weathering of the underlying sediments and agricultural activity.

5. Recommendations for further analysis

The site location of Core 1 was revisited and sampled for palaeoenvironmental consideration. The stratigraphy encountered within Core 1 was considered most representative of the deposits present within the River Gipping floodplain affected by the proposed pipeline route.

One phase of peat accumulation is believed to have occurred. It is proposed that any palaeoenvironmental assessments undertaken should concentrate on these peat deposits. Therefore in order to obtain an understanding of the palaeoenvironmental conditions responsible for the development of the peat unit, the following assessment is suggested:

- Pollen assessment throughout the *c*. 0.60m thick peat unit at regular 0.10m intervals (7 samples in total) in order to assess the palaeoecological conditions present at the time of deposition. It is recommended that samples from within the peat unit are assessed for pollen at 2.50m, 2.60m, 2.70m, 2.80m, 2.90m, 3.00m and 3.10m depth.

- The remaining deposits from the peat unit should be bulked into top (2.50-2.70m), middle (2.70-2.90m) and bottom (2.90-3.10m) samples to be assessed for beetle remains (3 samples in total).

- Radiocarbon dating is also suggested on suitable wood fragments or bulk organic samples from the top and base of the peat unit (2 samples in total) to establish the timing of the onset and cessation of peat deposition. Samples should be taken from *c*. 2.50m and 3.10m depth.

6. Archive

The core sampled during fieldwork (Core 1) is currently stored by Birmingham Archaeo-Environmental, University of Birmingham, Edgbaston, Birmingham, B15 2TT. In addition, original core logs, location plans, photographs and associated material are stored within Birmingham Archaeo-Environmental.

Acknowledgements

The authors are grateful to Kieron Heard and John Newman from Suffolk County Council Archaeological Service for their assistance prior to and during fieldwork.

References

Troels-Smith, J. (1955). Karakterisering af lose jordater (characterisation of unconsolidated sediments). *Denmarks Geologiske Undersogelse*, Series IV/3, 10, 73.

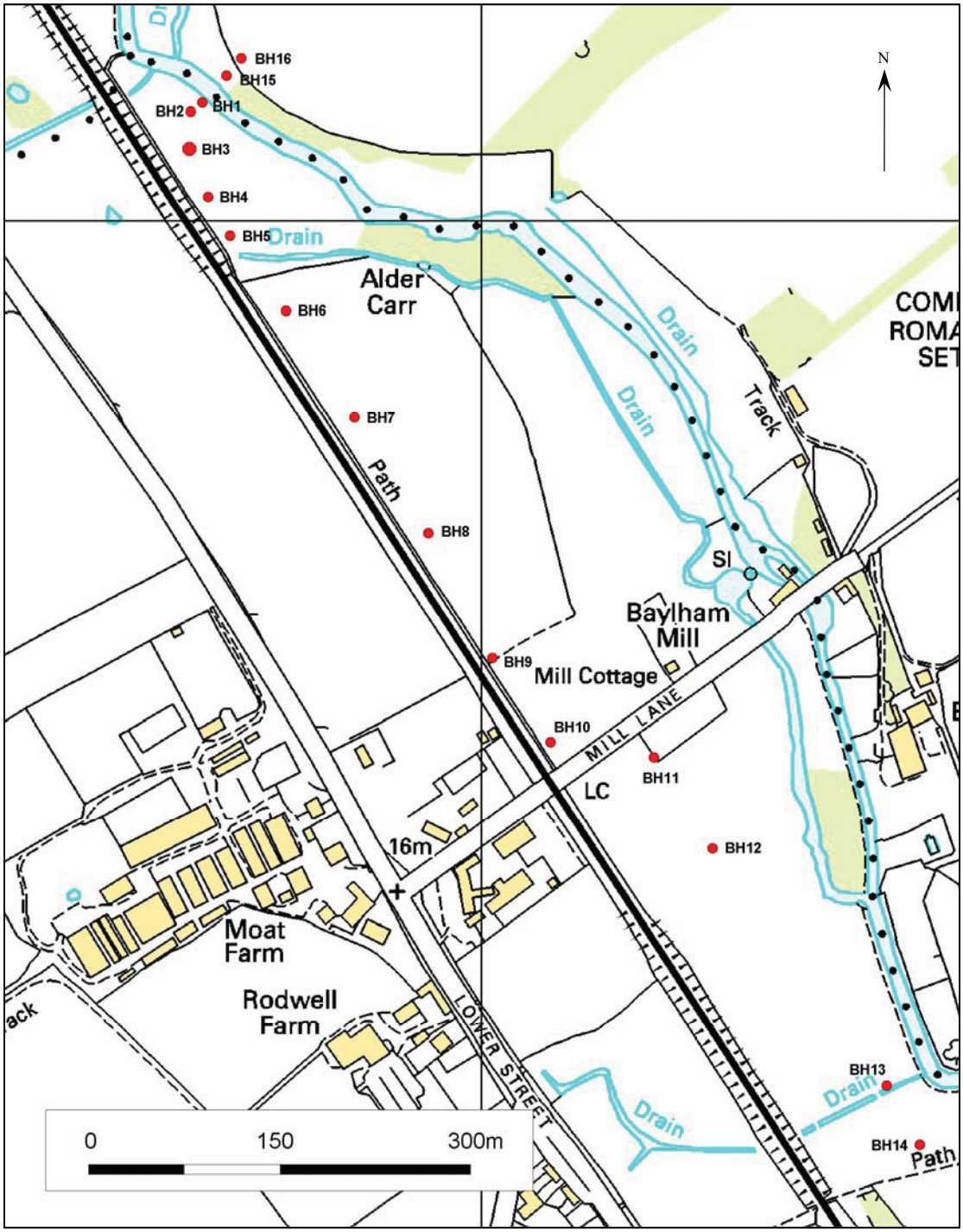

Figure 1. Borehole locations

Degree of Darkness	
nig.4	black
nig.3	
nig.2	
nig.1	
nig.0	white

Degree of Stratification	
strf.4	well stratified
strf.3	
strf.2	
strf.1	
strf.0	no stratification

Degree of Elasticity	
elas.4	very elastic
elas.3	
elas.2	
elas.1	
elas.0	no elasticity

Degree of Dryness	
sicc.4	very dry
sicc.3	
sicc.2	
sicc.1	
sicc.0	water

	Sharpness of Upper Boundary
lim.4	< 0.5mm
lim.3	< 1.0 & > 0.5mm
lim.2	< 2.0 & > 1.0mm
lim.1	< 10.0 & > 2.0mm
lim.0	> 10.0mm

	Sh	*Substantia humosa*	Humous substance, homogeneous microscopic structure
I Turfa	*Tb*	*T. bryophytica*	Mosses +/- humous substance
	Tl	*T. lignosa*	Stumps, roots, intertwined rootlets, of ligneous plants
	Th	*T. herbacea*	Roots, intertwined rootlets, rhizomes of herbaceous plants
II Detritus	*Dl*	*D. lignosus*	Fragments of ligneous plants >2mm
	Dh	*D. herbosus*	Fragments of herbaceous plants >2mm
	Dg	*D. granosus*	Fragments of ligneous and herbaceous plants <2mm >0.1mm
III Limus	*Lf*	*L. ferrugineus*	Rust, non-hardened. Particles <0.1mm
IV Argilla	*As*	*A.steatodes*	Particles of clay
	Ag	*A. granosa*	Particles of silt
V Grana	*Ga*	*G. arenosa*	Mineral particles 0.6 to 0.2mm
	Gs	*G. saburralia*	Mineral particles 2.0 to 0.6mm
	Gg(min)	*G. glareosa minora*	Mineral particles 6.0 to 2.0mm
	Gg(maj)	*G. glareosa majora*	Mineral particles 20.0 to 6.0mm
	Ptm	*Particulae testae molloscorum*	Fragments of calcareous shells

Table 1. Physical and sedimentary properties of deposits according to Troels-Smith (1955)

Plate 1. Looking north, across the River Gipping. View from close to the location of BH1

Plate 2. Looking southeast along the floodplain of the River Gipping, from close to the location of BH11

Appendix: Core Stratigraphy

Refer to Table 1 for summary of sedimentary classification scheme of Troels-Smith (1955)

Core 1 (Grid reference: TM 10784 53098)

0.00-0.30m	Da	St	El	Dr	UB
	3	0	1	3	-
	Sh2, Ga1, Ag1, As+, Th+, Ptm+				
	Dark brown sandy organic topsoil				
0.30-0.50m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ag2, Ga1, Sh1, Th+, As+, Ggmin+				
	Medium grey-brown organic-rich sandy silt				
0.50-1.05m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ag2, As2, Sh+, Ptm+, Ga+, Dg+				
	Medium brown clayey silt				
1.05-1.42m	Da	St	El	Dr	UB
	2	0	0	3	1
	Ag3, As1, Sh+, Ptm+, Lf+				
	Light brown (iron mottled) clayey silt				
1.42-1.65m	Da	St	El	Dr	UB
	3	0	0	3	2
	Ag2, As1, Sh1, Ga+, Dg+				
	Dark brown organic-rich clayey silt				
1.65-2.02m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ag3, As1, Sh+				
	Light grey-brown clayey silt				
2.02-2.50m	Da	St	El	Dr	UB
	3	0	0	3	1
	Ag2, As1, Sh1, Th+, Dg+				
	Medium-dark brown organic-rich clayey silt				
2.50-2.62m	Da	St	El	Dr	UB
	3	0	1	3	1
	Ag2, As1, Sh1, Th+, Dg+				
	Dark brown very well humified peat				
2.62-3.04m	Da	St	El	Dr	UB
	3	0	1	2+	1
	Sh2, Ag1, Ga1, Th+, Dg+, Ptm+				
	Dark brown well humified peat with abundant sand and silt				
3.04-3.10m	Da	St	El	Dr	UB
	3	0	1	3	1
	Sh2, Dg2, Ag+, As+				
	Dark brown very well humified peat				
>3.10m	*Gravels encountered*				

Core 2 (Grid reference: TM 10775 53091)

0.00-0.20m	Da	St	El	Dr	UB
	2+	0	0	3	-
	Ag2, Dh1, Sh1, Th+, Ptm+				
	Medium brown organic-rich silt topsoil				
0.20-0.40m	Da	St	El	Dr	UB
	2	0	0	3	1
	Ag2, As1, Sh1, Ga+, Dh+, Th+				
	Light yellow-brown organic-rich clayey silt				
0.40-0.95m	Da	St	El	Dr	UB
	2	0	0	3	1
	Ag2, As2, Lf+, Sh+, Th+				
	Light yellow-brown iron mottled clayey silt				
0.95-1.24m	Da	St	El	Dr	UB
	2+	0	0	2+	1
	Ag2, As1, Sh1, Ga+, Th+				
	Medium grey-brown organic clayey silt				
1.24-1.55m	Da	St	El	Dr	UB
	2+	0	0	2+	2
	Ag2, As1, Ga1, Sh+, Lf+				
	Orange-brown iron mottled clayey silt				
1.55-1.70m	Da	St	El	Dr	UB
	2+	0	0	2	1
	Ga2, Ag2, As+, Lf+				
	Orange-brown silty sand				
1.70-2.06m	Da	St	El	Dr	UB
	2	0	0	2	2
	Ga4, Ag+, Ptm+, Sh+				
	Light grey shelly sand				
2.06-2.45m	Da	St	El	Dr	UB
	3+	0	1	2	2
	Sh2, Dg1, Ga1, As+, Ptm+				
	Dark brown-black well humified sandy peat				
2.45-2.60m	Da	St	El	Dr	UB
	3	0	2	2	1
	Sh3, Dg1, Ga+, Ptm+				
	Dark brown very well humified peat				
2.60-2.70m	Da	St	El	Dr	UB
	3+	0	1	2	2
	Sh2, Dg1, Ga1, As+, Ptm+				
	Dark brown-black well humified sandy peat				
>2.70m	*Gravels encountered*				

Core 3 (Grid reference: TM 10770 53057)

0.00-0.25m	Da	St	El	Dr	UB
	2+	0	1	3	-
	Ag2, Sh1, Dg1, Th+, As+				
	Medium brown organic-rich silt topsoil				
0.25-0.45m	Da	St	El	Dr	UB
	2	0	0	3	1
	Ag2, As1, Sh1, Dg+, Lf+				
	Yellow-brown clayey silt				
0.45-1.50m	Da	St	El	Dr	UB
	Ag2, As2, Lf+, Sh+, Th+				
	Light yellow-brown clayey silt				
	Becoming orange brown (iron mottling) with depth				
1.50-1.66m	Da	St	El	Dr	UB
	2+	0	0	2	1
	Ga2, Ag1, Ggmin1, As+				
	Orange gravely silty sand				
1.66-2.10m	Da	St	El	Dr	UB
	3	0	0	2	1
	Sh2, Ag2, Dg+, As+				
	Grey-brown organic-rich silt				
2.10-2.90m	Da	St	El	Dr	UB
	3+	1	1	2	2
	Dg2, Dh1, Sh1, Ag+, Ga+, Dl+, Ptm+				
	Dark brown-black very well humified peat with occasional sand horizons				

>2.90m Gravel encountered

Core 4 (Grid reference: TM 10785 53019)

0.00-0.30m	Da	St	El	Dr	UB
	2+	0	0	3	-
	Ag2, As1, Sh1, Th+, Dh+, Dg+				
	Grey-brown organic clayey silt topsoil				
0.30-1.25m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ag2, As2, Lf+, Sh+				
	Grey-brown (iron mottled) clayey silt				
1.25-1.75m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ag2, as1, Ga1, Lf+, Sh+				
	Orange-brown sandy clayey silt				
1.75-1.90m	Da	St	El	Dr	UB
	3	0	1	2	1
	Ag2, As1, Sh1, Ga+, Th+				
	Dark grey-brown organic clayey silt				
1.90-2.30m	Da	St	El	Dr	UB
	Ag2, Sh2, Dg+, As+, Dh+				

Dark grey-brown organic-rich silt

2.30-2.90m

Da	St	El	Dr	UB
3+	0	1+	2	2

Dg2, Sh1, Ga1, Th+, Dh+, Ptm+, Ag+
Dark brown-black sandy very well humified peat

>2.90m Gravels encountered

Core 5 (Grid reference: TM 10802 52988)

0.00-0.35m

Da	St	El	Dr	UB
3	0	0	3	-

Ag2, As1, Sh1, Ptm+, Ga+, Dg+, Dh+
Medium brown organic silt topsoil

0.35-0.45m

Da	St	El	Dr	UB
2+	0	0	3	1

Ag2, As2, Sh+, Dg+, Ptm+, Lf+
Light grey-brown clayey silt

0.45-0.80m

Da	St	El	Dr	UB
2+	0	0	3	1

Ag2, As1, Ga1, Sh+, Lf+
Light grey-brown (with iron mottling) slightly sandy clayey silt

0.80-1.10m

Da	St	El	Dr	UB
2+	0	0	3	2

Ga2, Ag1, Ggmin1, Ggmaj+, As+, Lf+
Orange-brown gravely silty sand

1.10-1.40m

Da	St	El	Dr	UB
2+	0	0	2+	1

Ga2, Ag1, Ptm1, Ggmin+, Sh+
Orange-brown shell-rich silty sand

1.40-1.60m Unsampled

1.60-1.80m

Da	St	El	Dr	UB
3	0	0	2	1

Ga2, Ag1, Sh1, Ptm+, Dl+, Dh+
Dark grey silty sand with organic mottling

1.80-2.20m

Da	St	El	Dr	UB
2+	0	0	1+	1

Ga2, Ggmin1, Ggmaj1, Ag+
Orange brown sands and gravels

>2.20m Gravels encountered

Core 6 (Grid reference: TM 10846 52929)

0.00-0.20m

Da	St	El	Dr	UB
2+	0	0	3	-

Ga3, Sh1, Ggmin+, Ggmaj+, Ag+, Ptm+, Th+
Light brown slightly organic fine sand

0.20-0.35m Da St El Dr UB

	2+	0	0	3	1
	Ga4, Sh+, Ag+, Ggmin+				
	Light brown sand				

0.35-0.65m	Da	St	El	Dr	UB
	2	0	0	3	1
	Ga3, Ggmin1, Ggmaj+, Ag+				
	Orange-brown gravely sand				

>0.65m *Gravels encountered*

Core 7 (Grid reference: TM 10900 52845)

0.00-0.30m	Da	St	El	Dr	UB
	2+	0	0	3	-
	Ga4, Sh+, Ggmin+, Ggmaj+, Th+, Ag+				
	Light brown sand				

0.30-0.50m	Da	St	El	Dr	UB
	Ga3, Ggmaj1, Ggmin+, Ag+				
	Orange brown gravely sand				

>0.50m Gravels encountered

Core 8 (Grid reference: TM 10958 52754)

0.00-0.40m	Da	St	El	Dr	UB
	2+	0	0	3	-
	Ga4, Sh+, Ggmin+, Th+, Ag+				
	Light brown sand				

0.40-0.70m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga4, Ag+, Ggmin+, Ggmaj+				
	Orange-brown sand				

0.70-0.80m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga3, Ggmaj1, Ggmin+, Ag+				
	Orange-brown gravely sand				

>0.80m *Gravels encountered*

Core 9 (Grid reference: TM 11008 52655)

0.00-0.30m	Da	St	El	Dr	UB
	3	0	0	3	-
	Ga3, Ggmin1, Ggmaj+, Ag+, Sh+				
	Dark grey-brown gravely sand				

0.30-0.45m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga2, Ggmin1, Ggmaj1, Ag+				
	Orange-brown sands and gravels				

>0.45m *Gravels encountered*

Core 10 (Grid reference: TM 11054 52589)

0.00-0.25m	Da	St	El	Dr	UB
	3	0	0	3	-
	Sa3, Sh1, Ggmin+, Ggmaj+, Ag+				
	Dark brown organic sand				
0.25-0.80m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga4, Ag+, Ggmin+, Sh+				
	Light orange-brown sand				
0.80-0.90m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga2, Ggmin1, Ggmaj1, Ag+				
	Light orange-brown sands and gravels				
>0.90m	*Gravels encountered*				

Core 11 (Grid reference: TM 11135 52577)

0.00-0.35m	Da	St	El	Dr	UB
	2+	0	0	3	-
	Ga3, Ggmaj1, Ggmin+, Sh+				
	Medium brown gravely sand with occasional organic mottling				
0.35-0.75m	Da	St	El	Dr	UB
	2	0	0	3	1
	Ga2, Ggmin1, Ggmaj1, Gg+				
	Orange brown sands and gravels				
>0.75m	*Gravels encountered*				

Core 12 (Grid reference: TM 11181 52505)

0.00-0.10m	Da	St	El	Dr	UB
	2+	0	0	3	-
	Ga4, Ggmin+, Ggmaj+, Sh+, Ag+				
	Medium brown sand with occasional gravel				
0.10-0.20m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga3, Ag1, Sh+				
	Medium brown silty sand with occasional organic mottling				
0.20-0.40m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga3, Ggmin1, Ggmaj+, Ag+				
	Orange-brown gravely sand				
0.40-0.70m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga2, Ggmin1, Ggmaj1, Ag+, Gg+				
>0.70m	*Gravels encountered*				

Core 13 (Grid reference: TM 11318 52318)

0.00-0.10m	Da	St	El	Dr	UB
	2+	0	0	3	-

Ag2, Sh1, As1, Th+
Medium brown organic clayey silt

0.10-0.40m	Da	St	El	Dr	UB
	2	0	0	3	1

Ag2, As2, Ga+, Sh+
Light brown clayey silt

0.40-0.65m	Da	St	El	Dr	UB
	1+	0	0	3	1

Ag3, As1, Lf+, Sh+
Light grey (with iron mottling) clayey silt

0.65-1.70m	Da	St	El	Dr	UB
	2+	0	0	3	1

Ag2, As1, Ga1, Sh+, Lf+, Ptm+
Orange brown slightly sandy clayey silt

1.70-0.80m	Da	St	El	Dr	UB
	3	0	0+	2	1

Ag2, Sh2, As++, Dh+
Dark grey-brown organic-rich silt

1.80-2.10m	Da	St	El	Dr	UB
	3+	0	0+	2	1

Sh2, Ag1, Dg1, Th+, Dh+
Dark brown-black silty well humified peat

2.10-2.70m	Da	St	El	Dr	UB
	3+	0	0	2	1

Ptm1, Sh1, Ga1, Ag1, As+, Dh+, Dl+, Ggmin+, Ggmaj+
Dark brown-black organic shell-rich sandy silt

>2.70m *Gravels encountered*

Core 14 (Grid reference: TM 11344 52272)

0.00-0.20m	Da	St	El	Dr	UB
	2+	0	0	3	-

Ag2, As1, Sh1, Th+, Ptm+
Medium brown organic clayey silt

0.20-0.65m	Da	St	El	Dr	UB

Ag2, As2, Sh+
Light brown clayey silt

0.65-1.05m	Da	St	El	Dr	UB
	2	0	0	3	1

Ag3, As1, Lf+, Sh+
Light grey (with iron mottling) clayey silt

1.05-1.65m	Da	St	El	Dr	UB
	2+	0	0	3	1

Ga2, Ag2, As+
Grey-brown sandy silt

>1.65m *Gravels encountered*

Core 15 (Grid reference: TM10803 53119)

0.00-0.05m	Da	St	El	Dr	UB
	3	0	1	3	-
	Dh2, Sh1, Ag1, Th+, Dg+, Ggmin_, Dl+				
	Dark brown silty organic topsoil				
0.05-0.35m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ag2, As1, Sh1, Dh+, Th+, Ggmin+				
	Medium brown organic clayey silt				
0.35-0.80m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ag2, As1, Ggmaj1, Ggmin+, Sh+, Lf+				
	Light orange-brown gravely clayey silt				
0.80-1.80m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga2, Ag1, Ggmin1, As+, Ggmaj+, Lf+				
	Orange-brown gravely silty sand				
1.80-3.10m	Da	St	El	Dr	UB
	2+	0	0	2	1
	Ga4, Ggmin+, Ggmaj+, Ag+, Gg+				
	Orange-brown sands				
>3.10m	Gravels encountered				

Core 16 (Grid reference: TM 10811 53128)

0.00-0.15m	Da	St	El	Dr	UB
	2+	0	0	3	-
	Ag2, As1, Ga1, Th+, Sh+				
	Medium brown slightly sandy clayey silt				
0.15-0.30m	Da	St	El	Dr	UB
	2+	0	0	3	1
	Ga2, Ggmin1, Ag1, Ggmaj+				
	Medium brown gravely silty sand				
0.30-0.60m	Da	St	El	Dr	UB
	Ga2, Ggmin1, Ggmaj1, Ag+				
	Orange-brown gravely sand				
0.60-0.80m	Da	St	El	Dr	UB
	Ga1, Gg1, Ggmin1, Ggmaj1				
	Orange-brown sands and gravels				
>0.80m	*Gravels encountered*				

Appendix 8. Geophysical survey results: Coddenham (SAM)

Archaeological Services & Consultancy Ltd

TOPOGRAPHIC AND GEOPHYSICAL SURVEYS: CEDARS PARK (SAM SF 89) CODDENHAM SUFFOLK

for
Anglian Water Services Ltd.

Alastair Hancock BSc PgDip

March 2007

ASC: 871/SCP/02

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Tel: 01908 608989 Fax: 01908 605700
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Site Data

ASC site code:	SCP	Project no:	871
County:	Suffolk		
District:	Coddenham		
Village/Town:	Nr Baylham		
Parish:	Baylham CP		
NGR:	TM 1100 5332 (site centre)		
Extent of site:	c.20.5 ha		
Present land use:	Pasture (part of Scheduled Ancient Monument SF 89)		
Development:	Water pipeline		
Extent of development:	tba		
Planning application ref/date:	na		
Client:	Anglian Water Services Ltd Thorpe Wood House Thorpe Wood Peterborough Cambridgeshire PE3 6WT		
Contact name:	Cherie Bellamy		
Telephone	01733 414424	Fax:	01733 414350

Summary

Detailed topographic and magnetometer surveys were carried out over 20.5 hectares of a Scheduled Ancient Monument. The topographic survey has characterised the natural topography and defined earthworks resulting from recent agricultural activity. The magnetometer survey has defined the location of a boundary/enclosure ditch, settlement/funerary activity and a possible flanking ditch of a Roman road at the southeast corner of the survey area. A settlement, trackway and field system have been identified at the southwest. Other possible archaeological anomalies have been identified spread across the southern half of the survey area.

1. Introduction

1.1 General

Archaeological Services and Consultancy Ltd (ASC) was commissioned by *Anglian Water Services Ltd* to undertake topographic and geophysical surveys over a parcel of land through which a section of a proposed water pipeline would pass. The *c.*20.5 hectares surveyed lay within the northern part of *Combretovium* Roman settlement, which is designated a Scheduled Ancient Monument (SAM SF 89). The work described in this report forms the initial phase of a programme of archaeological evaluation required to inform the route of the pipeline through the SAM and aid the design of an appropriate archaeological mitigation strategy. Fieldwork commenced on the 5th February 2007 and was completed on the 28th February 2007. Prevailing weather conditions during the fieldwork were cold and overcast with intermittent showers.

1.2 Planning Background

The surveys were requested by Anglian Water Services Ltd to fulfil their statutory obligations to the environment and in pursuance of Scheduled Monument Consent. The scope of the work was defined in a brief (Tipper 2006) prepared on behalf of English Heritage and the local planning authority (LPA), *Suffolk County Council,* by the Council's archaeological advisor (AA), *Suffolk Archaeological Service Conservation Team*. A Section 42 Licence was sought and obtained from English Heritage before commencement of fieldwork (Appendix 6).

1.3 Proposed Development

The proposed pipeline is to run for 9.5km between Stowmarket and Baylham. The surveys described in this report examine a small area traversed by the pipeline which forms the northern part of an SAM. The groundwork is likely to consist of top and subsoil strip along a *c.*10m wide easement and subsequent excavation of a *c.*0.4m wide pipe trench. The exact methods of insertion of the pipe and its route will be informed by the results presented in this report and the results of further phases of archaeological evaluation.

1.4 Location & Description

The survey area was an irregularly shaped *c.* 20.5 hectare open field located in the Gipping Valley *c.* 3km northwest of Great Blakenham, Suffolk. The site was delimited at the southwest by a hedge line and the River Gipping, and by the A14 at the northeast. The north-western boundary was defined by a hedge line and the south-eastern extent was delimited by an area of scrub and trees known as Pool Covert. An agricultural building, a metalled access track and electrified wire strand livestock fences internally subdivided the site. Groundcover at the time of survey was permanent pasture.

1.5 Geology & Topography

The topography of the site undulated although it may be characterised as exhibiting a generalised northeast - southwest trending slope descending from 28.8m AOD to 15m AOD at the floodplain of the River Gipping.. The soils of the area belong to the Ludford Association, which are described as *"deep well drained fine loamy, coarse loamy and sandy soils, locally flinty and in places over gravel"* (Soil Survey 1983 571x). It is probable that alluvial deposits are present on the river floodplain although none are noted by the Soil Survey. The underlying geology is glaciofluvial drift.

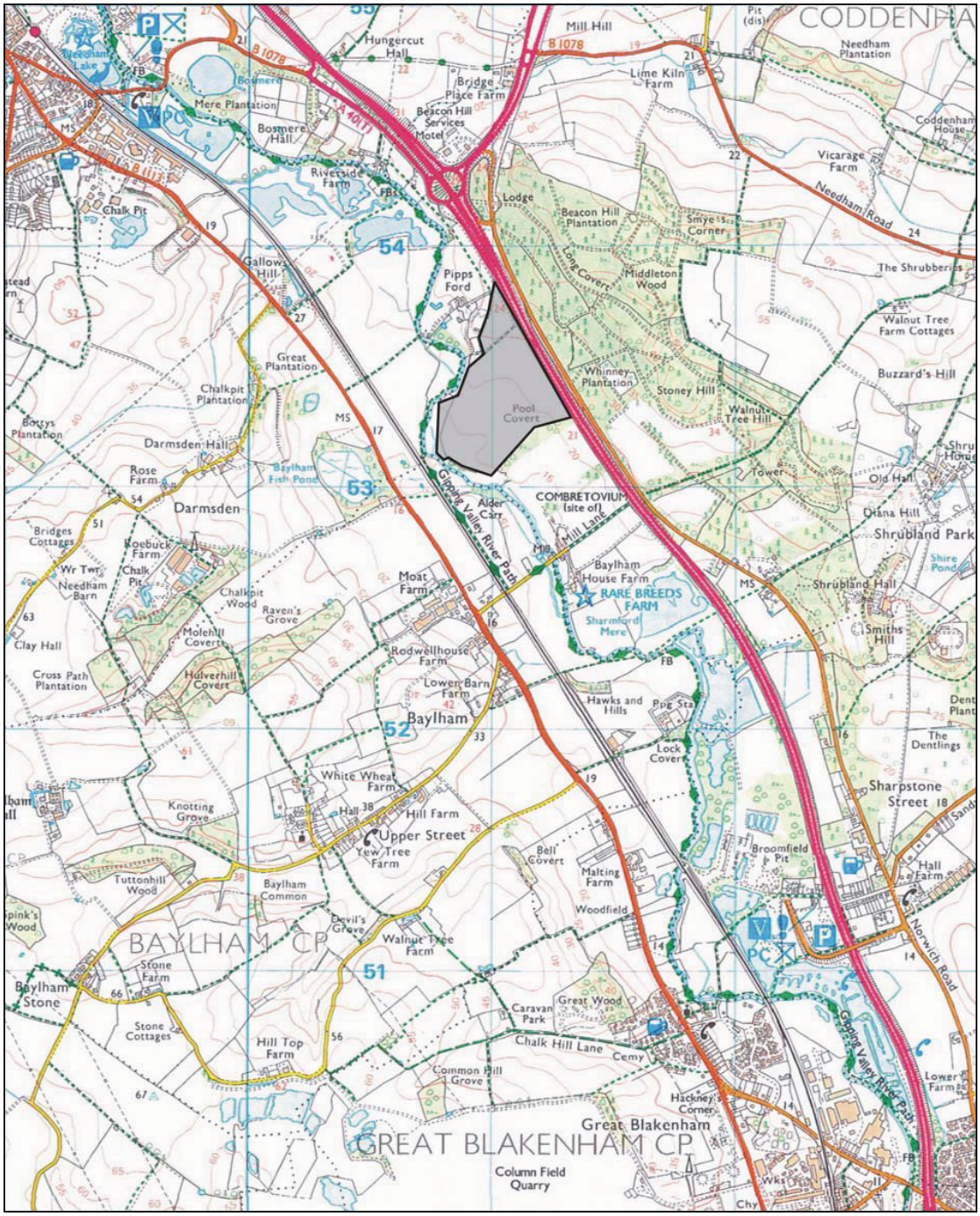

Figure 1. General location (scale 1:25,000)

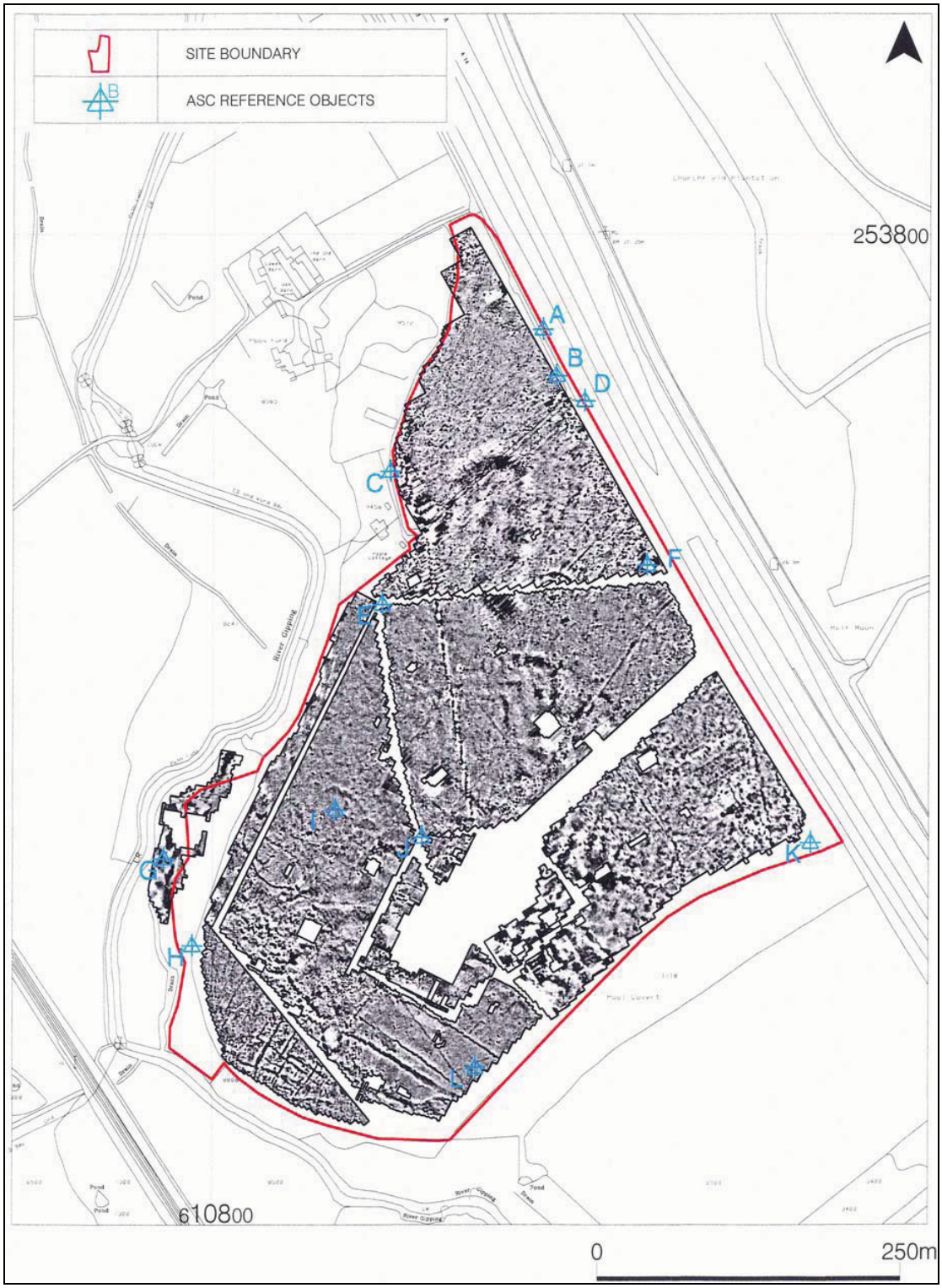

Figure 2. Site location showing greyscale gradiometer data

2. Archaeological & Historical Evidence

2.1 Introduction

The local and regional settings of archaeological sites are factors that are taken into consideration when assessing the implications of development proposals. The following sections provide a summary of the archaeological and historical background presented in a desk-top assessment focussed on the proposed pipeline (Rolfe 2006).

2.2 *Archaeological & Historical Background*

The proposed 9.5km pipeline will run through the valley of the River Gipping and has significant potential to adversely impact archaeological resources that date from many periods. The area (hereafter "site") examined by the topographic and geophysical surveys forms a small part of the pipeline route and lies within the northern part of a Scheduled Ancient Monument (SAM SF 89) which protects a large Romano-British (RB) settlement. Although archaeology of other periods is present in the immediate vicinity of the site, the majority of the archaeology affected by insertion of the pipeline is likely to date to the Romano-British period.

Prehistoric - Iron Age (before AD 43)

Flint assemblages indicating exploitation of the Gipping Valley by Mesolithic hunter-gatherers have been recovered a few hundred meters north of the survey boundary (CDD 006, CDD 060, BRK 104), at the southeast of the SAM (CDD 009) and at more distant locations along the proposed pipeline route (CRM 027, CRP 007). Flint assemblages (CDD 009, CDD 017, CDD 060, BRK 104) dating to the later Neolithic period have also been recovered in the immediate vicinity of the site.

The presence of Bronze Age populations is illustrated by recovery of a fragment of a knife/dirk (CDD 017) just southeast of the SAM and two concentrations of round barrows located a few hundred meters northwest and on a ridge immediately west of the site.

Finds and archaeological features (CDD 003, CDD 009, CDD 017) are recorded illustrating that an earlier Iron Age settlement underlies at least part of the later RB settlement protected by the SAM.

Romano-British (AD 43-c.450)

The site forms the northern part of an SAM that protects the large RB settlement of *Combretovium* (CDD 003). The more densely occupied parts of the settlement are thought to lie south and southeast of the site but cropmark evidence suggests that two Roman roads (BAY 014, BRK 004) run through it. Recent archaeological work undertaken at the site during construction of an agricultural building and its access road did not reveal evidence of either Roman road although eighteen coins, a statuette and three lead weights (CDD 063) were recovered.

Combretovium extends north of the remains of another SAM which protects two superimposed Roman auxiliary forts (CDD016) located *c.*0.5km southeast of the site. The larger fort had three ditches and enclosed an area of over 4.45 hectares. The second smaller auxiliary fort lies in the south-western corner of the larger fortification and covers an area of *c.* 2.2 ha. A number of notable finds have been recovered, including a saddle-cloth weight, indicating the presence of cavalry, and a bronze statuette of Nero with silver and niello inlay.
Other disparate finds dating to the Romano-British period are noted at other sections of the proposed route of the pipeline and include a suggested villa site (CRM 003) located *c.*500m northwest of the site.

Anglo-Saxon (c. 450-1066)

Settlement features (BRK 104) of this period are recorded a few hundred meters northwest of the site and a ring ditch and other finds (CDD 057, CRM 043) which may indicate funerary activity are noted *c.* 500m north of the site. An Anglo-Saxon pot associated with fragments of a human skull (CDD 003) has been recovered south of the site within the SAM, and two coins, a brooch and a hooked tag (CDD 017) were found *c.*1km to the southeast.

Medieval (1066-1500)
The desk-top assessment notes a church (CRP 004) listed in the Domesday Survey and recovery of disparate finds of this period along the proposed route of the pipeline although no sites or finds of this period are recorded within the site or its immediate environs.

Post-Medieval (1500-1900)
A milestone (SF18220) is recorded at the north of the site. Other notable features of this period include a lock (BAY035), a bridge (BAY028) and a possible 17th century watermill (BAY 030) *c.*400m south of the site. Pipps Ford, a Grade II listed 16th/17th century farmhouse is located immediately north of the site.

Modern (1900-present)
The 1st Edition Ordnance Survey map shows the site subdivided into four fields by boundaries or trackways of unknown antiquity. It is probable that these boundaries were grubbed out during the latter half of the 20th century.

3. Aims, Methodology and Report Presentation

3.1 Aims
In line with the requirements of the *brief* (Section 2.3), the aims of the topographic and geophysical surveys were:

• To provide information to construct an archaeological conservation strategy, dealing with the preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

3.2 Methods
The methods adopted for this project were:

• Comprehensive topographic survey at a gridded resolution of 5m x 5m of *c.* 20.5 hectares.

• A detailed magnetometer survey at a sample interval of 0.25m x 1.0m of suitable areas of the *c.* 20.5 hectare site.

3.3 Standards
The work conformed to the requirements of the *brief* (Tipper, 2006), to the *project design* (Hancock, 2006), to *Standards for Field Archaeology in the East of England* (Gurney, 2003), to the relevant sections of the Institute of Archaeologists' *Standard & Guidance Notes* (IFA., 2001) and *Code of Conduct* (IFA., 2000a) and to MAP2 (English Heritage, 1991). The work also conformed to the relevant sections of ASC's own *Operations Manual,* to English Heritage geophysical survey guidelines (David, 1995) and to IFA geophysical survey guidelines (Gaffney, *et al* 2002). Data from the topographic and magnetometer survey was treated and archived in accordance with Archaeology Data Service guidelines (Richards and Robinson, 2000; Schmidt 2003).

3.4 *Report Presentation*
A general site location plan incorporating the 1:25000 Ordnance Survey mapping is presented in Figure 1. Figure 2 (1:5000) shows the site and relative position of the geophysical survey blocks. The digital elevation model and interpretation are shown in Figures 3 and 4 (1:4000). The processed greyscale gradiometer data and accompanying interpretations are presented in Figures 5 to 10 at scales of 1:2500 and 1:1250. XY trace plots (1:1500) of the unprocessed "raw" gradiometer data are presented in Appendix 4.

Comprehensive technical details on the underlying principles of magnetic survey, the equipment used and general geophysical survey methodology are given in Appendix 1. Details on data processing and display are also given in Appendix 1. Survey location information is presented in Appendix 2 and the composition of the archive described in Appendix 3.

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of ASC staff.

4. Topographic Survey: Results and Discussion (Figs. 3 and 4)

4.1 Inspection of the site prior to commencing the topographic survey showed that upstanding archaeological earthworks were absent. Visible modern earthworks were also absent, although a poorly developed bank was observed at either side of the un-metalled access track to Poole Cottage.

4.2 A closed traverse marked with five wooden survey station pegs was established within the site to create suitable control for the topographic survey (Fig 2). The position of a number of semi permanent reference objects used to tie in the geophysical survey grids and further survey stations located at inaccessible parts of the site were recorded with side shots while the traverse was being established. The reduced level of survey station A was calculated by levelling from an Ordnance Survey bench mark located *c.*100m to its north on the opposite side of the A14.

4.3 The natural topography shown by the digital elevation model (DEM) illustrates that the northern part of the site exhibits a gradual northeast-southwest trending slope that descends from 28.8m AOD to 21m AOD. The slope levels to form a small plateau at the centre of the site at a height of 20.7m AOD before descending gradually to the flood plain of the River Gipping at 15m AOD. A small knoll sits proud of the flood plain at a height of 17.1m AOD in the south-western corner of the site.

4.4 Initial examination of the DEM illustrated that a number of very slight northeast-southwest orientated linear earthworks were present. All are aligned roughly parallel with the extant track to Poole Cottage and one marks the position of a largely grubbed out, similarly orientated field boundary marked on 1st Ed OS mapping. The nature of these linear earthworks suggests that they result from the presence of vestigial remnants of relatively recent ploughing or other modern agricultural activity.

4.5 The DEM was subsequently examined with height values exaggerated by a number of scaling factors to determine whether other ephemeral earthworks were visible. The greyscale raster DEM shown in Figure 3 has its heights exaggerated by a factor of 50 in order to aid definition of the linear agricultural earthworks previously discussed. The presence of other earthworks was not noted during manipulation of the survey data.

4.6 The geophysical survey identifies numerous archaeological features (Figs. 5 and 6) yet there is nothing in the topographic survey data that would suggest the presence of coincidental earthworks. The absence of any direct co-relation between the two data sets suggests that any extant archaeological earthworks may have been denuded and removed by later ploughing or that they are so slight that the 5m x 5m resolution of the topographic survey spot heights was too coarse to pick them up.

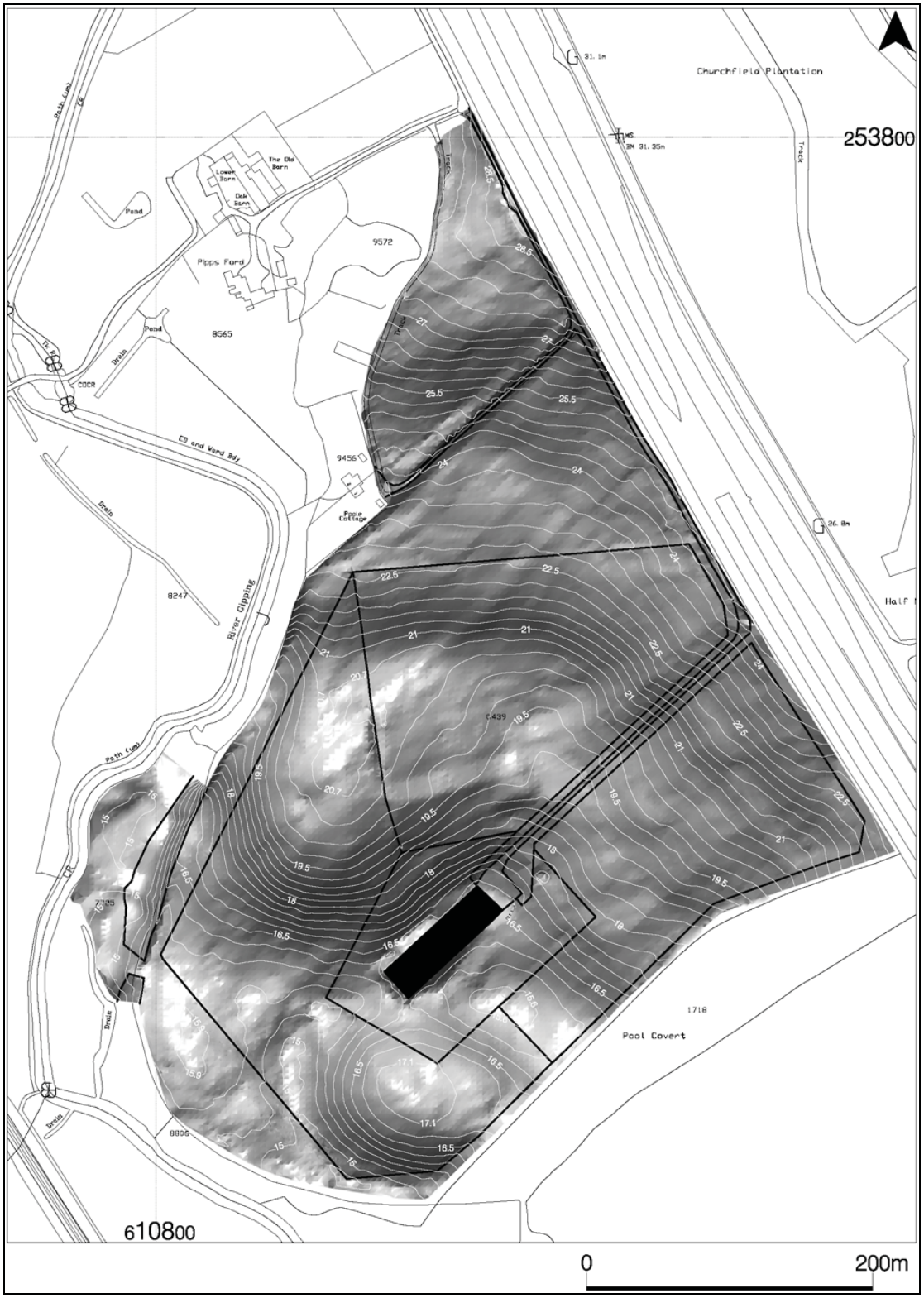

Figure 3. Digital elevation model overlain by contours

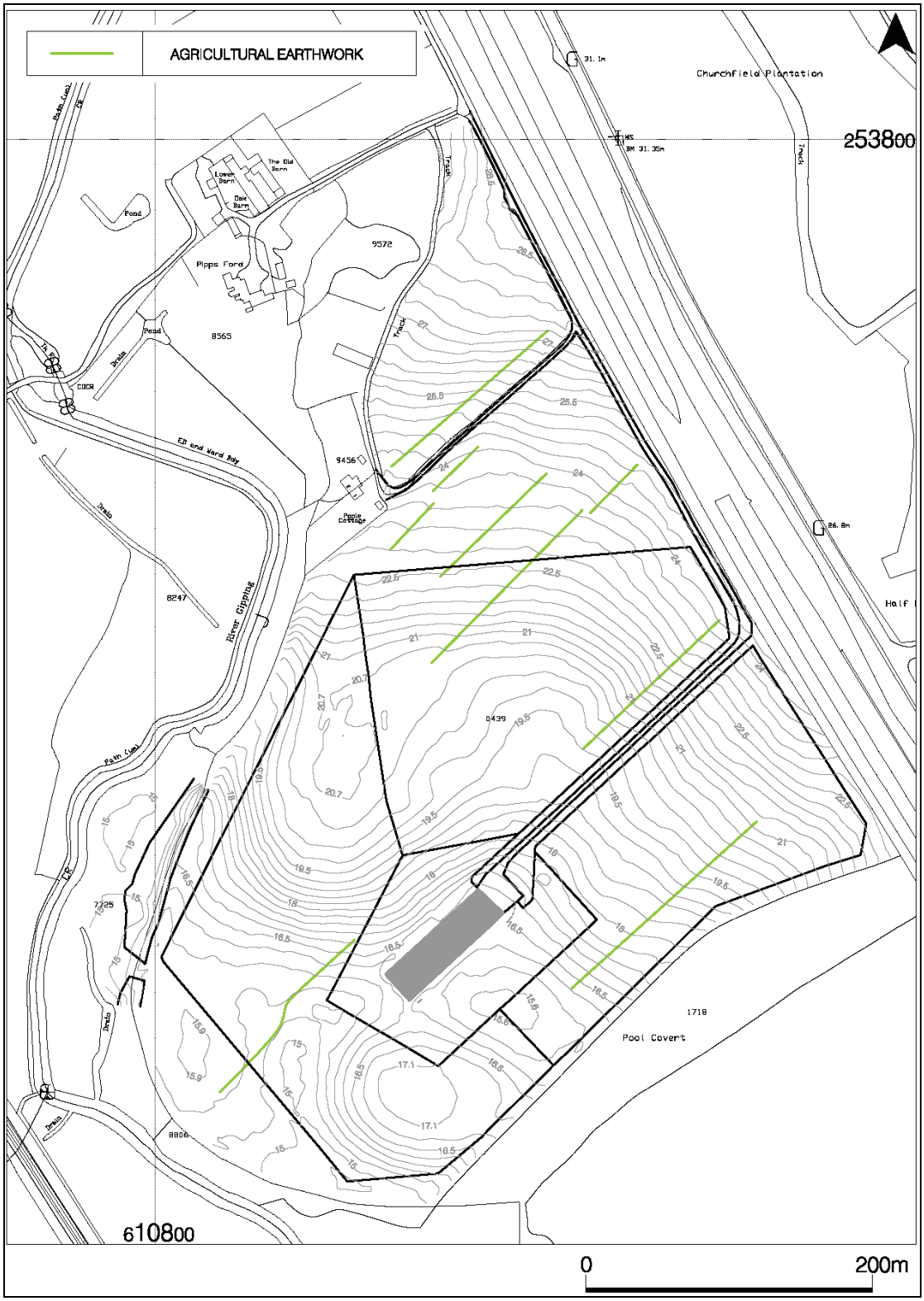

Figure 4. Interpretation of digital elevation model

5. Geophysical Survey: Results and Discussion

5.1 *Non Archaeological Anomalies (Figs. 5 and 6)*

5.1.1 Isolated dipolar anomalies ("iron spikes" – Appendix 1) are identified distributed across all parts of the site. These "iron spike" anomalies are usually indicative of ferrous objects or other strongly magnetic material incorporated into the topsoil/subsoil and are often caused by modern cultural debris. Archaeological artefacts may manifest this type of anomaly and significant clusters associated with other substantiating evidence may be included in the discussion of archaeological anomalies. Only the strongest of the iron spikes are identified on the interpretation.

5.1.2 Areas of magnetic disturbance caused by ferrous or fired/heated material are distributed across the survey area although a concentration toward the perimeters of the survey blocks and around the agricultural building is noted. The majority of these anomalies are caused by proximity to ferrous wire strand fencing, proximity to livestock shelters/feeders, accumulation of ferrous/fired material against a since removed field boundary marked on 1st Ed OS mapping and proximity to an agricultural building. The obvious archaeological potential of the south-western and south-eastern parts of the site indicates that an archaeological origin should not be discounted for all of these anomalies as thermoremanent features such as kilns, furnaces or hearths may produce similar magnetic signatures.

5.1.3 A north-south aligned linear dipolar anomaly is identified at the north of the site. These types of anomaly are usually caused by modern services and the landowner identified it as locating a power cable supplying electrical equipment and lighting in the agricultural building at the south-centre of the site.

5.1.4 A large area of weak magnetic enhancement is identified in the northern part of the site. An archaeological origin for this anomaly and smaller more strongly disturbed/enhanced areas within it cannot be discounted although distribution of magnetically enhanced/burnt modern material by ploughing is suggested.

5.1.5 Also evident at the north of the site are parallel, weakly positive linear trends signifying the presence of buried vestigial remnants of past ploughing regimes. Their orientation correlates with the alignment of the earthworks visible on the DEM. An intermittent weak positive linear trend running roughly orthogonal to those just discussed likely identifies the remnants of a field boundary or footpath shown on 1st Ed OS mapping.

5.1.6 An area of magnetic disturbance is identified immediately south of the agricultural building and is indicative of the presence of made ground. This area was identified by the landowner as the location where stripped top/subsoil was dumped during construction of the foundation raft of the building. Unequivocal archaeological features identified southwest and northeast of this location suggest that the magnetic anomaly from the area of made ground could mask underlying archaeological features.

5.1.7 The position of a discrete area of magnetic disturbance *c.*60m southwest of the agricultural building coincides with topographic low shown by the DEM. This area was noticeably waterlogged at the time of fieldwork and it is suggested that the strong magnetic response is caused by the presence of modern material deliberately dumped to infill a hollow/pond.

5.1.8 Areas of magnetic enhancement with a probable geological or modern intrusive derivation are identified slightly northeast of the site centre. An archaeological origin for these anomalies is not discounted yet they are weak and broad, characteristics more suggestive of infilled shallow natural features or shallow ground disturbance.

5.1.9 Areas of strong magnetic enhancement are present in the small area surveyed immediately adjacent to the River Gipping and probably define the locations of geomorphological features resulting from reworking and deposition of sediment by the river. An archaeological origin for some of these anomalies cannot be discounted but their position on the river floodplain next to the river channel indicates that a natural origin is more likely.

5.2 ***Archaeological Anomalies at the Southwest of the Survey Area (Figs. 7 and 8)***

5.2.1 Differently aligned strongly positive linear anomalies and discrete areas of magnetic enhancement (**G**) are present at the extreme southwest of the site on the flood plain of the River Gipping. These anomalies define enclosure ditches, pits and possible structural elements of a small settlement. A concentration of "iron spike" anomalies (**H**) of possible archaeological significance is noted just beyond the settlement. The north-western extent of the "iron spikes" is delimited by a linear anomaly suggesting the position of another infilled ditch (**I**).

5.2.2 A small number of disparate, weak positive anomalies and small areas of magnetic enhancement of less certain archaeological origin are also identified near **G**, **H** and **I**.

5.2.3 Positive linear anomalies locating a probable ditched trackway (**J**) and field system (**K**) are visible *c.*80m east of the settlement. The location of a further sinuous trackway bounded by ditches could be suggested by weak curvilinear anomalies (**L**) south of trackway **J**. The differing alignment of the linear anomalies defining the field system may indicate two phases of activity rather than subdivision of contemporary fields. A sub rectangular positive anomaly (**M**) on the northern side of the field system defines the position of a small enclosure.

5.2.4 Running between the settlement (**G**) and trackway (**J**), and extending beyond them in a north-westerly direction, are curvilinear, small and large amorphous areas of strong magnetic enhancement (**N**). Some of the well defined curvilinear areas suggest a continuation of the southernmost trackway ditch and the presence of a ditch associated with the settlement. It is possible that most, if not all, of the large amorphous areas of enhancement define or contain infilled archaeological features or deposits. However, it seems suspicious that none of these areas extends southwest of the fenceline that bounded this part of the survey and some magnetic enhancement resulting from modern intrusive activity or dumping could be indicated.

5.2.5 Three curvilinear positive anomalies (**O**) are visible *c.*20m beyond the northern extent of the large amorphous areas of magnetic enhancement (**N**). A continuation of the southernmost ditch may be suggested by an alignment of weak positive linear anomalies extending eastward toward the agricultural building. The curvilinear anomalies lie on the suggested alignment of a Roman road identified from parallel ditches seen as cropmarks on the western side of the River Gipping. However, evidence of a continuation of the cropmarks into the site on the same alignment is not visible in the magnetic data and the nature of the aforementioned curvilinear anomalies suggests they define the location of a small enclosure and boundary ditch.

5.2.6 The area northwest of the three curvilinear ditches (**O**) contains a concentration of discrete and curvilinear areas of magnetic enhancement. These anomalies could be caused by infilled archaeological features, although it is possible that they result from areas of modern disturbance or the presence of geomorphological features.

5.2.7 Areas of magnetic enhancement (**P**) are identified at the southern side of the agricultural building. The presence of a large area of made ground (see Section 5.1.6) at the centre of these anomalies inhibits definitive interpretation, although some may be caused by infilled archaeological features.

5.3 *Archaeological Anomalies at the Southeast of the Survey Area (Figs. 9 and 10)*

5.3.1 A north-south aligned intermittent linear positive anomaly (**A**) characteristic of an infilled archaeological ditch is visible toward the southeastern corner of the site. The location and orientation of this linear anomaly coincide with the suggested position of a Roman road from Colchester to Caistor and it could locate the roads western flanking ditch. The cause of the intermittent nature of the anomaly is unclear, although it may have been damaged by recent ploughing. Evidence of metalling of a road surface is not visible and in the absence of other evidence it is not certain that the ditch forms part of the Roman Road.

5.3.2 A number of magnetic anomalies *c.*8m east of anomaly **A** could suggest the location of the severely truncated eastern flanking ditch of the road although the anomalies are discontinuous and it is equally probable that they define the position of infilled pits.

5.3.3 A large area of magnetic enhancement (**B**) is identified immediately west of ditch **A.** The concentration of magnetic anomalies within this area is characteristic of those caused by settlement or funerary activity.

5.3.4 Two parallel northeast-southwest aligned weak positive linear anomalies (**C**) are tentatively identified immediately north of area **B**. The anomalies may define the position of lines of structural postholes although they could result from imperfections in the collected magnetic data which have been enhanced by subsequent data processing methods.

5.3.5 A weakly positive and discontinuous north-northwest-south-southeast linear anomaly (**D)** locates an infilled ditch *c.*100m west of ditch **A**. The majority of anomaly **D** is not parallel to anomaly **A** and it is tentatively suggested that it may define the position of an earlier/later boundary or enclosure ditch Its segmented nature suggests that this feature may be relatively shallow and damaged by recent ploughing.

5.3.6 A weaker even more segmented linear positive anomaly (**E**) is identified apparently branching from anomaly **D** on its eastern side. The slightly different orientations of anomalies **D** and **E** could indicate realignment of the suggested boundary/enclosure ditch while it was extant.

5.3.7 Two southwest-northeast trending positive linear anomalies (**F**) are visible *c.*50m north of anomalies **D** and **E**. A definitive relationship between **D, E** and **F** cannot be determined due to the inability to survey across a modern metalled access track and their weak and discontinuous nature. The southerly anomaly at **F** appears to branch from its northern counterpart which could support the hypothesis of realignment of a boundary/enclosure ditch suggested in the previous section and define the anomalies at **F** as the returns of boundary/enclosure ditches **D** and **E**.

5.3.8 Disparate small areas of magnetic enhancement are also identified at the southeast of the site. These anomalies may be caused by modern intrusive activity although the presence of infilled archaeological features suggests that some will result from the presence of infilled archaeological pits.

5.4 *Archaeological Anomalies in other parts of the Survey Area (Figs. 9 and 10)*

5.4.1 A curvilinear anomaly (**Q**), tentatively identified as an infilled archaeological ditch, is visible slightly northeast of the site centre. A large area of magnetic enhancement of uncertain derivation located immediately to the south of **Q** may be associated with it, and may therefore share a possible archaeological origin. Smaller areas of magnetic enhancement are noted surrounding the larger area and these anomalies may define the locations of archaeological pits.Figure 5. Greyscale plot of gradiometer data

Figure 5. Greyscale plot of gradiometer data

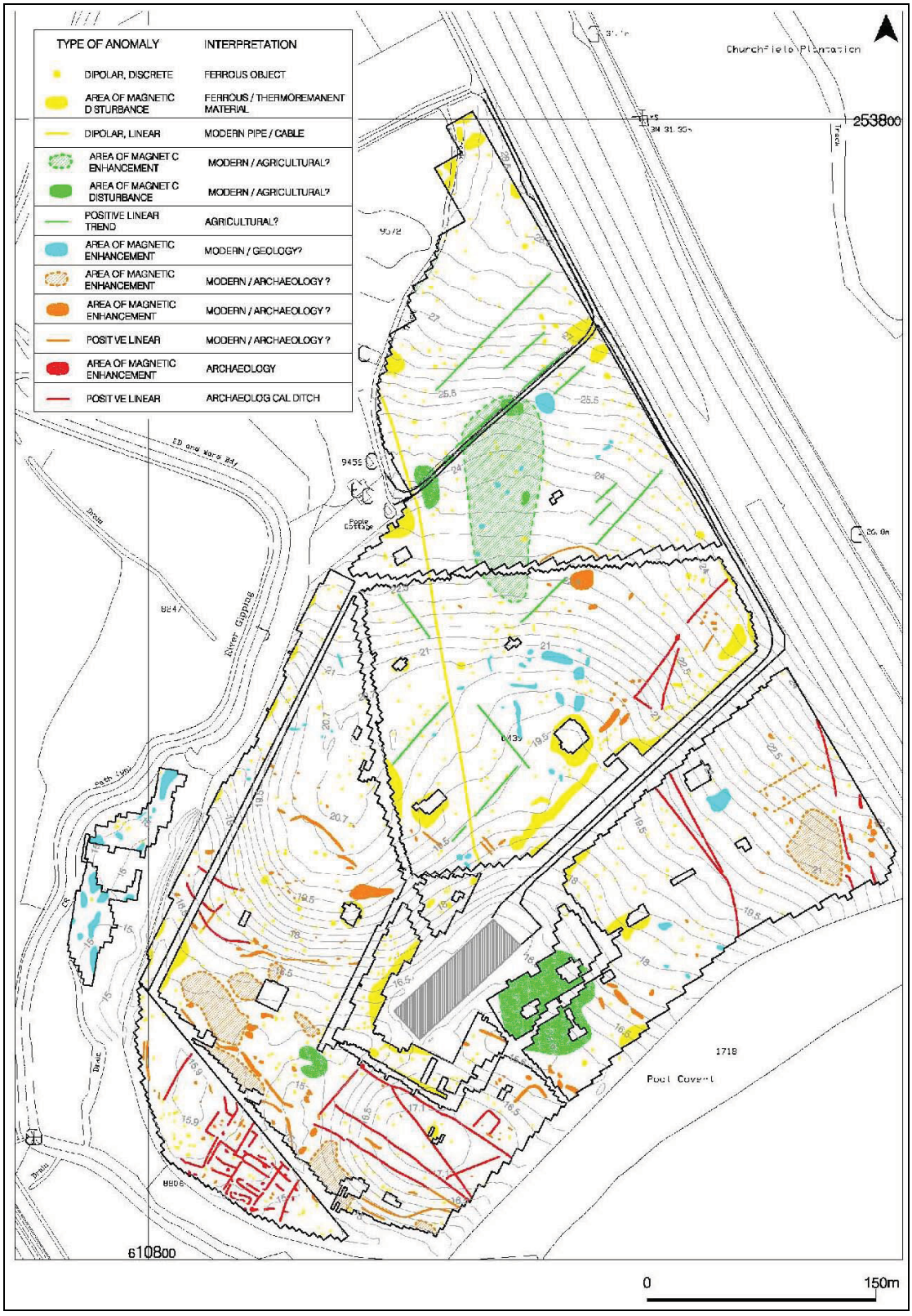

Figure 6. Interpretation of gradiometer data

Figure 7. Greyscale plot of gradiometer data at southwest of site

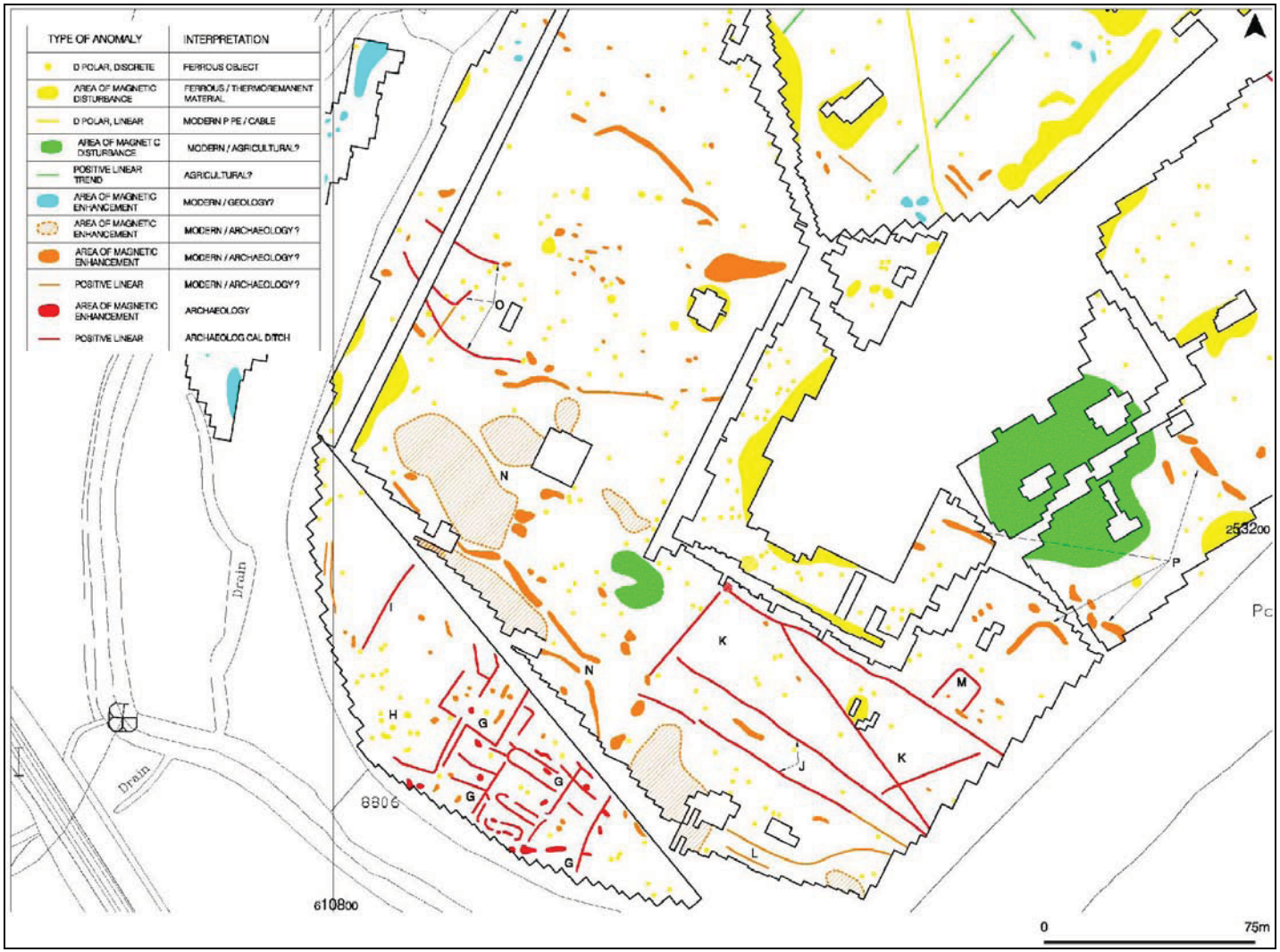

Figure 8. Interpretation of gradiometer data at southwest of site

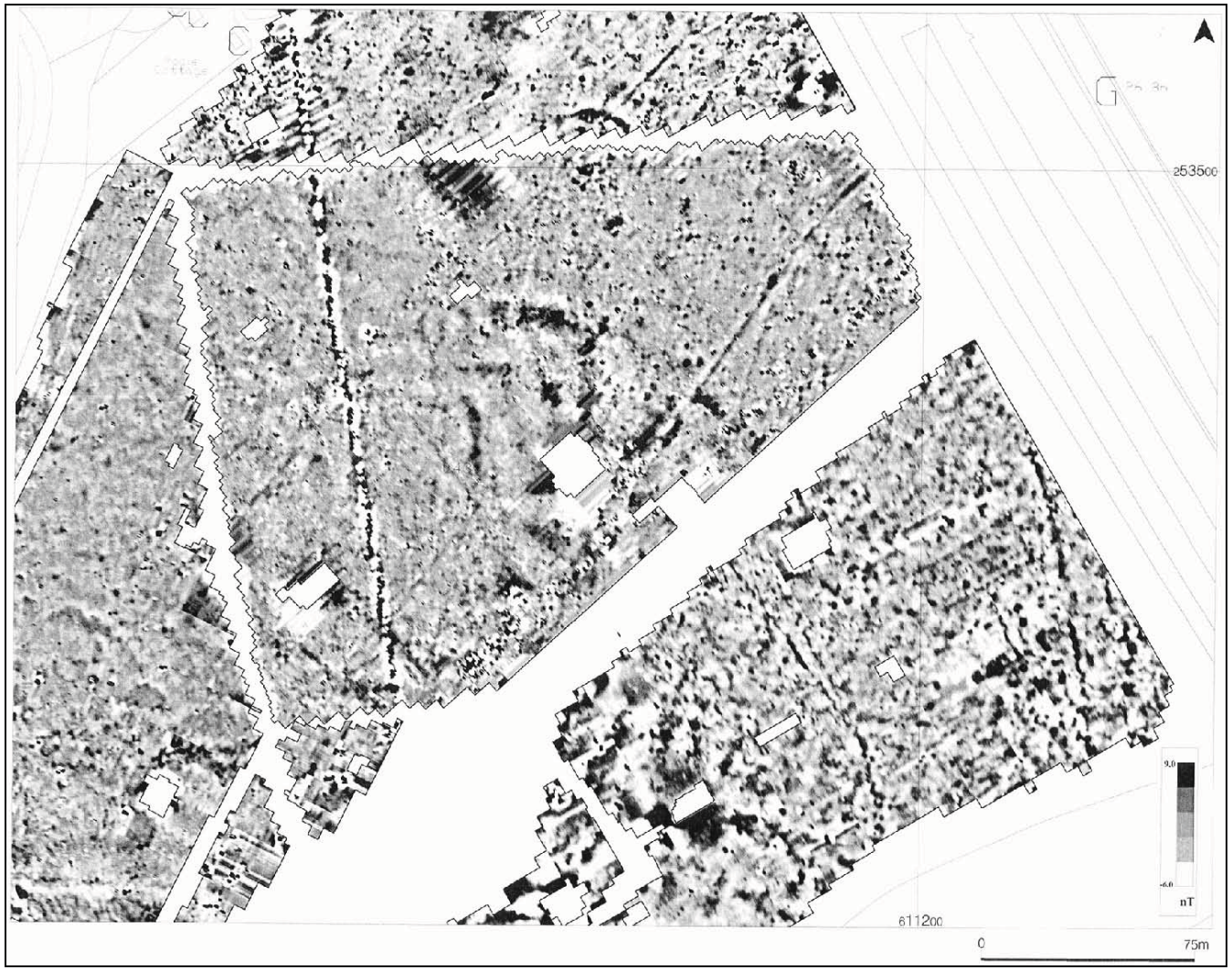

Figure 9. Greyscale plot of gradiometer data at southeast of site

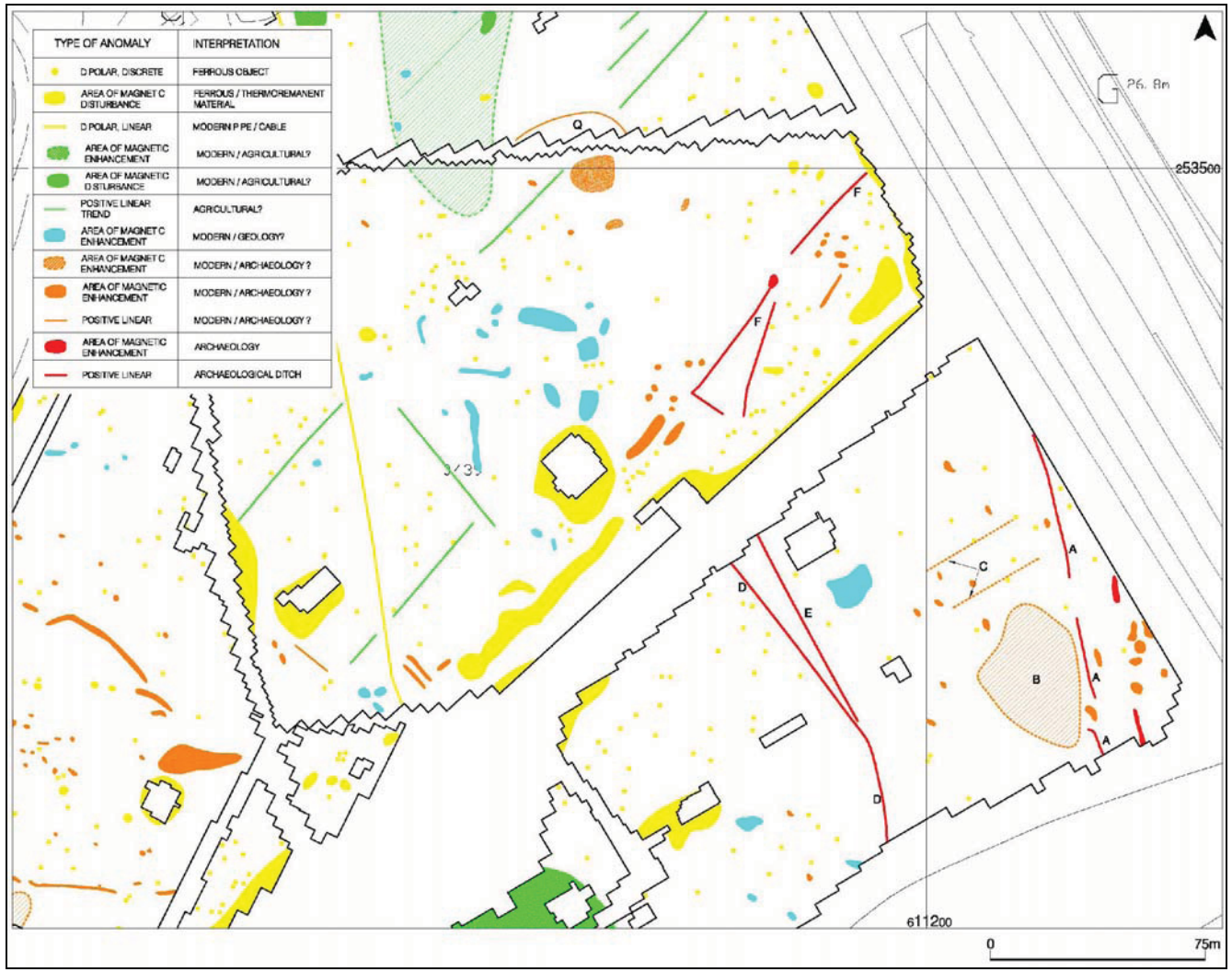

Figure 10. Interpretation of gradiometer data at southeast of site

6. Conclusions

6.1 The topographic survey has characterised the natural topography of the site and illustrated that earthworks of archaeological origin are absent. Poorly developed linear earthworks are present although these derive from relatively recent ploughing and other modern agricultural activity.

6.2 The magnetic data collected at the north of the survey area does not contain anomalies definitively locating archaeological features. Anomalies suggesting relatively modern agricultural activity, modern disturbance and/or the presence of geological features, plus one possible short curvilinear archaeological ditch and a few associated areas of magnetic enhancement are present. The summarised evidence indicates that archaeological potential of this area is low/medium.

6.4 The geophysical survey has located two concentrations of archaeological features which are interpreted as field system ditches, a possible Roman road and areas of possible settlement/funerary activity at the southeast plus settlement, a trackway, a field system and a small enclosure at the southwest of the survey area. The most intense activity is located at the southwest, although both areas clearly have high archaeological potential.

6.4 Whether archaeological features are present at the south centre of the site is unclear. A large area of made ground resulting from construction of the agricultural building in the survey area could mask anomalies caused by archaeological features although it is observed that archaeological features were not revealed during archaeological monitoring carried out during the groundworks.

6.5 Magnetic anomalies indicating the presence of the Roman road to Pakenham or Scole have not been identified on the alignment suggested by two parallel cropmarks located on the western side of the River Gipping Two parallel ditches indicating the presence of a northwest-southeast aligned possible trackway are identified at the southwest of the survey area and could suggest the position of the road, although it is unclear whether they extend more than 150m into the survey area.

6.6 The identified archaeological features suggest two routes for the proposed pipeline across the SAM (see Appendix 5). Some flexibility in the pipeline route may be possible at the northern part of the survey area where few, if any, archaeological features are identified. However, the location and character of archaeological features at the southwest and southeast of the survey area are likely to constrain much of the route of the pipeline to two corridors, one follows the northern boundary and the alternative crosses the central part of the survey area then follows the southern boundary of the site. The northern corridor is likely to encounter fewer archaeological features than the southern corridor and should be the preferred route to minimise adverse archaeological impact.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

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8. Acknowledgements

The author is grateful to Cherie Bellamy of *Anglian Water Services Ltd* for commissioning this project. The landowner Mr Gareth Hart is thanked for his cooperation during the fieldwork. Jess Tipper of *Suffolk County Council Archaeological Service* is gratefully acknowledged for his advice as is John Ette of *English Heritage* for granting the Section 42 Licence. Bob Zeepvat BA MIFA edited the report.

Fieldwork

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C Rouse BA PIFA
L Gill BSc PgDip

Report

A. Hancock

Graphics

A. Hancock

Appendix 1: Magnetic Survey: Technical Information

1. Magnetic Susceptibility and Soil Magnetism

1.1 Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed ***magnetic susceptibility***. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. These effects are often observable by measuring the magnetic susceptibility of the topsoil, which can enable identification of areas where human occupation or settlement has occurred by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently fills features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

1.2 In general, it is a contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of the surrounding matrix, i.e topsoils, subsoils and rocks, into which these features have been cut that causes the most recognisable archaeological responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. Less magnetic material such as masonry or plastic service pipes that intrude into the topsoil may give a negative magnetic response relative to the background level.

1.3 An alternative method of enhancement to the magnetic properties of soil or archaeological features is through sustained heating. This can lead to the detection of features such as hearths, kilns or burnt areas through thermoremanent magnetism.

2. Types of Magnetic Anomaly

2.1 In the majority of instances anomalies are termed ***'positive'***. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as ***'negative'*** anomalies that, conversely, means that the response is negative relative to the mean magnetic background. Such negative anomalies are often very faint and are commonly caused by modern, non-ferrous, features such as plastic water pipes. Infilled natural features may also appear as negative anomalies on some geologies.

2.2 Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

2.3 It should be noted that some anomalies that are interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the origin of the anomaly.

2.4 The types of response mentioned above can be divided into five main categories which are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)
These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.
Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. This type of anomaly is characterised by very strong, 'spiky' variations in the magnetic background. A modern origin is usually assumed unless there is other supporting information.

Linear trend
This is usually a weak or broad linear anomaly of unknown cause or date. An agricultural origin, either ploughing or land drains is a common cause.

Areas of magnetic enhancement/positive isolated anomalies
Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an X–Y trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic of an area of magnetic disturbance or of an 'iron spike' (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post holes or by kilns, with the latter often being characterised by a strong, positive double peak response. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies
Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

3. Methodology

3.1 Gradiometer Survey

There are two main methods of using the fluxgate gradiometer for commercial evaluations. The first of these is referred to as ***scanning*** and requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10-15m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey. In favourable circumstances scanning may be used to map out the full extent of features located during a detailed survey.

The second method is referred to as ***detailed survey*** and employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.5m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

A Bartington Grad 601-2 fluxgate gradiometer was used for the detailed gradiometer survey. Readings were taken, on the 0.1nT range, at 0.25m intervals on zig-zag traverses 1m apart within 20m by 20m square grids.

3.2 Data Processing and Presentation

The detailed gradiometer data has been presented in this report in X-Y trace and greyscale formats. The former option shows the 'raw' data with no processing other than grid biasing whilst in the latter the data has been selectively filtered to remove spurious errors such as striping effects and edge discontinuities caused by instrument drift and inconsistencies in survey technique caused by poor field conditions.
An X-Y plot presents the data logged on each traverse as a single line with each successive traverse incremented on the Y-axis to produce a 'stacked' plot. A hidden line algorithm has been employed to block out lines behind major 'spikes' and the

data has been clipped at 5nT. The main advantage of this display option is that the full range of data can be viewed, dependent on the clip, so that the ‘shape’ of individual anomalies can be discerned and potentially archaeological anomalies differentiated from ‘iron spikes’. ArchaeoSurveyor was used to create the X-Y trace plots.

ArchaeoSurveyor was used to process the data and produce the greyscale images and XY trace plots. All greyscale plots are displayed using a linear incremental scale.

Appendix 2: Survey Location Information

1. The geophysical survey blocks were established using a Pentax R-326EX total station. Survey block points were set out at 60m intervals with the total station and points at 20m intervals were set out as required using 100m tapes.

2. The survey grids were superimposed onto an Ordnance Survey digital map base. Overall there was a good correlation between the local survey and the digital map base and it is estimated that the average 'best fit' error is better than ±2m. It should be noted that Ordnance Survey 1:2500 mapping data have an error of ±1.9m at 95% confidence. This potential error must be considered if co-ordinates are measured off for relocation purposes from points other than those listed below or if anomalies are relocated using GPS technology.

Station	Easting	Northing
A (wooden stake)	611072.39	253721.26
B (wooden stake)	611083.47	253682.84
C (wooden stake)	610946.65	253604.16
D (wooden stake)	611106.70	253662.36
E (wooden stake)	610940.09	253494.32
F (wooden stake)	611158.71	253526.91
G (wooden stake)	610759.95	253284.93
H (wooden stake)	610783.57	253213.10
I (wooden stake)	610901.71	253325.08
J (wooden stake)	610972.90	253302.51
K (wooden stake)	611294.05	253298.16
L (wooden stake)	611017.61	253112.48

Appendix 3: Geophysical Archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data; plot meshes, composites, report text (Word 2000), and graphics files (CorelDraw12 and AutoCAD 2006) files.
- a full copy of the report

At present the archive is held by ASC Ltd although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (*i.e*. available for consultation in the relevant Sites and Monument Record Office). An online OASIS form will be completed.

Appendix 4: XY Trace Plots of Raw Gradiometer Data (1:1500)

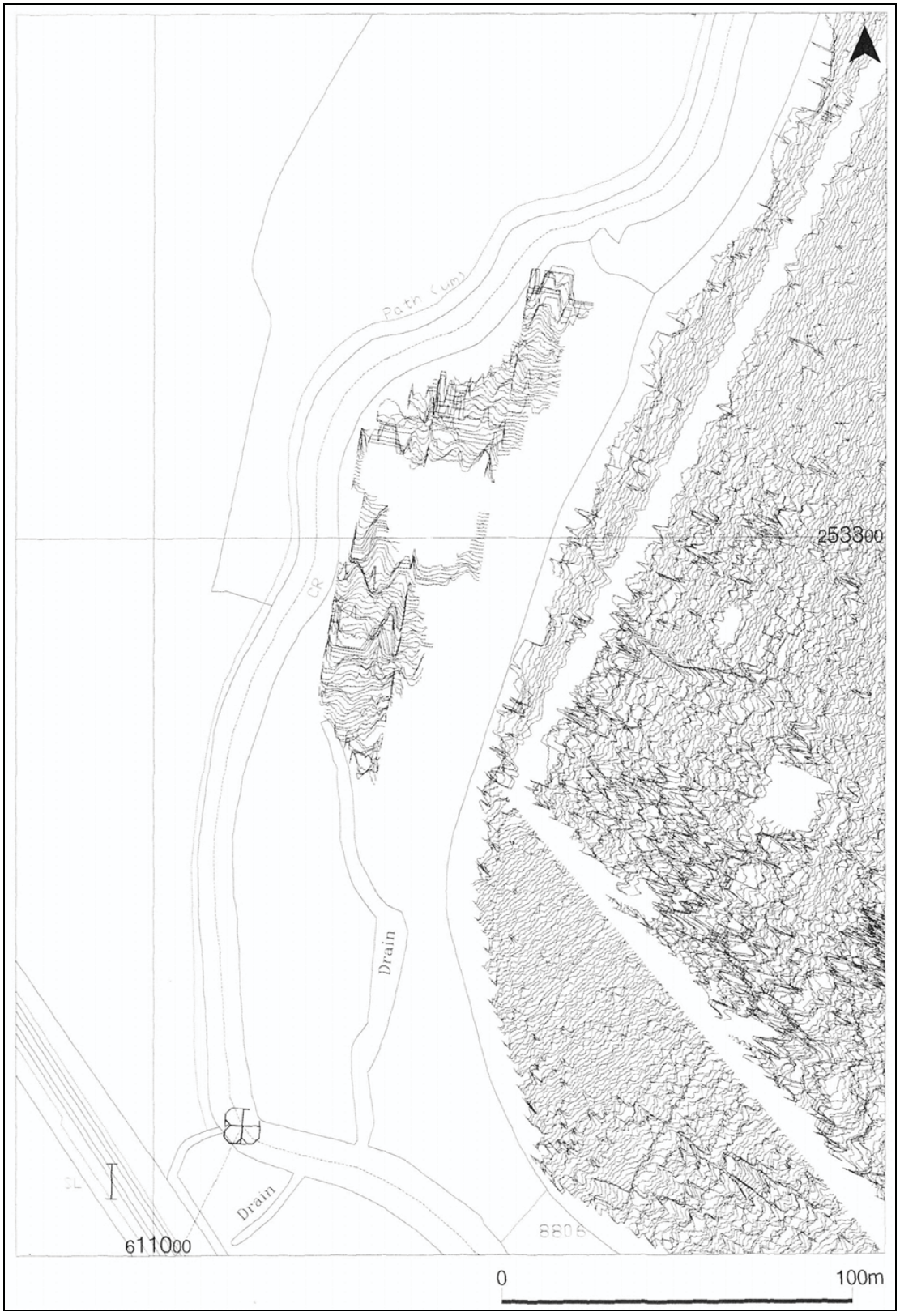

Figure 11: XY trace plot of raw gradiometer data at northwest of site

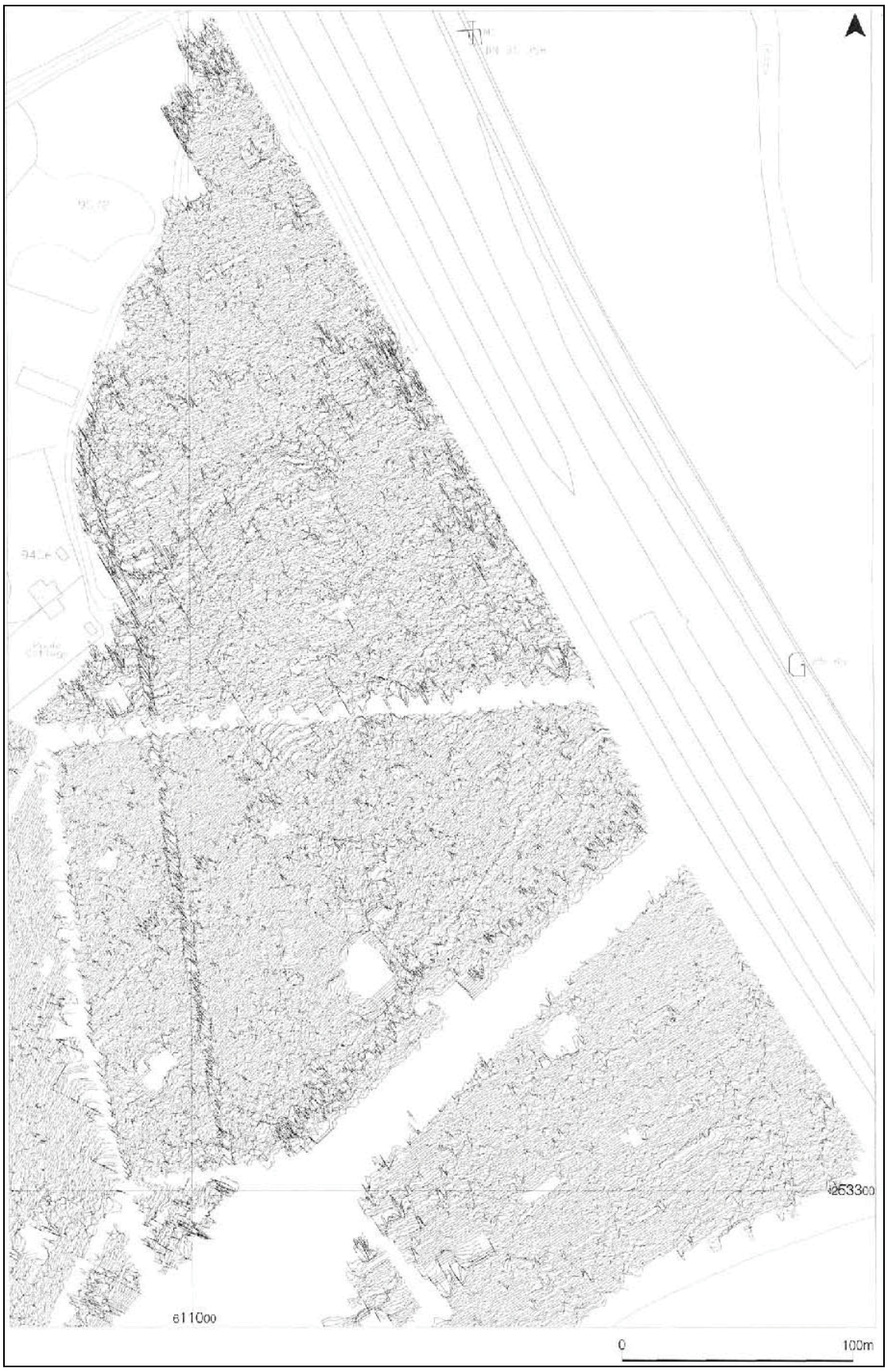

Figure 12. XY trace plot of raw gradiometer data at north and southeast of site

Figure 13. XY trace plot of raw gradiometer data; southwest of site

Appendix 5: Proposed Pipeline Corridors

Appendix 6: Section 42 Licence

ENGLISH HERITAGE

RECEIVED
29 JAN 2007

EAST OF ENGLAND REGION

Mr Alastair Hancock
Archaeological Services & Consultancy Ltd.
Letchworth House
Chesney Wold, Bleak Hall
Milton Keynes
MK6 1NE

Direct Dial: 01223 582711
Direct Fax: 01223 582701

Our ref: AA/40381
26 January 2007

Dear Mr Hancock

Ancient Monuments and Archaeological Areas Act 1979 (as amended) section 42 - licence to carry out a geophysical survey

BAYLHAM ROMAN SITE, CODDENHAM, BARKING, BARKING, MID SUFFOLK, SUFFOLK
Case No:SL00000143
SF89

I refer to your application to carry out a geophysical survey at the above site, as made in your letter dated 22 December 2006.

English Heritage is empowered to grant licences for such activity and I can confirm that we are prepared to do so as set out below.

By virtue of powers contained in section 42 of the 1979 Ancient Monuments and Archaeological Areas Act (as amended by the National Heritage Act 1983) English Heritage hereby grants permission for geophysical survey of BAYLHAM ROMAN SITE, for the areas shown on the map that accompanied your application (copy attached). This permission is subject to the following conditions.

1. The permission shall only be exercised by Mr Alastair Hancock and by no other person. It is not transferable to another individual.

2. The permission shall commence on 26 January 2007 and shall cease to have effect on 26 July 2007.

3. A full report summarising the results of the survey and their interpretation shall be sent to John Ette and to Paul Linford of the English Heritage Geophysics Team at Fort Cumberland (Fort Cumberland Road, Eastney, Portsmouth, Hampshire, PO4 9LD), no later than 6 months after the completion of the survey.

24 BROOKLANDS AVENUE, CAMBRIDGE, CB2 8BU
Telephone 01223 582 700 Facsimile 01223 582 701
www.english-heritage.org.uk

ENGLISH HERITAGE

EAST OF ENGLAND REGION

You are also asked to complete and return the enclosed questionnaire about the survey to the Geophysics Team, Fort Cumberland (address as above), in order to assist with maintenance of our national database of geophysical surveys.

A copy of the report to be lodged with English Heritage and the Centre of Archaeology.

This letter does not carry any consent or approval required under any enactment, bye-law, order or regulation other than section 42 of the 1979 Act (as amended).

You are advised that the person nominated under this licence to carry out the activity should keep a copy of this licence in their possession in case they should be challenged whilst on site.

Yours sincerely

John Ette
Team Leader and Inspector of Ancient Monuments
E-mail: john.ette@english-heritage.org.uk
cc

24 BROOKLANDS AVENUE, CAMBRIDGE, CB2 8BU
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www.english-heritage.org.uk

Appendix 9. Geophysical survey results: Baylham

Archaeological Services & Consultancy Ltd

GEOPHYSICAL SURVEY:
BAYLHAM BARROW CEMETERY
BAYLHAM
SUFFOLK

for
Anglian Water Services Ltd.

Alastair Hancock BSc PgDip

May 2007

ASC: 915/BBC/02

Letchworth House
Chesney Wold, Bleak Hall,
Milton Keynes MK6 1NE
Tel: 01908 608989 Fax: 01908 605700
Email: office@archaeological-services.co.uk
Website: www.archaeological-services.co.uk

Site Data

ASC site code:	BBC	Project no:	915
County:	Suffolk		
District:	Baylham		
Village/Town:	Nr Baylham		
Parish:	Baylham CP		
NGR:	TM 1107 5272 (site centre)		
Extent of site:	c.11.7 ha		
Present land use:	Agricultural		
Development:	Water pipeline		
Extent of development:	tba		
Planning application ref/date:	na		
Client:	Black and Veatch Ltd on behalf of Anglian Water Services Ltd Thorpe Wood House Thorpe Wood Peterborough Cambridgeshire PE3 6WT		
Contact name:	David Barton		
Telephone	01244 304178	Fax:	01244 304175

Summary

Detailed magnetometer survey was carried out over 9 hectares of an 11.7 hectare site. The northern part of the survey defines the location of part of a large ring ditch previously identified from crop marks. Other magnetic anomalies indicating the presence of a trackway and possible enclosure or field system ditches are identified northeast, east and southeast of the ring ditch.

The presence of a smaller ring ditch, also identified from cropmarks in the southern part of the survey area, has not been substantiated by the magnetometer survey although short sections of two parallel ditches, which may define a trackway or small enclosure, are evident near its suggested location. A number of magnetic anomalies defining the location of superimposed palaeochannels are present at the southeast of the survey.

1. Introduction

1.1 General

Archaeological Services and Consultancy Ltd (ASC) was commissioned by *Anglian Water Services Ltd* to undertake geophysical survey over a parcel of land through which a section of a proposed water pipeline would pass (Fig. 1). The *c.*11.7 hectares survey area, hereafter "site", lay immediately west of the River Gipping and *Combretovium* Roman settlement, which is designated a Scheduled Ancient Monument (SAM SF 89), and covered land containing parts of two ring ditches identified from cropmarks.

The work described in this report forms the initial phase of a programme of archaeological evaluation required to inform the route of the pipeline through the site and aid the design of an appropriate archaeological mitigation strategy. Fieldwork commenced on the 2nd May 2007 and was completed on the 10th May 2007. Prevailing weather conditions during the fieldwork were warm although frequently overcast with occasional showers.

1.2 Planning Background

The survey was requested by Anglian Water Services Ltd to fulfil their statutory obligations to the environment. The scope of the work was defined in a brief (Tipper 2007) prepared on behalf of the local planning authority (LPA), *Suffolk County Council,* by the Council's archaeological advisor (AA), *Suffolk Archaeological Service Conservation Team*.

1.3 Proposed Development

The proposed water pipeline will run for 9.5km between Stowmarket and Baylham. The survey described in this report examines a small area immediately west of the River Gipping toward the southern end of the route. The groundwork for the pipeline will consist of top and subsoil strip along a *c.*15m wide easement and subsequent excavation of a *c.*0.4m wide pipe trench. The exact methods of insertion of the pipe and its route will be informed by the results presented in this report and the results of further phases of archaeological evaluation.

1.4 Location and Description

The designated site was an irregularly shaped parcel of land comprising the greater part of three fields located in the Gipping Valley, *c.*3km northwest of Great Blakenham, Suffolk. The survey area covered *c.*11.7 hectares and was bounded at the southeast by a drain and by a drain and probable artificial channel of the River Gipping at the northeast. The northwestern limit was defined by a field boundary and the southwestern extent was delimited by railway embankment. The site was bisected by Mill Lane and the southern field was subdivided by an electrified stock fence. The majority of the site was set aside although the southern half of survey block 2 had been ploughed and contained a recently germinated cereal crop.

1.5 Constraints

The part of the site north of Mill Lane was subdivided by a field boundary and the area east of the boundary was covered by dense, knee high vegetation. The presence of this vegetation prevented safe survey and reduced the total site area to 9 hectares (Fig 2).

1.6 Geology & Topography

The soils of the area belong to the Ludford Association, which are described as *"deep well drained fine loamy, coarse loamy and sandy soils, locally flinty and in places over gravel"* (Soil Survey 1983 571x). Alluvial deposits are likely to be present near the river although none are noted by the Soil Survey. The underlying geology is glaciofluvial drift.

The survey area lies on the western side of the River Gipping and the northern part of the site is characterised as exhibiting a gentle southwest-northeast trending slope that descends from *c.*16m AOD to *c.*14m AOD at the river. The area south of Mill Lane descends relatively steeply from *c.*16m AOD atop a possible relict terrace at the northwest corner to *c.*14m AOD at the floodplain below.

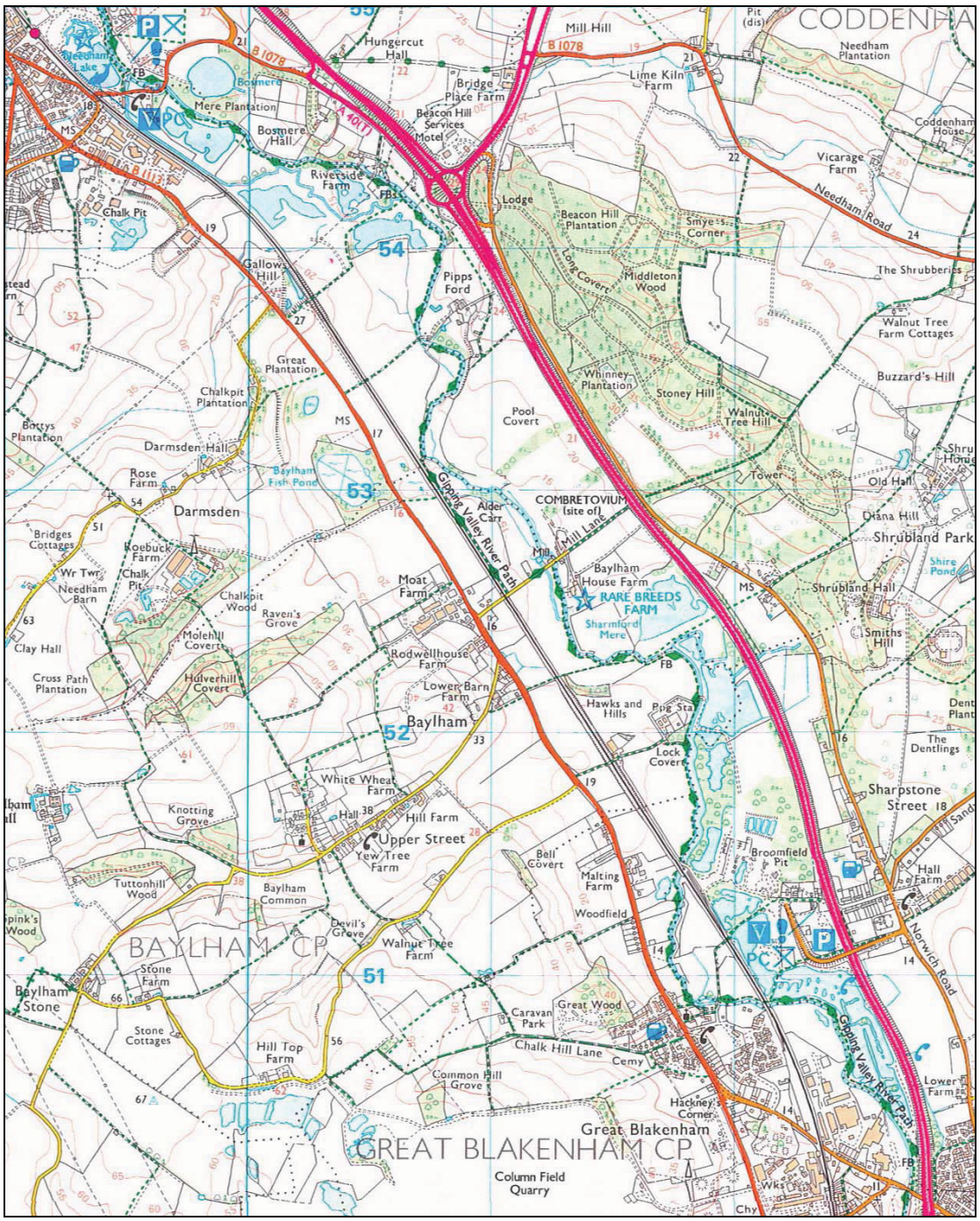

Figure 1. General location (scale 1:25, 000)

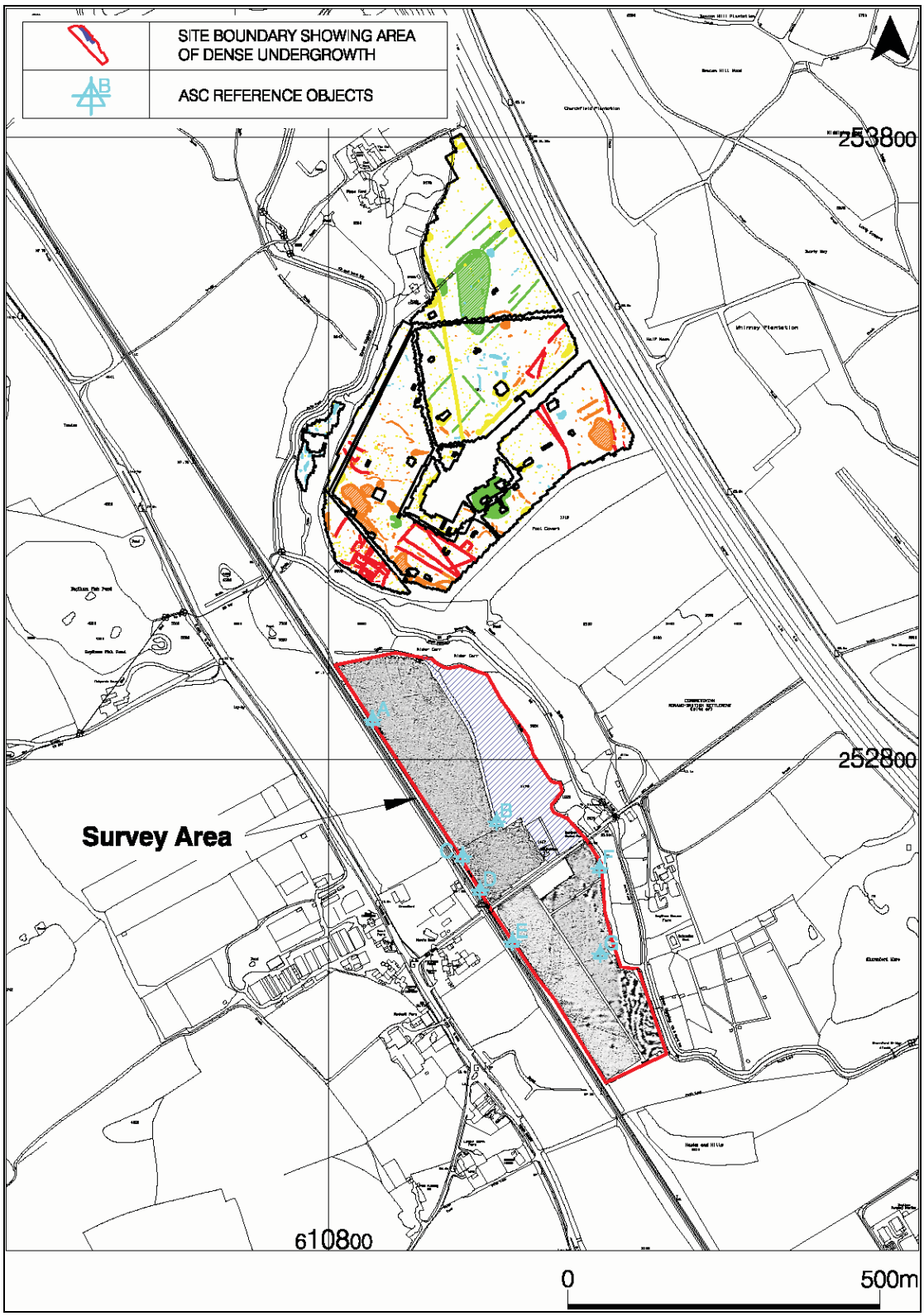

Figure 2. Survey location showing interpretation of earlier geophysical survey *(scale 1:10,000)*

2. Archaeological & Historical Evidence

2.1 Introduction

The local and regional settings of archaeological sites are factors that are taken into consideration when assessing the implications of development proposals. The survey area lies immediately east of a number of ring ditches identified from cropmarks and immediately west of a Scheduled Ancient Monument (SAM) that protects two Roman forts and an associated vicus. The following sections provide a summary of the relevant archaeological and historical background presented in a desk-top assessment examining the proposed pipeline (Rolfe 2006).

2.2 *Prehistoric - Iron Age (before AD 43)*

Flint assemblages indicating exploitation of the Gipping Valley by Mesolithic hunter-gatherers have been recovered a few hundred meters east of the survey boundary (CDD006, CDD060, BRK104), at the southeast of the SAM (CDD009) and at more distant locations along the proposed pipeline route (CRM027, CRP007). Flint assemblages (CDD009, CDD017, CDD060, BRK104) dating to the later Neolithic period have also been recovered near the site.

The geophysical survey examines an area of land containing part, or all, of two ring ditches (BAY007, BAY012) identified from cropmarks and lies immediately east of the location of a number of other ring ditches also identified from cropmarks. The ring ditches form part of a larger northwest-southeast aligned linear barrow cemetery of suggested Bronze Age date, that runs for *c.*1.15km along the Gipping Valley. This area is currently unscheduled although it may contain nationally important archaeological remains.

Finds and archaeological features (CDD003, CDD009, CDD017) are recorded illustrating that an earlier Iron Age settlement underlies at least part of the later RB settlement protected by the SAM.

2.3 Romano-British (AD 43-c. 450)

The remains of two superimposed legionary forts lie immediately east of the survey area on the opposite side of the River Gipping and are suggested to have protected a river crossing. The forts and an associated civilian settlement (*vicus*) are statutorily protected as a Scheduled Ancient Monument (SAM SF89). The larger fort had three ditches and enclosed an area of over 4.45 hectares. A second smaller auxiliary fort lies in the south-western corner of the larger enclosure and covers an area of c.2.2 ha. The site has produced a number of notable finds, including a saddle-cloth weight, indicating the presence of cavalry, and a bronze statuette of Nero with silver and niello inlay which may have been deliberately broken.

A *vicus* eventually developed and this civilian settlement is known as *Combretovium*. A recent geophysical survey (Hancock 2007: Fig 2) at the north of the SAM has defined the locations of a possible Roman road, field system ditches, enclosure ditches, suggested settlement activity and possible funerary/ritual activity.

2.4 Anglo-Saxon (c. 450-1066)

Settlement features (BRK104) of this period are recorded a few hundred meters north of the site and a ring ditch and other finds (CDD057, CRM043) which may indicate funerary activity are noted c.500m north of the site. An Anglo-Saxon pot associated with fragments of a human skull (CDD003) has been recovered east of the survey area within the SAM, and two coins, a brooch and a hooked tag (CDD017) were found c.1km to the east.

2.5 Medieval (1066-1500)

The desk-top assessment notes a church (CRP004) listed in the Domesday Survey, and recovery of disparate finds dating to the medieval period along the proposed route of the pipeline although no sites or finds of this period are recorded within the survey area or its immediate environs.

2.6 Post-Medieval (1500-1900)

Metal detectorists have recovered a harness buckle, other buckles and a spoon bowl (SF 11414) of this period within the southern part of the survey area. Other notable features of this period include a lock (BAY035), a bridge (BAY028) and a possible 17th century watermill (BAY030) which lie immediately east of the survey area.

2.7 Modern (1900-present)
The 1st Edition Ordnance Survey map shows the survey area subdivided by a number of field boundaries that are no longer extant. It is probable that these boundaries were grubbed out during the latter half of the 20th century.

3. Aims, Methodology and Report Presentation

3.1 Aims
In line with the requirements of the *brief* (Section 2.3), the aims of the geophysical survey were:

- To provide information to construct an archaeological conservation strategy, dealing with the preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

3.2 Methods
The methods adopted for this project were those set out in the project design (Hancock 2007) and consisted of:

- A detailed magnetometer survey at a sample interval of 0.25m x 1.0m of *c.*11.7 hectares

3.3 Standards
The work conformed to the requirements of the *brief* (Tipper 2007), to the *project design* (Hancock 2007), to *Standards for Field Archaeology in the East of England* (Gurney 2003), to the relevant sections of the Institute of Archaeologists' *Standard & Guidance Notes* (IFA 2001) and *Code of Conduct* (IFA 2000a) and to MAP2 (EH 1991). The work also conformed to the relevant sections of ASC's own *Operations Manual,* to English Heritage geophysical survey guidelines (David 1995) and to IFA geophysical survey guidelines (Gaffney *et al* 2002). Data from the magnetometer survey was treated and archived in accordance with Archaeology Data Service guidelines (Schmidt 2003).

3.4 Report Presentation

3.4.1 A general site location plan incorporating the 1:25,000 Ordnance Survey mapping is presented in Figure 1. Figure 2 (1:10,000) shows the site and relative position of the geophysical survey blocks. The processed greyscale gradiometer data and accompanying interpretations are presented in Figures 3 to 6 at a scale of 1:1250. XY trace plots (1:1250) of the unprocessed "raw" gradiometer data are presented in Appendix 4.

3.4.2 Comprehensive technical details on the underlying principles of magnetic survey, the equipment used and general geophysical survey methodology are given in Appendix 1. Details on data processing and display are also given in Appendix 1. Survey location information is presented in Appendix 2 and the composition of the archive described in Appendix 3.

3.4.3 The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of ASC staff.

4. Geophysical Survey: Results and Discussion

4.1 *Non Archaeological Anomalies*

4.1.1 Discrete dipolar anomalies ("iron spikes" – Appendix 1) are identified distributed across all parts of the site. These "iron spike" anomalies are usually indicative of ferrous objects or other strongly magnetic material incorporated into the topsoil/subsoil and are often caused by modern cultural debris. Archaeological artefacts may manifest this type of anomaly and significant clusters associated with other substantiating evidence may be included in the discussion of archaeological anomalies.

4.1.2 Large areas of magnetic disturbance caused by ferrous or fired/heated material are identified in all four survey blocks although they are more prevalent adjacent to the railway line in Block 1 and on the higher ground near the railway line at the north of Block 2. The majority of these anomalies result from proximity of the survey blocks to ferrous components of the railway line, presence of wire strand fencing and accumulation of modern ferrous/fired detritus against field boundaries. An archaeological origin cannot be discounted for all of these anomalies as thermoremanent features such as kilns, furnaces or hearths may produce similar magnetic signatures.

4.1.3 Negative linear trends probably resulting from modern agricultural activity are identified in Blocks 1 and 2. The trend in Block 2 runs parallel with an electrified stock fence and was caused by a channel of shallower topsoil at the limit of a strip of recently ploughed ground. The trends in Block 1 also run parallel with an extant boundary and likely result from modern ploughing or compression of topsoil by agricultural vehicles.

4.1.4 Curvilinear areas of magnetic enhancement caused by modern agricultural activity are identified in all four survey blocks. The position of those identified in Blocks 2, 3 and 4 match the locations of since grubbed out field boundaries shown on 1st Ed. OS mapping. The origin of the short trend located at the southeast of survey Block 1 cannot be interpreted as definitively although the presence of significant ferrous/thermoremanent magnetic disturbance in this area suggests that relatively modern activity is the likely cause.

4.1.5 A large area of anomalous magnetic enhancement is present on the floodplain of the River Gipping at the southeast of Block 4. The strong and broad magnetic response of the curvilinear anomalies within this area are characteristic of those caused by geomorphological features, in this instance they result from the presence of superimposed palaeochannels.

4.1.6 Identified in Blocks 2, 3 and 4 are a number of discrete areas of magnetic enhancement. The broad, magnetically positive character of these anomalies and their position on the floodplain of the river suggests that they identify features resulting from the operation of geomorphological or other natural processes.

4.2 *Archaeological Anomalies: Block 1*

4.2.1 Block 1 has located a “ring ditch” (BAY 007) previously identified from cropmarks (Rolfe 2006). A little less than half of the ring ditch (**A**) lies within the site although enough is present to suggest a diameter of *c.*90m. The magnetic anomaly caused by the ditch fill is weak and it is unclear whether an apparent gap at the east of the anomaly defines an entrance or is the consequence of a lack of magnetic contrast between the ditch fill and the surrounding natural strata. The impressive projected diameter of this anomaly may indicate that it locates the ditch of a ritual monument or an enclosure rather than the ring ditch of a Bronze Age funerary monument.

4.2.2 Two north northwest – south southeast aligned parallel linear anomalies (**B**) are present at the north of the survey block. The anomalies are characteristic of those caused by infilled archaeological ditches and probably locate the flanking ditches of a trackway. A large discrete anomaly located toward the southern end of the eastern ditch may identify the position of an infilled pit. Two weakly positive curvilinear anomalies cross the proposed trackway and could define the positions of further infilled ditches. It is unlikely that the curvilinear ditches were contemporary with the trackway and it is suggested that they may predate it.

4.2.3 A west southwest – east northeast aligned linear positive anomaly (**C**) suggests the presence of an infilled archaeological ditch. The eastern part of anomaly **C** is strongly magnetic but the anomaly weakens as it progresses westward toward “ring ditch” **A**. It is tentatively suggested that Ditch **C** may be contemporary with trackway ditches (**B**) as they respect its position and it could post date the “ring ditch” **A** which it appears to cross.

4.2.4 Northwest – southeast aligned, weakly positive curvilinear anomaly (**D**) could define the position of an infilled boundary ditch. Two weak positive linear anomalies (**E**) may locate the flanking ditches of an entrance into an enclosure or field system bounded by **D**. Other magnetic anomalies indicating the presence of cut and infilled features are scarce east of **D**, and this could suggest that **D** defines the limit of a field system rather than an enclosure containing settlement activity.

4.2.5 Two large areas of magnetic disturbance resulting from human activity can be seen east of ditch **D**. The magnetic disturbance probably defines areas of made ground or intrusive activity associated with a relatively modern, partially infilled extraction pit which was observed in this area. The evidence summarised in this and the previous section indicates that attribution of an archaeological origin to anomalies **D** and **E** should remain tentative.

4.2.6 A weak positive rectilinear anomaly (**F)** is visible *c.*30m southeast of the southernmost limit of anomaly **D**. Anomaly **F** may define the position of an infilled enclosure ditch although a relatively modern agricultural origin cannot be discounted.

4.2.7 Disparate small discrete areas of magnetic enhancement with a possible archaeological origin are identified in Block 1. The presence of infilled archaeological ditches at the northern half of the block suggests that some of the discrete anomalies in this area will locate infilled archaeological pits although it is probable that some will be caused by infilled natural features or modern intrusive activity.

4.3 *Archaeological Anomalies: Blocks 2, 3 and 4*

4.3.1 Two parallel, weakly positive west southwest – east northeast aligned linear anomalies and a tentatively identified short section of a north - south aligned return are located next to the railway line at the northwest of Block 2. The “ring ditch” (BAY 012) of a possible Bronze Age barrow has been identified from cropmarks in this area (Rolfe 2006) but the identified anomalies are rectilinear in plan and are unlikely to define the position of a funerary monument of this period. The anomalies appear to locate infilled ditches of unknown antiquity and the presence of a trackway or small square enclosure is tentatively suggested.

4.3.2 Two small, discrete areas of magnetic enhancement that may be caused by infilled archaeological features are tentatively identified in Block 4. The anomalies may locate archaeological pits although their isolation and position on the floodplain of the river suggests that a geomorphological or modern origin is equally probable.

4.3.3 Other magnetic anomalies suggesting the presence of archaeological features are not identified in Blocks 2, 3 and 4.

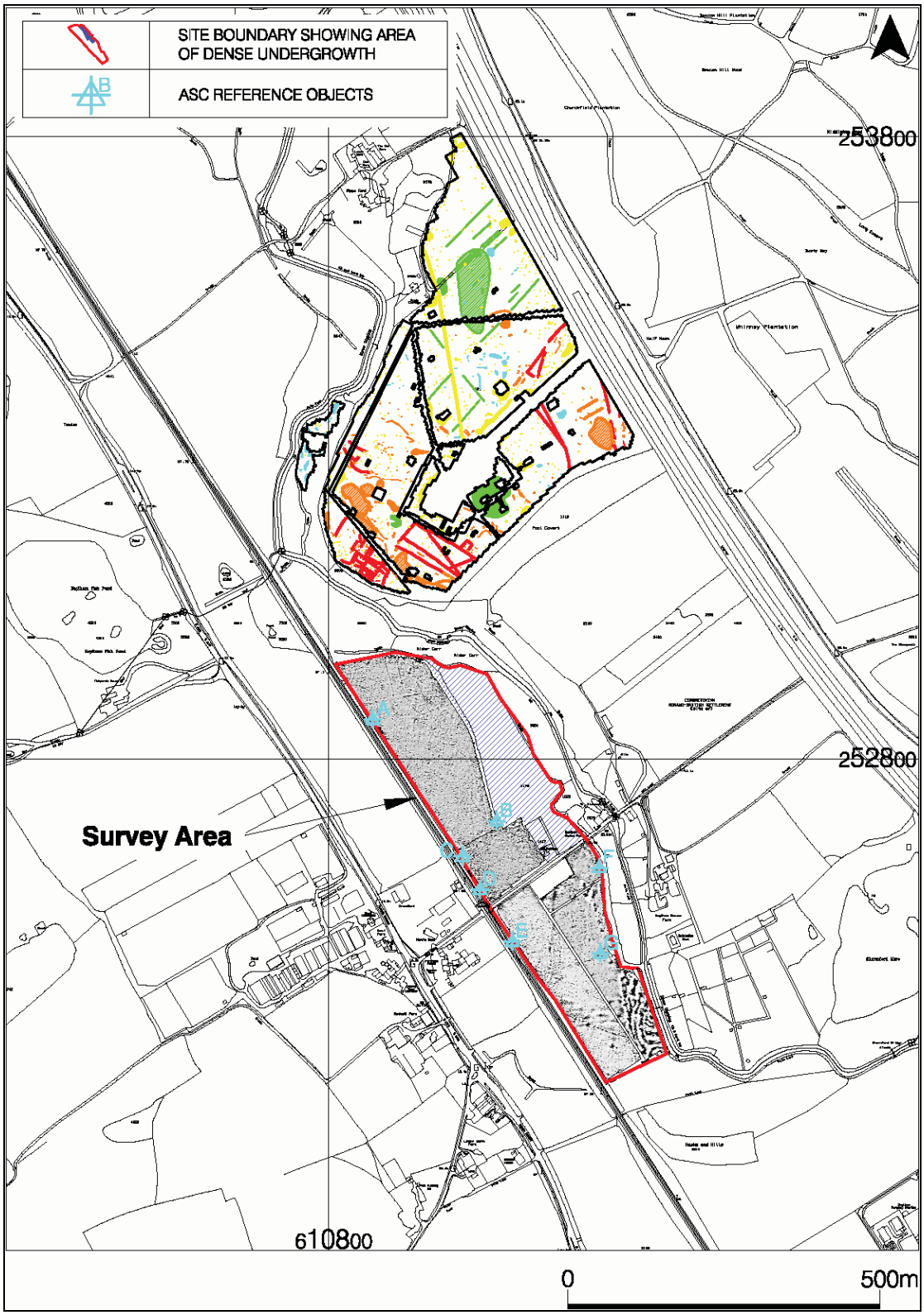

Figure 3. Greyscale plot of gradiometer data; Block 1

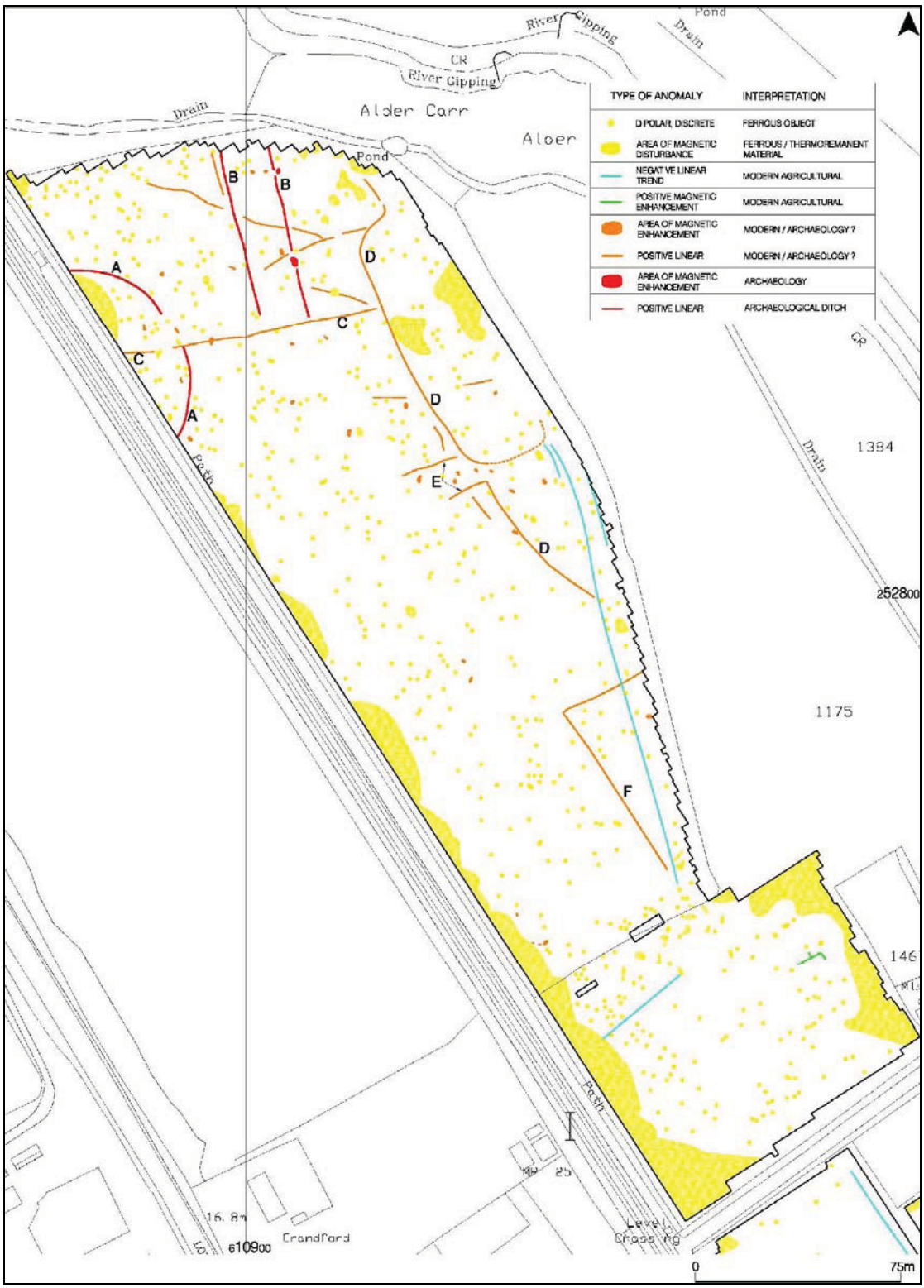

Figure 4. Interpretation of gradiometer data; Block 1

Figure 5. Greyscale plot of gradiometer data; Blocks 2, 3 and 4

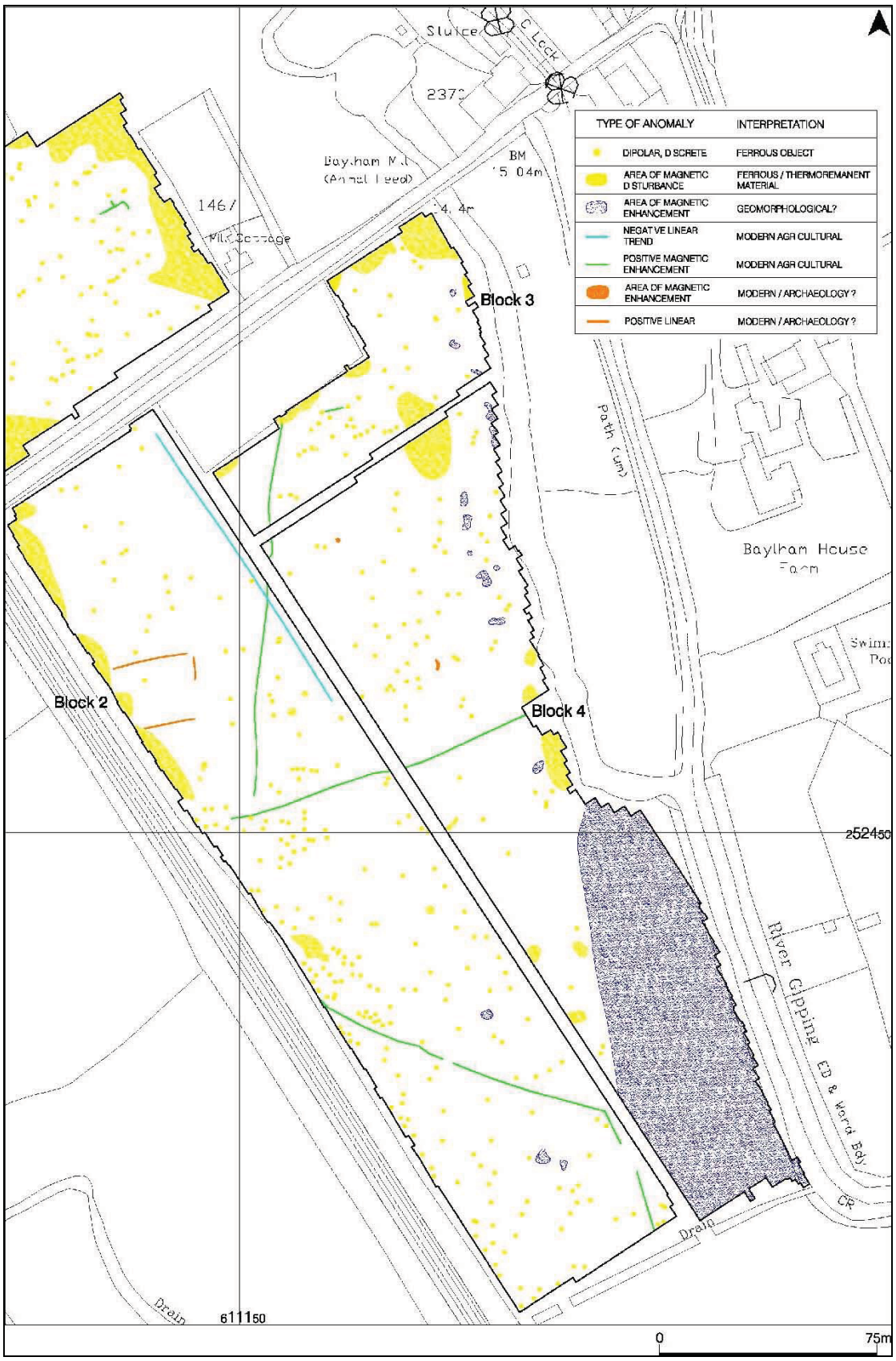

Figure 6. Interpretation of gradiometer data; Blocks 2, 3, and 4

5. Conclusions

5.1 The magnetometer survey has confirmed and successfully defined the position of a section of a large “ring ditch” (**A**) previously identified from crop marks. The ditch has been interpreted as defining the location of a Bronze Age barrow (Rolfe 2006) although a projected diameter of *c.*90m and a possible gap at the east of the ditch indicate that it may define an earlier ritual monument or a circular enclosure.

5.2 The survey has located previously unknown linear, curvilinear and rectilinear anomalies east, northeast and southeast of the “ring ditch”. The anomalies are interpreted as defining the position of a trackway and possible enclosure/field system ditches of unknown date. One of the ditches appears to pass through the area enclosed by the “ring ditch” and this relationship suggests that at least two phases of past human activity may be present at the north of the survey area.

5.3 The orientation of possible trackway (**B**) at the north of Block 1 suggests that it may meet the western side of the river opposite Romano-British settlement features discovered at the eastern side of the river during an earlier geophysical survey (Hancock 2007: Fig 2).

5.4 Areas of strong magnetic disturbance are present adjacent to the railway line in Block 1 and could obscure smaller, weaker anomalies characteristic of archaeological features. Magnetic anomalies indicating the presence of ditches extending from the areas of disturbance into Block 1 are absent and the extent of any obscured archaeology is probably limited.

5.5 The presence of a small ring ditch identified from cropmarks at the south of the survey area has not been substantiated by the results of the geophysical survey. Weak positive linear anomalies are identified at the proposed location of the ring ditch and could define a trackway or small enclosure of unknown antiquity.

5.6 Magnetic anomalies defining the position of superimposed palaeochannels are present on the flood plain of the River Gipping at the southeast of the survey area. The palaeochannels may contain soil/sediment and other forms of environmental evidence from which Holocene climatic conditions and the type and scale of past human exploitation of this area could be inferred.

5.7 The summarised results suggest that the archaeological potential of the northern half of survey Block 1 should be regarded as high, reducing to medium at the south. The archaeological potential of the area surveyed south of Mill Lane (Blocks 2, 3 and 4) is regarded as low.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

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7. Acknowledgements

The author is grateful to *Black and Veatch Ltd* and *Anglian Water Services Ltd* for commissioning this project. Jess Tipper of *Suffolk County Council Archaeological Service* is gratefully acknowledged for his advice. Bob Zeepvat BA MIFA edited the report.

Fieldwork

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T Joyce BA

Report

A. Hancock

Graphics

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Appendix 1: Magnetic Survey: Technical Information

1. Magnetic Susceptibility and Soil Magnetism

1.1 Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed ***magnetic susceptibility***. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. These effects are often observable by measuring the magnetic susceptibility of the topsoil, which can enable identification of areas where human occupation or settlement has occurred by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently fills features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

1.2 In general, it is a contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of the surrounding matrix, i.e topsoils, subsoils and rocks, into which these features have been cut that causes the most recognisable archaeological responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. Less magnetic material such as masonry or plastic service pipes that intrude into the topsoil may give a negative magnetic response relative to the background level.

1.3 An alternative method of enhancement to the magnetic properties of soil or archaeological features is through sustained heating. This can lead to the detection of features such as hearths, kilns or burnt areas through thermoremanent magnetism.

2. Types of Magnetic Anomaly

2.1 In the majority of instances anomalies are termed ***'positive'***. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as ***'negative'*** anomalies that, conversely, means that the response is negative relative to the mean magnetic background. Such negative anomalies are often very faint and are commonly caused by modern, non-ferrous, features such as plastic water pipes. Infilled natural features may also appear as negative anomalies on some geologies.

2.2 Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

2.3 It should be noted that some anomalies that are interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the origin of the anomaly.

2.4 The types of response mentioned above can be divided into five main categories which are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)
These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.
Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. This type of anomaly is characterised by very strong, 'spiky' variations in the magnetic background. A modern origin is usually assumed unless there is other supporting information.

Linear trend
This is usually a weak or broad linear anomaly of unknown cause or date. An agricultural origin, either ploughing or land drains is a common cause.

Areas of magnetic enhancement/positive isolated anomalies
Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an X–Y trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic of an area of magnetic disturbance or of an 'iron spike' (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post holes or by kilns, with the latter often being characterised by a strong, positive double peak response. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies
Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

3. Methodology

3.1 Gradiometer Survey
There are two main methods of using the fluxgate gradiometer for commercial evaluations. The first of these is referred to as ***scanning*** and requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10-15m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey. In favourable circumstances scanning may be used to map out the full extent of features located during a detailed survey.

The second method is referred to as ***detailed survey*** and employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.5m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

A Bartington Grad 601-2 fluxgate gradiometer was used for the detailed gradiometer survey. Readings were taken, on the 0.1nT range, at 0.25m intervals on zig-zag traverses 1m apart within 20m by 20m square grids.

3.2 Data Processing and Presentation
The detailed gradiometer data has been presented in this report in X-Y trace and greyscale formats. The former option shows the 'raw' data with no processing other than grid biasing whilst in the latter the data has been selectively filtered to remove spurious errors such as striping effects and edge discontinuities caused by instrument drift and inconsistencies in survey technique caused by poor field conditions.

An X-Y plot presents the data logged on each traverse as a single line with each successive traverse incremented on the Y-axis to produce a 'stacked' plot. A hidden line algorithm has been employed to block out lines behind major 'spikes' and the data has been clipped at 5nT. The main advantage of this display option is that the full range of data can be viewed, dependent on the clip, so that the 'shape' of individual anomalies can be discerned and

potentially archaeological anomalies differentiated from ‘iron spikes’. ArchaeoSurveyor was used to create the X-Y trace plots.

ArchaeoSurveyor was used to process the data and produce the greyscale images and XY trace plots. All greyscale plots are displayed using a linear incremental scale.

Appendix 2: Survey Location Information

1. The geophysical survey blocks were established using a Pentax R-326EX total station. Survey block points were set out at 60m intervals with the total station and points at 20m intervals were set out as required using 100m tapes.

2. The survey grids were superimposed onto an Ordnance Survey digital map base. Overall there was a good correlation between the local survey and the digital map base and it is estimated that the average 'best fit' error is better than ±2m. It should be noted that Ordnance Survey 1:2500 mapping data have an error of ±1.9m at 95% confidence. This potential error must be considered if co-ordinates are measured off for relocation purposes from points other than those listed below or if anomalies are relocated using GPS technology.

Station	Easting	Northing
A (wooden stake)	610871.71	252863.07
B (wooden stake)	611069.67	252699.44
C (wooden stake)	611015.18	252643.06
D (wooden stake)	611042.90	252589.36
E (wooden stake)	611094.96	252506.16
F (wooden stake)	611234.52	252624.46
G (wooden stake)	611236.03	252487.18

ASC Ltd cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party or for the removal of any of the survey reference points.

Appendix 3: Geophysical Archive
The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data; plot meshes, composites, report text (Word 2000), and graphics files (CorelDraw12 and AutoCAD 2006) files.

- a full copy of the report

At present the archive is held by ASC Ltd although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (*i.e*. available for consultation in the relevant Sites and Monument Record Office). An online OASIS form will be completed.

Appendix 4: XY Trace Plots of Raw Gradiometer Data (1:1250)

Figure 7. XY trace plot of raw gradiometer data; Block 1

Figure 8. XY trace plot of raw gradiometer data; Blocks 2, 3 and 4

ARCHAEOLOGICAL DESK-TOP ASSESSMENT

AN ASSESSMENT OF THE POTENTIAL FOR IMPACT ON ARCHAEOLOGICAL DEPOSITS AS A RESULT OF THE PROPOSED WATER PIPELINE

(Planning app. no. Pre-planning)

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SCCAS Report No. 2006/168

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Acknowledgements

This project was funded by Anglian Water and commissioned by Black and Veatch Ltd. The desk-top assessment was carried out by James Rolfe, Suffolk County Council Archaeological Service (SCCAS), Field Team. The project was managed by John Newman, Field Officer/Contracts Manager, SCCAS, Field Team and advice was given by Edward Martin and Jude Plouviez, SCCAS, Conservation Team.

Summary

An archaeological impact assessment has been undertaken as a result of a proposal to construct a 9.5 km pipeline between Stowmarket and Baylham. An examination of the County Sites and monuments Record (SMR) entries, aerial photographs and readily available cartographic and documentary material has been made of the area. The proposed development falls within a landscape of a river valley that has a high potential for archaeological material from all periods. This assessment has identified that a large number of archaeological sites are known to exist within the study area, including the two scheduled ancient monuments, the large Roman settlement of COBRETOVIVM and two forts, also known are a possible Roman villa and two Bronze Age barrow cemeteries. The evidence indicates that there is a high potential for further new sites to be uncovered during this development. The pipeline passes through some sensitive archaeological areas that have a high potential for good preservation of waterlogged and palaeo-environmental remains to be discovered particular on the valley floor. There are 5 routes that the pipeline could take in the most sensitive area at the southern end of proposed development. Each route will disturb some known archaeology and has the potential to disturb as yet unknown archaeological sites. Mitigation when the routes have been refined would likely require another stage of more detailed desktop study covering the accurate (rectified) plotting of archaeological evidence from aerial photographs in the area of the barrow cemeteries and the Roman small town and forts. This survey could also be followed by geophysical survey, as minor route diversions to avoid complex (and expensive) archaeological deposits may well be preferable to extensive excavation work. On an extensive linear pipeline project of this scale further mitigation work is also likely to include surface collection (field walking) once the route has been finalised followed by possible evaluation trenching and full scale excavation if archaeological deposits cannot be avoided. Finally monitoring of soil stripping for the wayleave coupled with rapid salvage excavation work would cover unexpected discoveries. At it's southern end in particular this route corridor includes sites of national and protected status with the roman small town and forts plus areas of potential high importance and sensitivity around the Bronze Age barrow cemeteries. A tiered approach to the archaeological study of the likely route options is strongly advised with flexibility maintained in finalising a route at least until detailed aerial photographic plotting has been carried out.

SMR information

Planning application no.	Pre-planning
Grid Reference:	TM 1000 5500
Funding body:	Anglian Water

1. Introduction and methodology

This archaeological desk based assessment has been prepared by James Rolfe of Suffolk County Council for Anglian Water.

The subject of the assessment is the proposed development area (PDA), of a pipeline between Stowmarket and Baylham running for a length distance of 9.5km. This development is within the parishes of Barking (**BRK**), Baylham (**BAY**), Coddenham (**CDD**), Creeting St Mary (**CRM**) and Creeting St Peter (**CRP**).

In accordance with PPG16, the Government's guidance on archaeology and planning, this assessment examines the available archaeological sources:- the Suffolk Sites and Monuments Record (SMR); any archaeological investigations close to the PDA; aerial photographs; readily available cartographic and documentary sources; the personal experience of various people familiar with the area and a walkover survey. Also detailed environmental consultation and study is also required to meet the relevant standards and policies adhered to by the national water companies.

In order to assess impact of the proposed development on the archaeological resource, a corridor of study was selected and any sites outside this area, which may encroach within it, were chosen for intensive survey (Fig. 1).

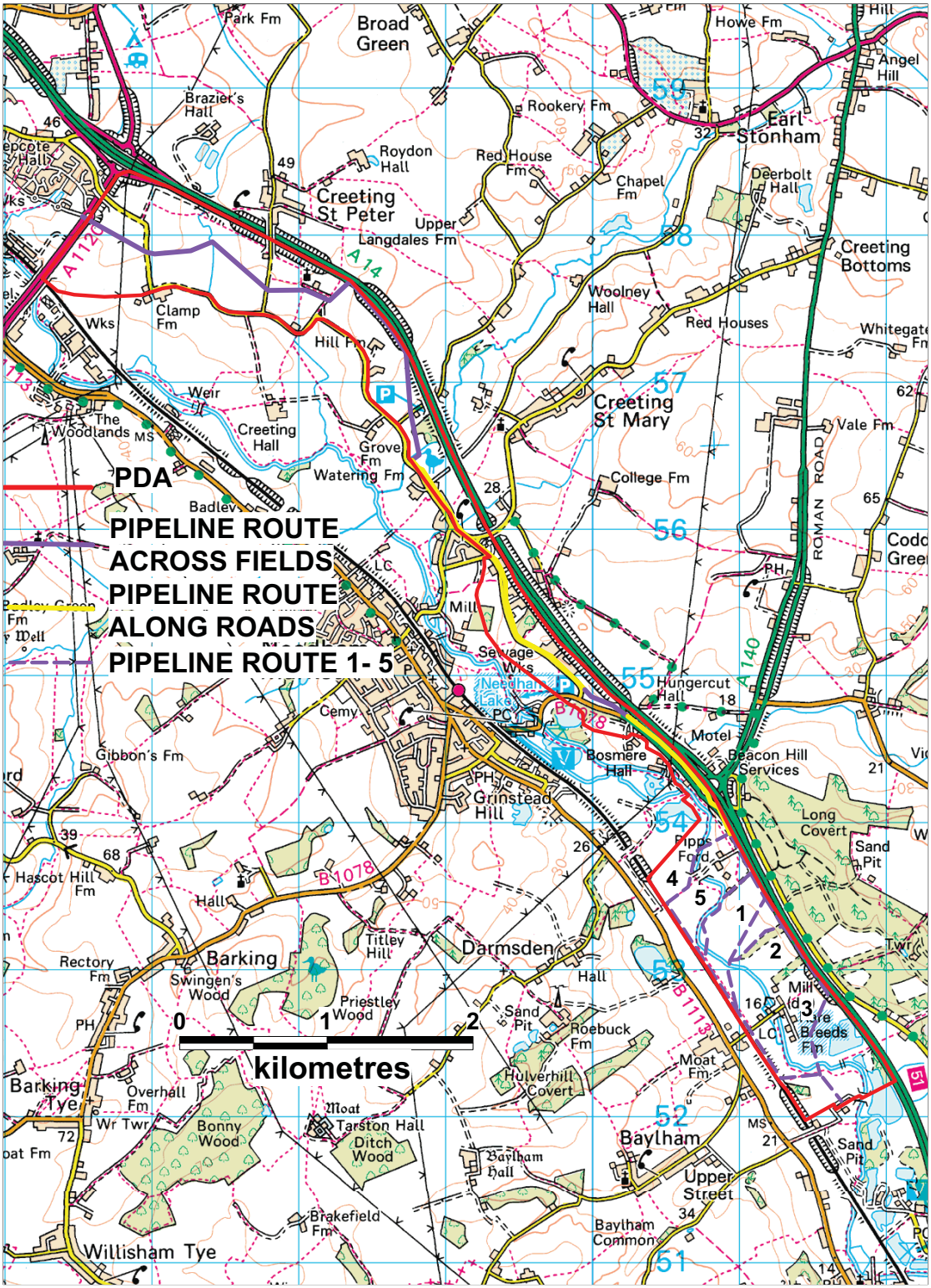

Figure 1. Proposed Development Area

2. Background

2.1. Legislative and planning background

PPG 16 (November 1990) provides guidance for planning authorities, developers and others in the investigation of archaeological remains. This advises developers to discuss their plans, preferably at a pre planning stage with the County archaeological planning officer for any possible archaeological constraints on their development proposal. This planning guidance sets out to protect nationally and locally important monuments and their settings. There will be a presumption in favour of preservation *in situ* of important remains. In certain circumstances field evaluation will be carried out to enable an informed decision to be made. On sites where there is no overriding case for preservation *in situ* provision will be made for their recording and excavation prior to development

Evidence in the Suffolk SMR records a frequency of one site per five hectares and this is used as a guiding principal in the advice offered on planning applications, in addition valley bottom areas are seen as zones of particularly high potential for archaeological deposits of all periods.

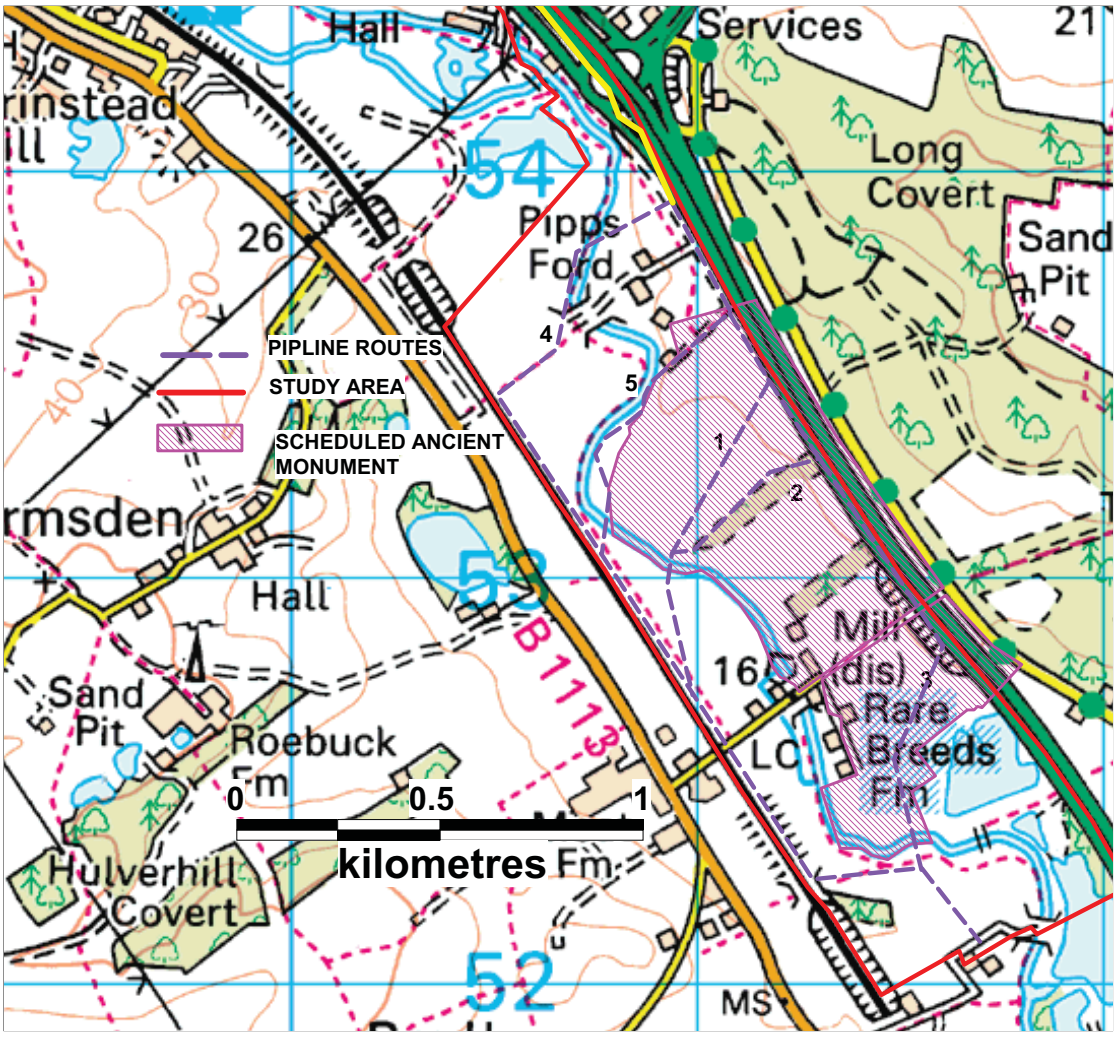

Figure 2. Scheduled Ancient Monuments

Scheduled Ancient Monuments (SAMs) are statutorily protected as nationally important sites, by the Ancient Monuments and Archaeological Areas Act 1979. This protects the SAM and their settings. There are two SAM's within PDA corridor (Suffolk SAM No.89 & 17901), **CDD 003** is the large Roman settlement identified with COBRETOVIVM and **CDD 016** that comprises of two multiple ditched Roman auxiliary forts, both dating from the first century. Any works to be carried out on a SAM need prior consent from English Heritage who would have to be informed of possible works at the earliest possible time. Any subsequent work carried out on the SAM would be further specified by English heritage. It is likely that English heritage will expect a thorough study of all potential route options before consenting to any direct impact on the SAM areas.

Listed building are protected under the Listed Buildings and Conservation Areas Act 1990. This ensures that listed buildings are given statutory protection against unauthorised demolition, alteration and extension. Buildings are listed because they are of special architectural importance due to their architectural design, decoration and craftsmanship; also because they are of historical interest, this includes buildings which illustrate important aspects of the nation's social, economic, cultural or military history or have close association with nationally important persons or events.

A SSSI is an area that has been notified as being of special interest under the Wildlife and Countryside Act 1981, which in the opinion of English Nature is of special interest at a national level due to its flora, fauna or geological or geomorphological features. The only SSSI within the PDA are the disused quarry pits at Creeting St Mary TM096552, which is of geological importance. English Nature would have to be informed of this development due to the close proximity of the pipeline to the SSSI.

2.2. Historical background

At around 440 000 years ago Suffolk as far south as Ipswich was covered by a vast glacier. The Gipping valley was formed at this time by the melt water. Following the end of the last ice age 10,000 BC hunter-gatherers probably used the river valleys as routes for travel as well as being areas of mixed resources to exploit. In the later prehistoric period when agriculture and a sedentary way of life was adopted the river valleys were also seen as rich areas to exploit and easy routes to travel. This can be seen in the large amount of settlement and burial activity in these locations. This trend carries on in the all the subsequent periods from the Roman, through the Anglo-Saxon, medieval, industrial and to present day where the river valley has been used as an easy corridor of travel.

3. Baseline conditions

3.1. Topology and geology (Fig. 3)

The PDA in the north area runs along the upper part of the eastern side of the River Gipping valley. In the middle and south areas it runs down from the eastern side of the valley onto the valley floor.

The soil type is variable along the length of the PDA (see Fig. 3). At the northern end the dominant soil are non-calcareous clayey soil over chalkey till geology (**411d**) with river alluvium over peat (**813a**) in the river valleys. In the middle section the dominant soil is calcareous and fine loamy soils over chalk rubble, over a chalky drift and chalk geology (**511e**). The southern area has a mix of fine to coarse loamy and sandy soils locally flinty and gravely in places over glaciofluvial drift geology (**571x**). Also present in the southern area to a large extent is river alluvium over peat (**813a**). (source: SCC digital data).

The OD for the area of the PDA is a maximum of circa 44.6m at the northern end and a minimum of circa 14.4m at the southern end.

Land-use in the PDA is largely arable or set aside farmland with some pasture throughout but concentrated in the southern area (Fig. 10).

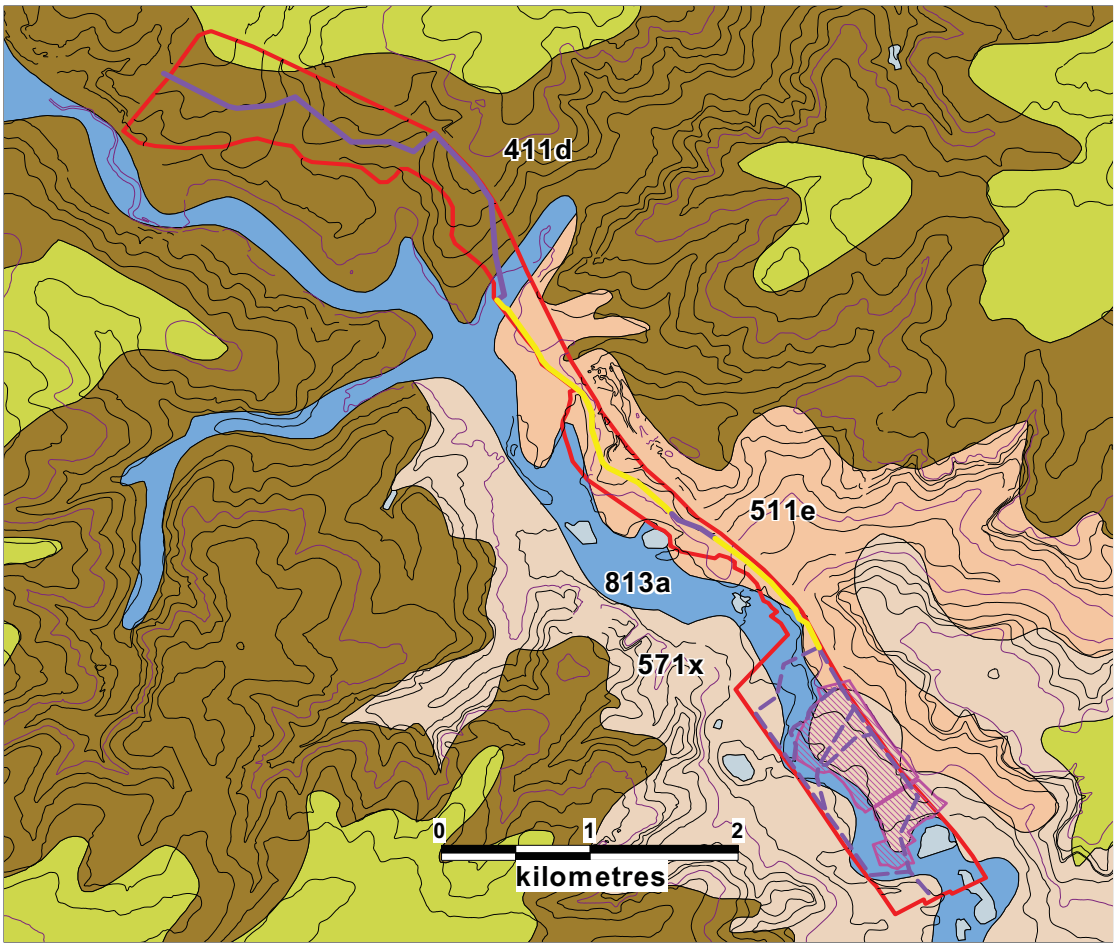

Figure 3. Geology and topology

3.2. Suffolk SMR search

For more details of the sites mentioned in the report see Appendix 1.

3.2.1. All known archaeological sites within the PDA corridor and immediate area

Figure 4. Distribution of SMR sites

Mesolithic (10,000BC-4001BC) flints have been found at 5 locations within the PDA. At **CDD 009** Mesolithic flints were found during an excavation, but no further details are known. At **CDD 006** and **CDD 060** Pipp's Ford Mesolithic flints wee found along with a "harpoon" though of what material this was made is unknown. **CRM 027** represents a large assemblage of 232 Mesolithic flints, that were found within a trench through the ditch of a Bronze Age round barrow. This obviously residual material indicates that there is a Mesolithic scatter of some density located in this area along the base of the river valley. 19 possible Mesolithic flints found at **CRP 007** during metal detecting/fieldwalking on the valley floor. At **BRK 104** an evaluation of the site produced unstratified Mesolithic flints.

The Neolithic (4000BC-2351BC) is represented by 4 sites, at **CDD 009** several flints were excavated prior to the construction of the A45. At **CDD 017** a leaf shaped arrowhead was found in a Roman ditch. Flint arrowheads and scrapers were found at **CDD** 060 Pipp's Ford, possibly from the now disused quarry pit. At **BRK** 104 the Neolithic is represented by finds of worked flints, some pottery and a few pits. The majority of activity was towards the western edge of the site.

A fragment of a Bronze Age (2350BC-701BC) notched knife/dirk, was found metal detecting a field where material from the construction of the A14 was spread **CDD 017**. There are 21 probable Bronze Age ring ditches within the PDA, 15 on the western side of the river on a ridge (**BRK 005**, **006**, **007**, **008**, **011**, **BAY 002**, **003**, **004**, **005**, **007**, **008**, **009**, **012**, **017**, **019**) in a linear cemetery. A further 6 are located on the eastern side of the river in a cluster (**CRM 013**, **019**, **020**, **021**, **022**, **027**). There is also a solitary ring ditch at **CRM 007,** 500m south-east of the other Creeting St Mary barrows, but this barrow could also be of Anglo–Saxon as various brooches of this date have been found metal detecting **CDD 057** and **CRM 043** in close proximity**.** At **CRP 007** there is a flint scatter possibly Bronze Age in date.

There are 4 Iron Age (800BC-42AD) entries in the SMR, 3 of these (**CDD 003**, **009**, **017**) are in close proximity to each other within the SAM and probably represent part of the same settlement. **CDD 003** is a wooden lined shaft, which could have been a well or a ritual monument. Found within this shaft was a piece of a snaffle bit and Belgic pottery. At **CDD 009** prior to construction of the A45 was found an area of Iron Age occupation dating from the 1st century AD, directly under the Roman settlement. The Iron Age settlement consisted of hut circles, drainage gullies and rubbish pits. Finds from this site consisted of pottery, brooches, silver coins and a gold plated copper coin. **CDD 017** is a field adjacent to **CDD 009** were metal detectorist's have found numerous Iron Age artefacts, including bronze, silver and gold coins, brooches and pottery. At **CRM 035** an Iron Age gold quarter stater was found metal detecting.

There are a number of Roman (42AD-409AD) sites within the PDA ranging from a large settlement to a single stray coin find. **CDD 003** (SAM) is the large Roman settlement identified with COBRETOVIVM (VCH 1, 1911 303, under Baylham) dating from the first century AD. It was first identified in 1823 when the main N-S Roman road was discovered along with a dense scatter of finds up to 3 feet thick, including coins, brooches, pottery, brick, tile, oyster shells and slag. There are other recorded sites that are part of the settlement **CDD 003**, at **CDD 063** in the northern part of **CDD 003** a monitoring of topsoil stripping was undertaken, this uncovered 18 coins, a cockerel statuette and 3 lead steelyard weights. During the construction of the A45 further evidence for the Roman settlement was discovered consisting of possible building foundations, a pottery kiln, a road, an enclosure, a cemetery and numerous finds including pottery and brooches, all of which are listed under **CDD 009**. On the eastern side of the A45, the site **CDD 017** possibly represents a further extension of the settlement area, here metal detectorists have found a large amount of Roman material coins, jewellery, pottery, toilet implements and a quern stone. Directly to the south of **CDD 003** is **CDD 016** (SAM) that comprises of two multiple ditched Roman auxiliary forts, both dating from the first century. One is probably post conquest, possibly the smaller of the two and the larger one that is similar to **PKM 005** (Pakenham West Suffolk) is likely to be post Boudican rebellion in date. To the south and running through the forts is the main north-south Roman road **BAY 014**, running from Colchester to Caistor. Heading north-north-east from the settlement is **BRK 004** another Roman road which either heads towards Pakenham or Scole. To the north of the settlement in the central area of the PDA is **CRM 003** a probable Roman villa, were workmen digging field drains found wall foundations of cemented flint and limestone, floor cement, rubble, tesserae, tiles, pottery and painted wall plaster. Metal detectorists have located Roman material in various quantities at **BAY 018** a small hoard of 33 bronze coins, **BAY 015** a scatter of coins, brooches and a pin, **BAY 021** coins and brooch fragments, **CDD 014** 3 coins, **CDD 057** 5 coins, **CRM 016** a coin, **CRM 030** a brooch, **CRM 031** a brooch fragment, **CRM 035** 5 coins, **CRM 046** 9 coins **CRM 049** a bronze coin and a brooch and **CRM 055** a brooch.

Figure 5. SMR Sites southern area

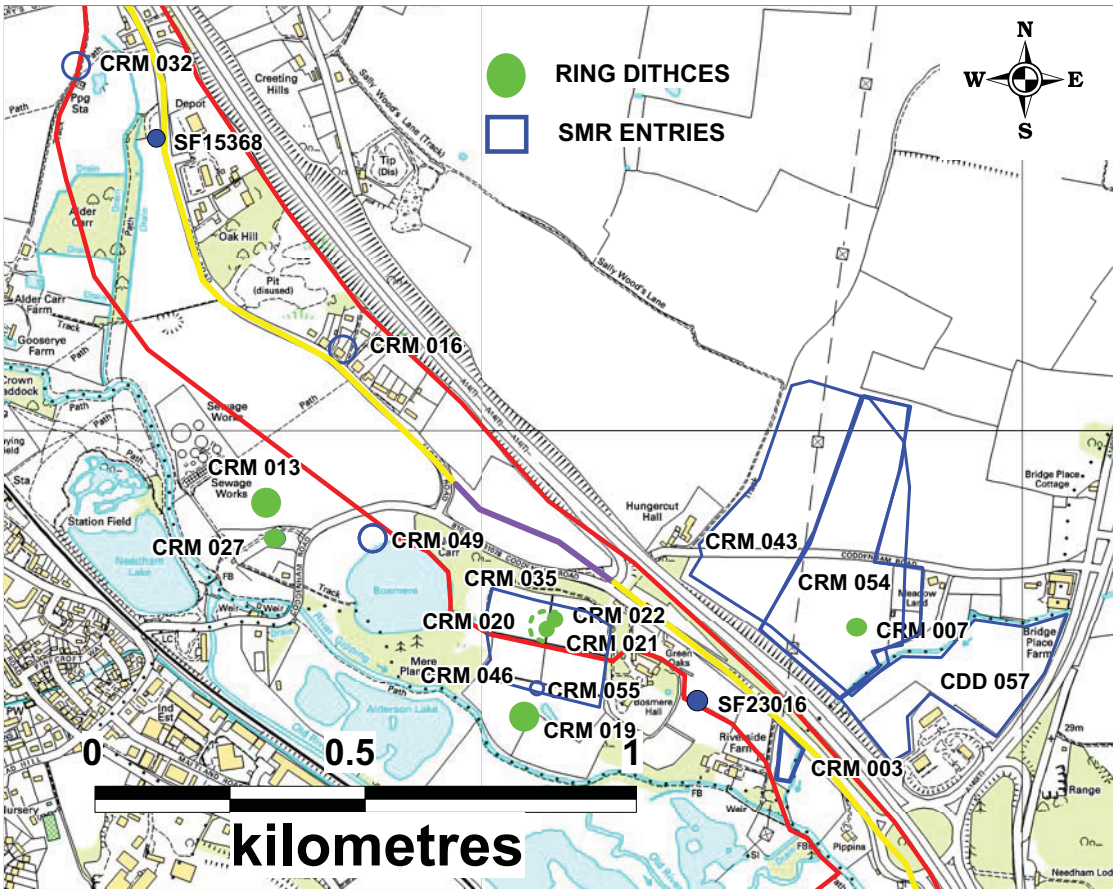

Figure 6. SMR Sites central area

There are 5 Anglo-Saxon (401AD-1065AD) sites within the study area, at **BRK 104** significant Early Saxon occupation deposits, comprising Sunken Featured Buildings, were identified. As a distance of 175 metres separated these features, this appears to represent dispersed occupation covering a large area. CDD **003** a pot with fragments of human skull and **CDD 017** 2 coins, a brooch and a hooked tag were found within the area of the earlier Roman settlement. At **CDD 057** and **CRM 043** Anglo-Saxon brooches have been found by metal detectorists, these brooches are usually only found in with burials, suggesting that there is a cemetery here. To add some weight to this theory there is also a cropmark of a ring ditch here **CRM 007** that could be of Anglo-Saxon date or even Bronze Age as the Anglo-Saxons are known to have cemeteries around earlier burial mounds.

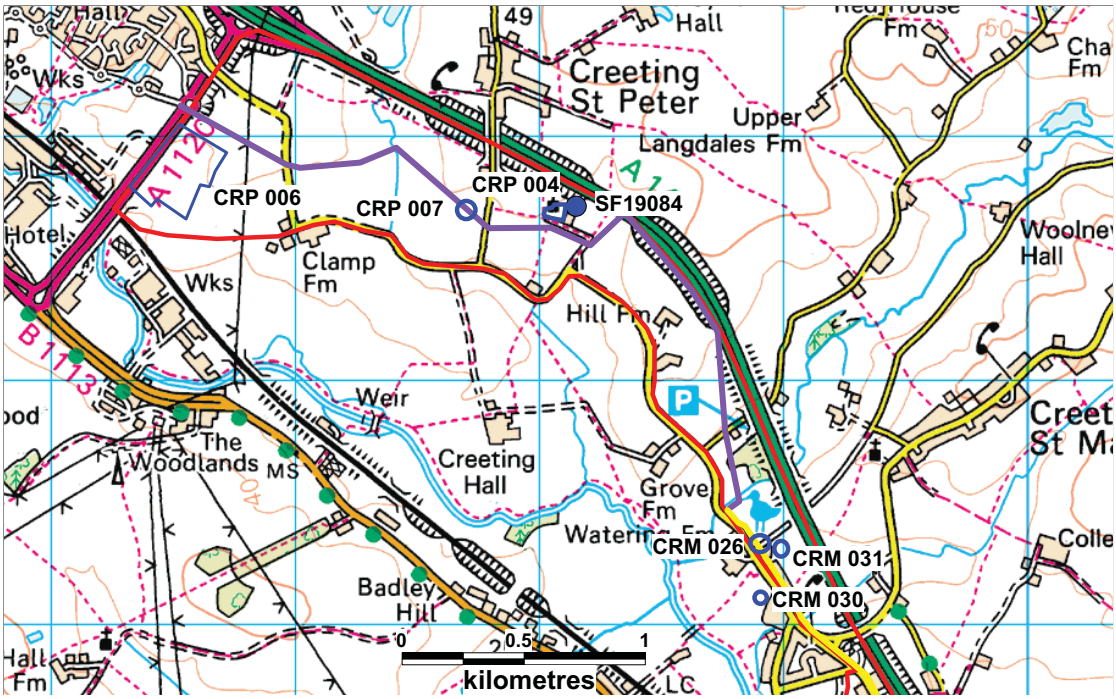

Figure 7. SMR Sites north area

There are 8 Medieval (1066AD-1539AD) entries on the SMR, 2 buildings, **BAY 030** a watermill said to have been standing since the beginning of the 17th century and **CRP 004** a church that was listed in the Domesday Survey. **CRM 032** and **SF15368** are both pottery scatters located during topsoil stripping for a pipeline. Metal detecting has located 6 sites, **CDD 017** a formerly gilded buckle, **CRM 030** two hammered silver coins, **CRM 035** 4 silver coins and a gilded buckle, **CRM 046** 3 silver pennies, **CRM 049** four coins and **CRM 055** 2 lead seal matrices.

The Post Medieval period (1540AD-1900AD) is represented by 7 sites, **BAY 035** is a lock and set of gates in a ruinous state next to **BAY 028** a bridge depicted on Hodskinson's map of 1783. **CRP 006** are a series of cropmarks of trackways leading to possible buildings. **SF18220** is a milestone. The remaining 3 entries are metal detector finds, **SF11414** harness & other buckles and spoon bowl, **CRM 046** small scatter of coins and tokens, **SF23016** a bronze purse bar and trade token.

Most of the undated entries are 5 cropmarks, **BRK 004** is a 500m length of parallel ditches probably one of the Roman roads heading north out of the Roman settlement, it respects ring ditch **BRK 005**. **BRK 016** an oval enclosure trapezoid with rounded E end, open W end. **BAY 029** two parallel ditches a possible trackway. **CDD 012** small are of rectilinear fields and enclosures. **CRM 054** is a area containing a trackway, enclosure and field system that respect ring ditch **CRM 007**. An undated ditch at **SF19084** was found during a monitoring. **CRM 026** is a patch of burnt flint found in a road verge cutting. A scatter of metalwork including a punch, an awl, a strap fitting and 2 bronze vessel fragments was found at **BAY 021.**

3.3. Aerial photographs

Only a cursory examination was made of aerial photographs held at SCCAS Bury St Edmunds, as it is beyond the scope of this study to examine in detail the aerial photographs of this area as it clearly calls for a specialist study focused on more refined route options.

3.4. Listed buildings

A search was carried out on the listed building web site http://lbonline.english-heritage.org.uk that identified the following listed buildings in the PDA and from were their descriptions were extracted.

3.4.1. Listed buildings within PDA corridor (Fig 8)

There are 9 Listed Buildings within PDA corridor.

1. **Church of St Peter grade I**, Parish church, mediaeval. Nave, chancel, west tower, south porch, north vestry. Flint rubble with freestone dressings, the nave largely plastered, with some mediaeval plaster on the north side. Plain tiled roofs; the nave has C19 fleur-de-lys ridge finials. Tower roof flat behind embattled parapets. Some areas of Norman flint walling; chamfered round-arched north doorway with C14/C15 plank door. Chancel has much plain early C14 work: pointed south doorway, 3-light intersecting traceried east window, simple pointed piscina and ogee-headed side windows. Later C14 work includes: - tower with double-chamfered west doorway, 2-light belfry windows and lion-head gargoyles; nave side windows, south porch and south doorway with plank door and ironmongery; tower doorway and door. Late C15 nave side windows and chancel arch with moulded shafts. Restored C16 pulpit, unusually with 7 sides, enriched with tracery and twin crocketted pinnacles. Good and delicately carved C15 limestone octagonal font, with angels beneath the bowl and lions supporting the stem. Fine C15 wall painting of St. Christopher on north nave wall with inscription and broad boarder of red, white and blue. Vestry almost or totally rebuilt in C19 but with a possibly C14 window. C19 roofs: in the chancel with scissor-braced coupled rafters, in the nave with arch-braced collar beam trusses.

2. **Hill Farmhouse grade II,** Former farmhouse. Mid or late C16 with early C17 parlour block to right. 3-cell plan. 2 storeys. Timber-framed and plastered. Plain tiled roof with an axial chimney of red brick; an internal end chimney to right. 2 storeys. Small-pane mid C19 sashes, those in hall and parlour cells having sidelights. C20 entrance porch, fully glazed, of semicircular plan and with glazed door. Good unmoulded framing exposed in C16 and C17 phases. Close-studding with some fragmentary moulded mullioned C16 windows in the hall cell, and ovolo-moulded mullioned windows in the parlour, one having a transome. Side-purlin roof. The parlour cell is out of alignment and appears once to have continued eastwards. Associated with probably mediaeval moat.

3. **The Watering grade II,** Farmhouse; late C16, with major alterations of C19 and early C20.

   2 storeys and attics. 3-cell cross-passage entrance plan. Timber-framed and rough-cast; the 1st floor is long-wall jettied on the south-east side. The rear wall and one end wall have exposed close-studding with arch wind-bracing. Concrete-tiled roof (formerly plain tiled) with axial chimney of red brick. Small-pane C19 sashes. C19 gabled entrance porch of red brick with 6-panelled door. To left is a small early C20 extension, and to right a forward-projecting wing, both of red brick.

4. **Oak Hill Cottage grade II,** House, probably late C16. 2 storeys. Timber-framed and roughcast, the 1st floor long-wall jettied towards the road on slender brackets. Concrete tiled roof, formerly plain tiled, with axial chimney of red brick. Small-pane metal casements of c.1980. Boarded C20 entrance door.

5. **Pippins grade II,** House, early or mid C16 with alterations of C17 and later. Timber-framed and plastered. Thatched roof with C19 eyebrow casement dormers; axial chimney of red brick. 1 storey and attics. 3-cell cross-entry plan. Various C19 and C20 casements. C20 lean-to thatched entrance porch with half-glazed stable-type

door. Twin service doorways in the hall with 4-centred arched heads (one restored); the service rooms were united in late C16/C17 and the room has deeply chamfered ceiling joists. A similar doorway leads to the parlour. Good original hall fireplace with deep cambered lintel; unmoulded floor joists and good C16 studwork. A C17/C18 single-cell extension to left has a lower roofline.

6. **Pipps Ford grade II,** Former farmhouse. Late C16 and C17, in 3 phases. Alterations of mid C19.Timber-framed; arch wind-braced studding largely exposed and blackened with plaster infill panels. A 2-storey C19 outshut along the front wall is in painted brick. Plain tiled roofs with 2 axial chimneys of red brick. 3-cell cross-entry plan. 2 storeys. Small-pane casements, mainly of C19. On the garden side are some original windows unblocked and glazed, with diamond and ovolo-moulded mullions. A 2-storey C17 entrance porch, at the cross-entry position, has the upper wall framing exposed; the moulded head of an original oriel survives above the entrance. C19 4-panelled door. A 2-cell C17 bake house-with-dairy is set forward to left. It was detached until C19, and has a little C18 cable-pattern pargetting. The hall and service cell of the house is the earliest phase, with plain framing; there is evidence for a rear cross-entry doorway with shallow arched head. The parlour block, of higher quality was added soon afterwards; the parlour has an ovolo moulded bridging joist. A further wing was added to rear of service end later in C17.

7. **Baylam Watermill and Mill House grade II*,** Watermill and Mill House. The house is in 2 sections; early C16 or earlier, and mid C19. A central 2-bay late-mediaeval block of 2 bays, and 2 storeys. Timber-framed and plastered. Plain tiled roof. C18 casement with transome, and hinged and boarded shutters; above is another with leaded glazing but without shutters. Plank entrance door, perhaps of C16; the segmental arch above and the flanking carved oak heads are both C16 work, but have been introduced from elsewhere. 2 storey C19 range to left is of gault brick with hippea slated roof. 4-panelled entrance door. Small-pane sashes.

   The mill is of early or mid C19; 3 storeys, with storage bins in the 4th attic storey. The ground storey is of red brick now painted. Timber-framed upper storeys, weather boarded: Plain tiled roofs. Small-paned sash and hopper windows. Boarded doors. A 2-storey gabled weather boarded hoist is cantilevered on diagonal braces. At centre rear is a short full-height wing. The main machinery is as follows:- Cast iron breast-shoe waterwheel on iron shaft, driving a wooden lineshaft via an all-iron pitwheel and pinion. 3 pairs of millstones on a hurst frame, driven via 3 wooden compass-arm gearwheels mounted on the lineshaft (2 now incomplete). 2 further pairs of stones could be driven by water or by the auxiliary oil engine (by E.R. & F. Turner of Ipswich). All 5 pairs of scones are complete with their furniture. Much ancillary machinery. The only complete watermill on the River Gipping.

8. **Bridge and Lock grade II,** Bridge and lock, c.1780 which repairs in gault brick of C 19. Humped bridge of red brick with semi-circular arch over the RiverGipping and an adjacent
   smaller arch to left. 1 metre high parapets with moulded and painted stone and concrete cappings. Attached and upstream of the bridge is a contemporary lock of red and gault brick. Wooden gates, at the top C20 and bottom C19, are fairly complete but ruinous. Believed to be the best surviving example of an Ipswich and Stowmarket Navigation lock. The parish boundary with Baylham follows the centre of the River Gipping and therefore passes through the bridge and lock.

9. **Baylam House grade II,** Former farmhouse; occupied by and probably built for William Dowsing, inconoclas in mid C17. Major alterations of early and late C19. 2 storeys. Timber-framed and rendered. Plain tiled roof, with a CI7 internal and chimney of red brick to right and another of C19 to left. Mid C19 small-pane sashes; most replaced 1985 with p.v.c. sashes in original openings. C19 4-panelled entrance door, the upper panels glazed; broad sunk and moulded architrave. Early C20 gabled wooden porch. A little good CI7 close-studding is exposed internally. Various C19

extensions to left and rear, of painted brick with plain tiled roofs. Included despite C19 and C20 alterations because the home of William Dowsing from 1626 to 1637.

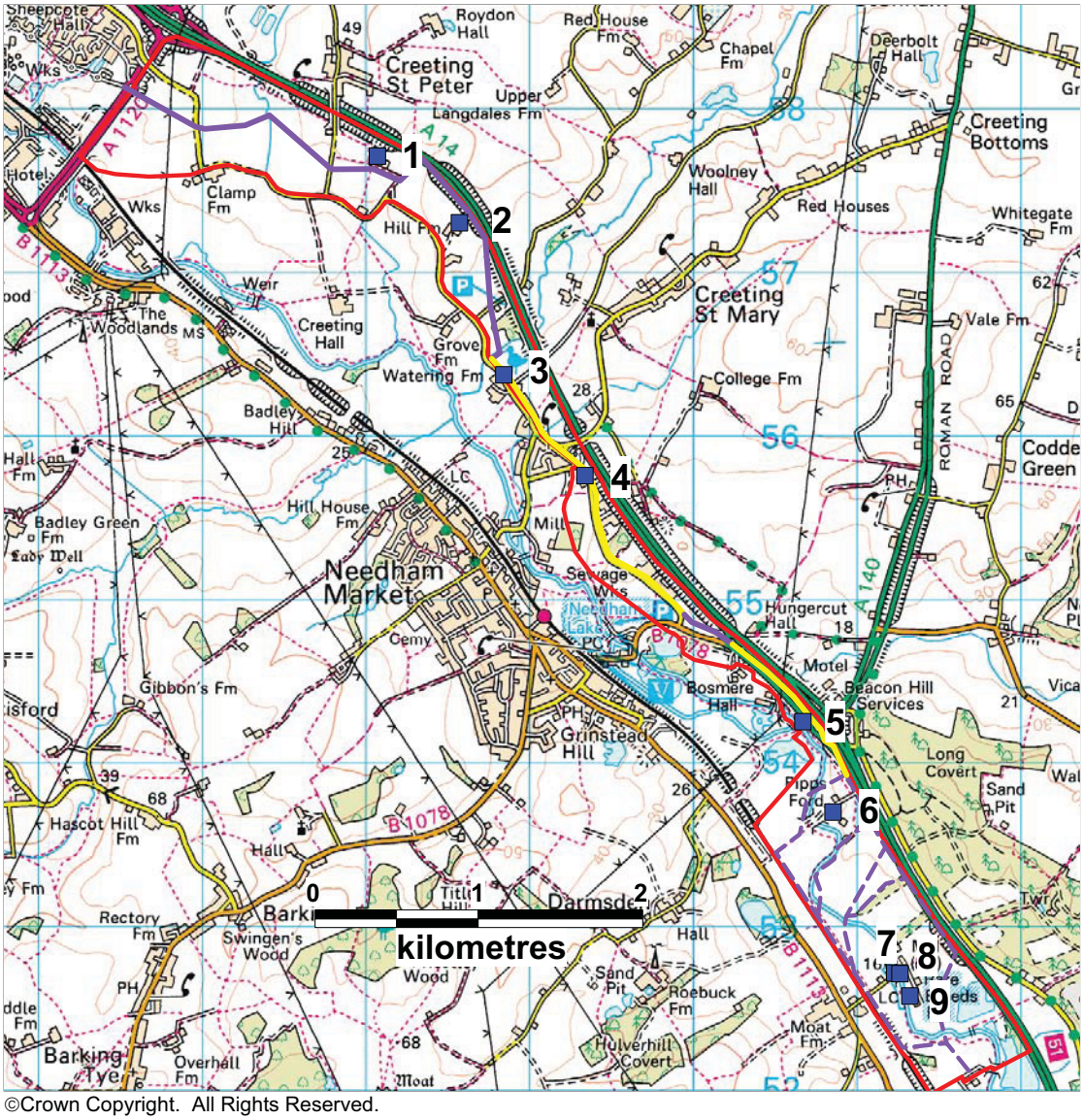

Figure 8. Listed building within the PDA

3.5. 1st Edition Ordnance Survey map 1880's

The first edition Ordnance Survey map was examined in the area of the PDA. The only differences are the consolidation of smaller fields into larger ones, the removal of some small areas of woodland and the destruction at some point of Bosemere Mill at TM 1054 5423. These were the only items shown on the 1880's map not present on the modern OS map (Fig. 7).

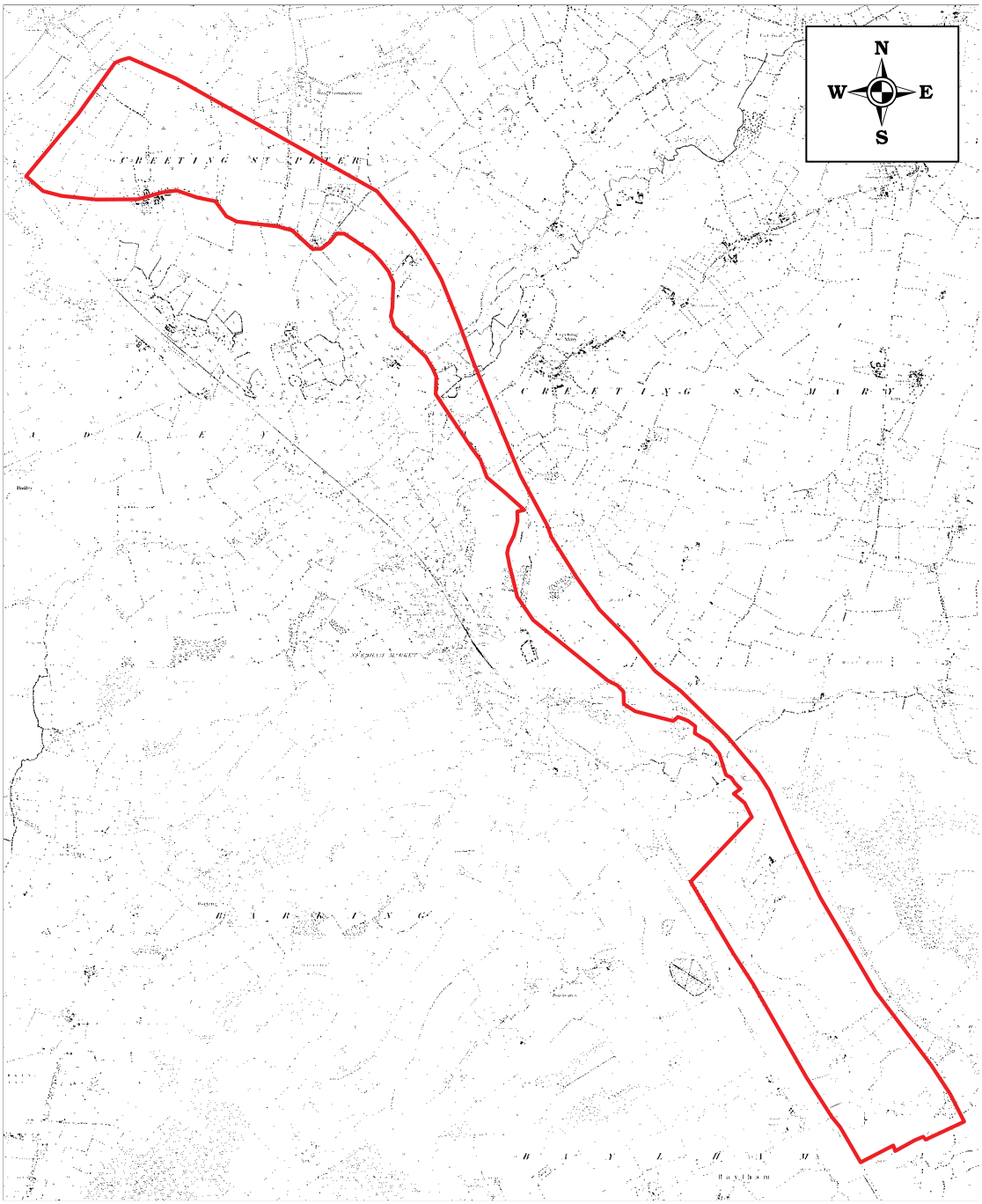

Figure 9. First edition Ordnance Survey 1880's

4. Assessment of impacts and effects

4.1 Potential of archaeology in the area

4.1.1 Potential for preservation of archaeological remains

On the arable land there will be some plough truncation of the archaeology. This will be more severe on the lighter soils due to erosion and soil movement, but as a rule can be expected to affect the top 30cm of the soil profile. In the river valley and natural ponds, there is the potential for well preserved waterlogged remains

Where the pipeline runs across the low lying land on either side of River Gipping there is a high potential for preserved waterlogged deposits. This allows potential for the recovery of artefacts and organic remains that would otherwise have decayed. It also allows the possibility for radiocarbon dating as well as dendrochronological and paleo-environmental sampling of archaeological artefacts and deposits. There is a high potential for preserved waterlogged archaeology from all periods to be encountered at various points along the length of the pipeline. In the northern and central area the potential is higher where the pipeline crosses tributaries of the River Gipping. There is an especially high potential in the southern area where the pipeline runs along the valley floor close to the river.

4.1.2 The pipeline

There is a high probability of encountering archaeology from almost any period of the past within the PDA as river valleys have been used throughout time as a means easy travel, good areas for settlement and areas rich in mixed resources that can be exploited.

There is potential for disturbing archaeological material from the prehistoric period along the whole length of the pipeline, as worked flint scatters have been discovered throughout the PDA. There is an especially high potential in the central and southern areas where there are major areas of monumental / ritual activity around the many Bronze Age burial mounds in the two cemetery sites. Both of these cemeteries are near to the river and there is the possibility that it was used for ritual purposes including deposition of votive offerings, therefor there may be the possibility for waterlogged / palaeo-environmental remains.

There is a high potential for disturbing Iron Age material in the southern area, as there is known settlement evidence under the later Roman occupation.

There is a very high potential if it is not certain that Roman archaeology will be encountered at some point along the pipeline. The southern area is almost totally covered by Roman settlement **CDD 003** or forts **CDD 016**. Outside of the settlement there is a chance that burials may also be encountered, as it is the Roman custom to bury the dead in cemeteries along the side of the roads just outside of settlements. There is a high potential for locating stretches of Roman roads that run through the PDA in various lengths of the proposed pipeline, with an especially high chance in any of the routes in the southern area. Again in the southern area there is a high potential for encountering waterlogged remains from the Roman period. In the central area the pipeline runs through a field where there is thought to be a Roman villa **CRM 003**, around this area there is a high possibility that Roman archaeology in the form of building remains or associated activities may be encountered. Again in this area it is possible that waterlogged remains may be encountered.

There is some potential for the location of Anglo-Saxon remains, this is almost certain at **BRK 104** were a dispersed Early Anglo-Saxon settlement has been found. The in the central area at **CDD 057**, **CRM 043** there is a chance that an Anglo-Saxon cemetery may be disturbed although the finds appear to be from the other side of the A14.

There is the potential to encounter Medieval or Post Medieval archaeology at some point along the pipeline even though there is only one definite site, the destroyed Baylham Mill **BAY 030**.

The probability of the pipeline passing through as yet unidentified archaeological sites can be estimated by looking at the frequency of sites discovered on another pipeline. In 1995 a mains water pipeline was monitored between Cambridge and Euston (Caruth 1995, 38). This was 23km long and produced 22 sites, of which 18 were new sites identified during the archaeological work associated with the pipeline, producing a ratio of 1 site per km. For this project, there is 9km of pipeline running through a landscape that has a higher potential for archaeological remains and subsequently will have a higher ratio of sites per km suggesting at least 9 unknown archaeological sites along its length.

4.2 Assessment of the impact of the development on archaeological sites

4.2.1 The pipeline

The impact of the pipeline is dependent on the method used to lay the pipe and its diameter. The pipe is expected to be up to 300mm in diameter and to be laid to a depth of between 1.3 to 2.5m deep. The course of the pipeline can be expected to cause almost total destruction to any archaeology within the width of the trench, although where it passes through arable land the ploughing will already have disturbed the top 30cm of soil. The pipeline at present doesn't appear to run through any ancient woodland or parkland, where the archaeology is likely to be better preserved at a higher level than within the arable fields. Where the pipeline passes through/along the river valley there is high potential for damage to the most sensitive, waterlogged, archaeological remains preserved paleo-environmental deposits.

There are 5 suggested routes in the southern area, all of which will impact on a variety of archaeology to differing degrees . English Heritage will have to be consulted at the earliest possible time if the route passes through or near to the SAM (see 2.1).

Routes 1 and 2 are very similar in both their location (proximity to each other) and the potential archaeology that they will impact on. They both pass through the northern area of the Roman settlement SAM, with route 2 being approximately 50-150m to the south of route1. It is thought that the Roman settlement is less dense the further north from the forts you go, but this is not certain. It is very likely that Roman features will be encountered which could be of almost any type, possibly settlement, domestic, industrial, ritual/religious, mortuary or in any combination, but certainly at least one Roman road will be encountered. Routes 1 and 2 converge at the river and cross to Alder Carr, at this point there is a high potential of encountering waterlogged archaeological remains on both sides of the river. These routes once over the river join up with routes 4 and 5 heading south.

Route 3 runs along the eastern side of the SAM for 1000m through the Roman settlement, that appears to extend out of the SAM area to the east under the A14. It then turns south-west and passes through the Roman forts before turning south again and crossing the river near where a Roman road would have crossed. The potential for encountering archaeology is certain and it is thought that there would be a very large amount of significant archaeology to contend with, including domestic and military settlement, industrial remains and the waterlogged remains of a Roman bridge is not inconceivable.

Route 4 avoids the SAM altogether heading west from the A14 300m before the area of the SAM begins. At this point it heads down slope towards the River Gipping. Along this length there is the potential to encounter archaeology from any period, as there is archaeology from all periods represented in close proximity. At the point where the pipeline runs close to and crosses the river there is the possibility that waterlogged material will be discovered. On the western side of the river in the area of the evaluation **BRK 104** there was found archaeology dating from the Mesolithic right through to the Medieval, with a significant discovery of an Early Anglo-Saxon dispersed settlement. Once across this area the pipeline turns south parallel to the railway, passing by a Bronze Age barrow cemetery. It is highly likely that further prehistoric activity will be encountered along this stretch.

Route 5 was suggested to avoid the SAM but passes through its very northern edge along the side of a track, past Pool cottages and then down the very steep slope to the low lying ground by the river. Along this course there is a greater potential of disturbing sensitive waterlogged archaeological remains and there is the chance to the west before pipeline turns south that

the remains of a waterlogged Roman bridge could be encountered where the Roman road crosses the river. It may be less archaeologically sensitive to run west along the higher ground overlooking the river just within the Sam, then turning south-west and crossing the river to join up with route 4 along the side of the railway line.

5. Mitigation measures

5.1 The pipeline

Mitigation should be tied to a tiered approach that will call for more detailed study of any refined route choice. Detailed work on aerial photographs to produce rectified plots where features may be affected by possible route options, particularly in the southern area around the Roman settlement and the barrow cemeteries and also in the central are where scattered ring ditches are known. Following this it is possible that geophysical survey may be specified in and around complex areas of archaeology once the route options have been refined down. It is likely that English heritage would also call for detailed survey work of this type to be carried out before considering any applications for scheduled monument consent should the SAM's be affected. Such detailed survey may also help inform local, small-scale route diversions even when the route option has been finalised as re-routing by a few meters could avoid a ring ditch or similar feature.

Over the route as a whole surface collection is advisable on arable land and detailed walkover of pasture etc to be followed by trial trench evaluation of known/possible sites and areas of potential wet deposits so full scale excavation can be carried out well in advance. At this stage a final decision on the route is strongly advised so that any archaeological fieldwork can be focused when the trial trench evaluation stage is reached. Finally when soil stripping is underway archaeologists will need to continually monitor this process with a contingency for rapid excavation should archaeological deposits be revealed.

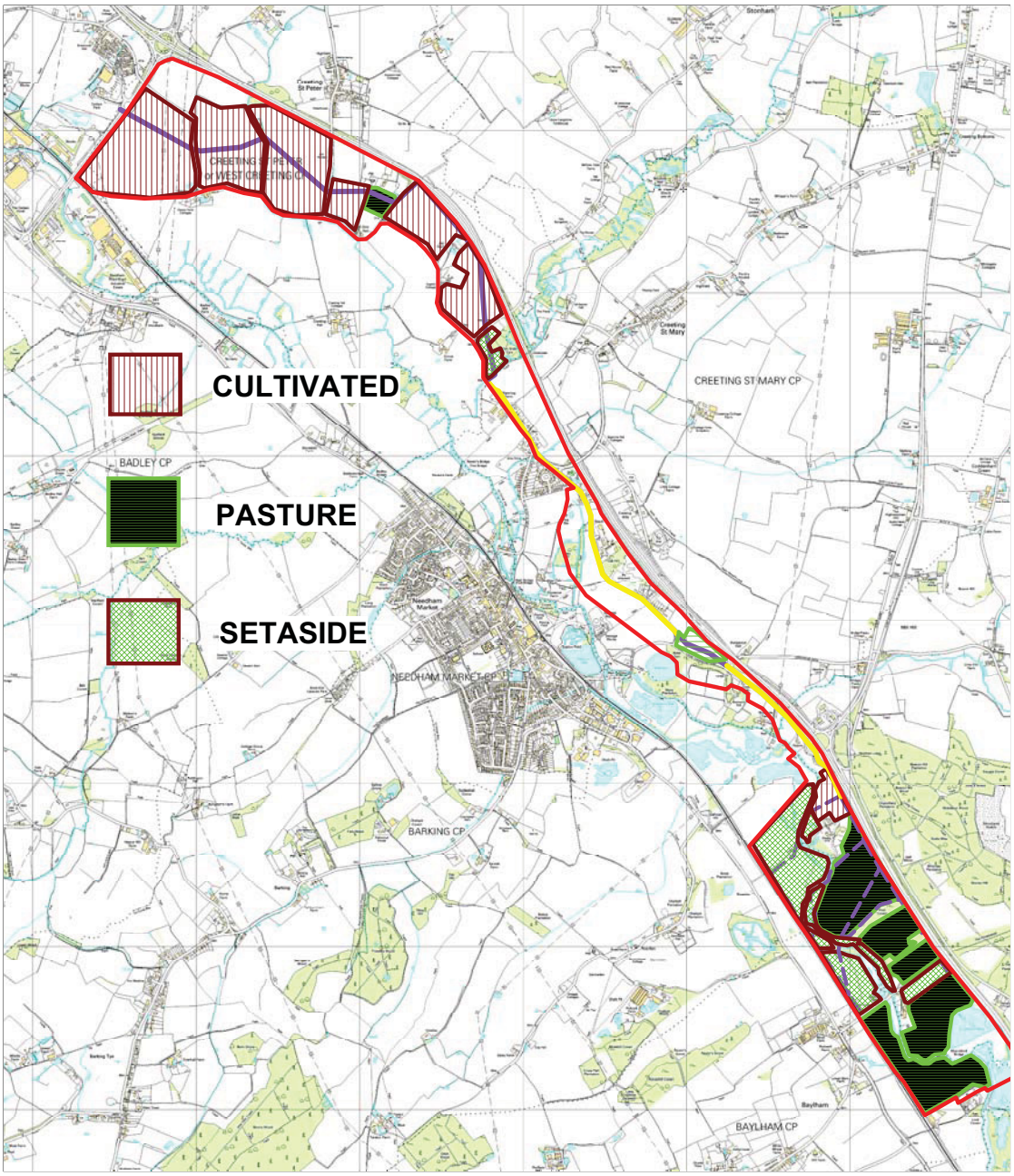

Figure 10. Land use in fields the pipeline will pass through

6. Conclusions

This assessment has identified a high number of archaeological sites known to exist within the development area and the potential for many other so far unknown sites. It is recommended that a phased approach to the archaeological study be taken to inform route option decisions. There is a presumption that SAM's should be avoided and archaeological work in the southern area could be very expensive if areas of the highest potential are not identified and if possible avoided by the pipeline. It is recommended that an survey plotting rectified aerial photographs should be carried out at the earliest possible opportunity once route options are reduced from possibles to probables.

References

Caruth, J., 1995 *Euston to Cambridge water mains pipeline* SCCAS report no. 96/5, unpublished.

Appendix: Sites and Monuments Record

BARKING

Ref	Site Name	Period	Summary Description	NGR
BRK 004	SF5331	Un	Parallel ditch system (at least 500 yards long) on E side of railway, other ditches visible in same fields (S1)(S2).	TM10605340
BRK 005	SF5332	Un	Cropmark of a ring ditch, circa 25m diameter (S1)(S2), trackway/linear feature BRK 004 swerves to avoid this.	TM10455353
BRK 006	SF5333	Un	Cropmark of a double ring ditch circa 23m in diameter.	TM10495319
BRK 007	SF5334	Un	Cropmark of a ring ditch circa 33m in diameter.	TM10405333
BRK 008	SF5335	Un	Cropmark of a ring ditch circa 25m diameter, beside railway (S1)(S2).	TM10665310
BRK 011	SF5340	Un	Cropmark of a ring ditch, circa 15m diameter -with interrupted inner circle? (S1).	TM10615316
BRK 016	SF5345	Un	Cropmarks, oval enclosure, circa 20m long x 10m wide, trapezoid with rounded E end, open W end - ?long barrow.	TM10585401
BRK 101	A45; B1113 SF18218	PMed	Milestone - site of, shown on 1955 OS map (S1) and on 1978 edition (S2).	TM10435330
BRK 104	Gallows Hill SF21942	Un	Finds & features identified in desktop, aerial, fieldwalking, metal detecting and geophysical surveys.	TM10755354
BRK 104	Gallows Hill SF21943	Preh	Finds & features from desktop, various surveys & trenched evaluation.	TM10755354

BRK 104	Gallows Hill SF21944	Rom	Finds from trenched evaluation of site confined to road/trackway (BRK 004).	TM10755354
BRK 104	Gallows Hill SF21945	Sax	Two sunken featured buildings and ESax pottery from the flanking ditches of a Roman road.	TM10755354
BRK 104	Gallows Hill SF21946	PMed	Series of C17-C18 quarry pits & PMed field boundaries identified in evaluation trenching.	TM10755354
BAYLHAM				
BAY 002	SF4433	Un	Cropmark of a ring ditch, circa 25m diameter, (S1) near ring ditch, BAY 012.	TM11025242
BAY 003	SF4434	Un	Cropmark of a double ring ditch, see details.	TM10805286
BAY 004	SF4435	Un	Cropmark of a ring ditch, circa 17m in diameter, S of Fishpond House (S1).	TM10605286
BAY 005	SF4436	Un	Cropmark of a double ring ditch, circa 30m dia.	TM10635300
BAY 008	SF4439	Un	Cropmark of a ring ditch, circa 20m diameter	TM10765289
BAY 007	SF4438	Un	Cropmark of a large ring ditch/circular enclosure, circa 80m diameter, cut by the railway line.	TM10795292
BAY 009	SF4440	Un	Cropmark of a ring ditch, circa 29m diameter.	TM10435268
BAY 012	SF4443	Un	Cropmark of a ring ditch circa 20m diameter - near BAY 002 (S1).	TM11105254
BAY 014	SF2276	Rom	Road running N-S, part of main Colchester - Caister line (Margary 3c).	TM11525200

BAY 015	SF2277	Rom	Scatter of coins and metalwork found metal detecting area around Rom road (BAY 014) S of river crossing from CDD 003 etc.	TM11525215
BAY 017	SF4280	Un	Cropmark of a ring ditch or small circular enclosure, circa 30m diameter.	TM10825262
BAY 018	SF8027	Rom	Scattered small coin hoard, comprising 33 bronze coins found metal detecting (S1).	TM11455213
BAY 019	SF11082	Un	Cropmark of a small ring ditch, circa 10m diameter, see details.	TM10765291
BAY 021	SF11412	Rom	Rom scatter C3-C4 coins, mount fragment, plate type brooch fragment, found metal detecting.	TM11305210
BAY 021	SF11413	Un	Scatter of metalwork, punch, awl, strap fitting and 2 bronze vessel fragments, found metal detecting (S1).	TM11305210
BAY 028	Mill Lane SF16845	PMed	Bridge depicted on Hodskinson's map of 1783 (S1), crossing River Gipping at Baylham Mill.	TM11255270
BAY 029	SF17701	Un	Cropmark of two sets of parallel ditches, possible trackways, heading NE from roadway (S1).	TM11205200
BAY 030	Baylham watermill and mill house. SF23091	Med	Watermill said to have ben standing at the beginning of the C17 on the River Gipping, red brick, see details.	TM11225272
BAY 035	SF23097	Pmed	Lock gates, Baylham, industrial building at risk (S1).	TM11245272
BAY Misc	SF11414	PMed	Scatter of metalwork harness & other buckles and ?spoon bowl, found metal detecting.	TM11205260

CODDENHAM

CDD 003	Coddenham Baylham Roman Site SF4312	IA	Piece of snaffle bit, late IA and belgic pottery from a possible shaft (S1).	TM11305295
CDD 003	Coddenham Baylham Roman Site SF4313	Rom	Large Roman settlement, identified with COMBRETOVIVM, see details.	TM11405280
CDD 003	Coddenham Baylham Roman Site SF4314	Sax	Sax pot with fragments of human skull discovered when cutting trench for water main see details.	TM11605275
CDD 006	Pipp's Ford SF4316	Mes	1 core, 1 blade, 2 scrapers, also see CDD 060, no further details.	TM10805380
CDD 009	SF4319	Mes	Flint scatter, exact location of 1973 site in (R1), no further details.	TM11705280
CDD 009	SF4320	Neo	Several Neo & BA flints and material. site excavated prior to destruction by A45	TM11705280
CDD 009	SF4321	IA	IA occupation, under Roman settlement CDD 003, site excavated prior to destruction	TM11755280
CDD 009	SF4322	Rom	Part of the Roman settlement CDD 003, Site excavated prior to destruction by A45	TM11755280
CDD 012	Coddenham Baylham Roman Site SF4325	Un	Small area of rectilinear fields/enclosures see details.	TM10805300
CDD 014	Coddenham Baylham Roman Site SF4328	Rom	Three coins found within CDD 003 , see details(R1).	TM11045354
CDD 016	Coddenham Baylham Roman Site SF4330	Rom	The site of two Roman forts immediately to south of CDD 003, see details.	TM11405260
CDD 017	Valley Farm	Neo	Leaf shaped arrowhead from Roman ditch	TM11805280

	SF17150		1996, see details.	
CDD 017	SF23048	Med	Formerly gilt bronze plate buckle, found metal detecting	TM12055250
CDD 017	SF4331	IA	Large group of coins (circa 65) including Norfolk Wolf type, various Iceni, Cunobelin, potin, Atrebatic see details.	TM11805280
CDD 017	Sheepwalk Plantation SF4332	Rom	Large scatter of metalwork and pottery, found metal detecting, east of CDD 003,	TM11805280
CDD 017	SF4333	Sax	Scatter of metalwork, 2 coins, brooch and hooked tag, found metal detecting, see details.	TM12005250
CDD 017	SF9029	BA	Blade fragment from a notch hilted knife/dirk, MBA, see details.	TM12005250
CDD 057	SF18825	Rom	Five Roman coins found metal detecting, 1999, see details.	TM10985457
CDD 057	SF18826	Sax	A very fine cruciform brooch found metal detecting, see details.	TM10975457
CDD 060	Pipp's Ford SF4273	Mes	Flints, harpoon (ex H Miller Collection) see details (S1).	TM10905370
CDD 060	Pipp's Ford SF4274	Neo	Flints - arrowheads, scrapers (ex H Miller Collection) see details (S1).	TM10905370
CDD 063	Pipes Ford SF23044	Rom	Watching brief within CDD 003, 18 coins, pottery, cockerel statuette, 3 lead steelyard weights, found in the topsoil metal detected, see details.	TM11075345
CDD Misc	A140	PMed	Milestone - site of, shown on 1955 OS map	TM11065373

	SF18220		(S1) but not on 1978 edition (S2).	

CREETING ST MARY

CRM 003	Riverside Farm SF4275	Rom	Possible villa, wall foundation, floor, several tesserae, tiles, painted wall plaster, pottery, details (S1).	TM10555438
CRM 007	SF4286	Un	Cropmark of a ring ditch, circa 36m in diameter, see details.	TM10695464
CRM 013	SF4292	Un	Cropmark of a double ring ditch, circa 30m diameter (S1)(S2).	TM09595485
CRM 016	The Limes SF4295	Rom	Follis of Diocletian (AD 284-305) found in the garden of The Limes, retained by finder.	TM09745515
CRM 019	SF4133	Un	Ring ditch or small circular enclosure, circa 40m diameter, possibly entrance to the N,	TM10085447
CRM 020	SF4134	Un	Cropmark of a ring ditch or circular enclosure, circa 75m diameter.	TM10085462
CRM 021	SF4135	Un	Cropmark of a small circular ring ditch, circa 20m diameter.	TM10115463
CRM 022	SF4136	Un	Cropmark of a ring ditch, circa 20m diameter, possible entrance to W.	TM10125465
CRM 026	Watering Farm SF12217	Un	Burnt flint patch observed in road verge cutting, on N side of the road (S1).	TM08905631
CRM 027	SF12241	Un	Cropmark of ring ditch, circa 20m in diameter, adjoining parallel ditches on SW side (S1).	TM09625479
CRM 027	SF14054	Mes	Assemblage of 232 worked flints excavated in trial trench across ring ditch, see details.	TM09625479

CRM 030	SF13713	Rom	Bronze plate brooch see details.	TM08925610
CRM 030	SF23008	Med	Two hammered silver farthings Edward I, found metal detecting (S1).	TM08915611
CRM 031	SF13714	Rom	Brooch fragment, trumpet-type, upper bow only, heavily abraded, trumpet plain, see details.	TM09005630
CRM 032	Alder Carr SF15367	Med	Concentration of Med pottery located duirng topsoil stripping for pipeline.	TM09265565
CRM 035	SF17272	IA	IA gold quarter stater, early Cunobeline (Trinovantes type) of AD 10-20, metal detected 1996.	TM10055469
CRM 035	SF17273	Rom	Five Rom coins - one silver and four bronze, found metal detecting 1996.	TM10055469
CRM 035	SF17274	Med	Four silver coins and PMed bronze jeton and gilded bronze buckle, found metal detecting	TM10055469
CRM 043	SF21804	Sax	Saxon metalwork scatter (cemetery), also some Roman, Medieval and Pmed metalwork, details (S1).	TM10565479
CRM 046	Bosmere Hall SF23009	Rom	9 Roman coins and a Langton Down veriant brooch, found metal detecting 1998, see details (S1).	TM10105460
CRM 046	Bosmere Hall SF23010	Med	3 silver medieval pennys, see details (S1).	TM10115461
CRM 046	Bosmere Hall SF23011	Pmed	Small scatter of coins and tokens, see details (S1).	TM10115461

CRM 049	SF23019	Med	Scatter of 4 Medieval coins, found metal detecting 1998 details (S1).	TM11505550
CRM 049	SF23020	Rom	Bronze Roman coin extremely corroded, found metal detecting, 1998 details (S1).	TM11505550
CRM 054	SF23028	Un	Trackway, enclosure and field systems, that respect ring ditch CRM 007, see details.	TM10665478
CRM 055	SF21862	Med	2 lead seal matrices found metal detecting in 2003.	TM10105452
CRM 055	SF23031	Rom	Roman Bow brooch, found metal detecting 2003 (S1).	TM10105451
CRM Misc	Alder Carr SF15368	Med	Widely scattered finds of Med pottery (& burnt flints) located following topsoil stripping for pipeline.	TM09405554
CRM Misc	SF23016	Pmed	Bronze purse bar fragment and trade token, found metal detecting 1997 details (S1).	TM10405450

CREETING ST PETER

CRP 004	Church of St Peter SF13481	Med	A church in Creeting St Peter, listed in the Domesday Survey, see details.	TM08075768
CRP 006	SF18698	PMed	Series of trackways(?) leading to buildings(?) each approximately 30m long, see details (S1).	TM06525785
CRP 007	SF19747	Mes	19 worked flints, including scrapers and a arrowhead, found in october 2000 see details.	TM07705770
CRP Misc	The Old Rectory SF19084	Un	Monitoring footings for stable block located undated ditch, details (S1)	TM08155771

Appendix 11. Bulk finds catalogue (CRM 058)

Cont No	Pot No	Pot Wt g	Pot period	CBM No	CBM Wt g	Flint No	Flint Wt g	Glass No	Glass Wt g	CTP No	CTP Wt g	Misc & comments
0001	5	8	p-med	3	121	1	1	3	9	4	9	metal 2 @ 27g; finds p-med with 1 CBM ?Rom
0002	18	90	?med- p-med	11	224	3	12	10	75	7	12	metal 10 @ 72g; finds ?med- p-med
0003	7	49	p-med	8	231	2	10	1	8	1	3	metal 5 @ 56g; finds p-med
0004	7	28	?med- p-med	4	205			2	9			metal 4 @ 36g; finds ?med-p-med
0005	2	12	?med- p-med	3	49	4	18	4	19	3	7	metal 4 @ 16g; finds ?med- p-med
0006	1	4	p-med	2	76	1	58	2	13			metal 1 @ 6g; fint/nat; finds p-med
0007				2	39	5	59	2	23	2	5	metal 2 @ 12g; finds p-med
0008	7	32	p-med	5	225	3	17	2	12			metal 6 @ 41g; finds p-med
0009	2	7		3	99	2	5	1	20			metal 3 @ 149g; finds p-med
0010	2	15		1	13	1	11					flint/nat piece
0011				2	47	1	22	1	13			flint/nat piece
0012	1	5	p-med	2	43							metal 1 @ 58g; finds p-med
0016				1	117							metal 1 @ 8g; finds p-med with 1CBM ?Rom
0018	1	37	p-med									metal 3 @ 120g

Appendix 12. Bulk finds catalogue (CDD 068)

Ctxt	Pot No	Pot Wt g	Cera Period	CBM No	CBM Wt g	Fired clay No	Fired clay Wt g	W flint No	W flint Wt g	Burnt flint No	Burnt flint Wt g	Animal bone No	Animal bone Wt g	Miscellaneous
0001														Rom glass bowl, late 1C (1 @ 5g)
0002								13	106					1 fe nail @ 11g
0003				1	56			3	26					
0005	4	132	SAX	1	65			6	155			69	729	heated stone (2 @ 216g)
0007	87	1275	SAX	2	84	34	515	15	136	13	200	52	462	heated stone (8 @ 591g)
0009	12	190	PMED	15	2223			2	5	1	7	2	32	1 post-med bottle glass @ 9g
0012										23	537			
0014										13	592			
0018	18	122	PRE					28	230	6	183			
0020								15	125					
0021	2	6	PRE					6	219	5	130			
0023	9	116	PMED					11	90					pottery inc Black basalt sw, mottled ware etc
0026	6	40	PRE					11	218					heated stone (1 @ 63g)
0028								1	13					
0034	3	16	MED							2	14	5	26	
0037	3	34	MED	1	3	12	43	4	139	8	659			1 shell @ 8g, 2 chalk pieces @ 102g
0045	1	2	ROM			1	1	2	12					
0047										1	36			
0053	11	68	MED	4	152	20	164							
0055				1	430									
0056	2	8	SAX					2	25					
0060				1	145							28	41	CBM = Roman tile
0061	2	24	MED											

Appendix 13. Small finds catalogue (CDD 068)

Ctxt	SF	Period	Material	type	No.	Wt. g.	Length mm	Width mm	Dia mm	Comments	conserve	x-ray
0001	1010		AE		1	1	10	7		small ferrule		
	1001	SAX	AE		1	4	27	15		decorated mount, pross. from a florid cruciform brooch		
	1002	PRE	AE	coin		1			11	bronze unit or copy of gold stater, Obv: ?dolphine, Rev: celticised horse to right, ?Trinovantian, LIA	yes	
	1003	ROM	AE	coin		7			23	Antonine dupondis, Rev: TRP[], 2C AD		
	1004		AE		1	7	24	24		end of a ferrule, poss. some fe corrosion with it		
	1005		AE			7				fragment, poor condition		
	1008	ROM	AE	coin		2			15	House of Constantine, AD 330-340, Ob. VRBS ROMA, Rev. Romulus & Remus, Trier mint		
	1009		AE	sheet	1	6	44	40		strip fragment with rivets along edge, poss. from a vessel		
0007	1006	ROM	glass	vessel	1	5				rim sherd from a large pillar moulded glass bowl		
0060	1101	ROM	FE			10	9	12		part of a ?buckle, very poor condition		yes

Appendix 14. Pottery catalogue (CDD 068)

Ctxt	Fabric	Type	No	Wt/g	MNV	Form	Rim	Base	Decoration	Glaze int	Glaze ext	Rim diam	Rim %	Abr.	Soot	Wear	Notes	Spot date
0005	ESCQ	RU	2	33	1	BL	UPPL					160	6				prob sparse shell too	
	ESSS	U	1	28	1													
	OXWSM		1	71	1	P 7.6	R										Eve 0.07, part of pushed down spout	L3-4C
0007	ESCF	FP	65	1055	1	JR	UPPL	FRO	smoothed			150	60		+		globular, fine, thin-walled, sparse inclusions, near complete, parts of base & rim missing	
	ESCF	U	18	197	1				smoothed								coarser tempering and thicker walled	
	ESCS	U	3	21	2									+				
	SACG		1	2	1		BS											2C
0009	GRE	R	1	114	1	BL	THEV			O	O	480	6			rim		
	REFW	FP	4	31	1	SA	PL		hand-painted flowers	C	C							
	REFW	B	2	13	2					C	C							
	YELW	RD	5	32	1	JG	UPPL		white slip lines	C	C	90	20					
0018	GROG		1	7													grog-temper	LIA/E Rom
	NGW		18	122	3												sherds + frags, 2-3 pots, decorated with grooves & stab marks	LN
0021	BEA		1	5	1												Beaker body sherd	LN/EBA
	NGW		1	1	1												fragment	LN
0023	BLSW	D	3	6	1				moulded raised lines, rilled edge									
	GRE	D	1	3	1					B	B							
	PMWW	RD	3	81	1	BL	BD		IHLs	Y	Y	200	19					
	SPEC	D	2	26	1					B	B							
0026	NGW		6	40	2												sherds + frags, 2 pots decorated with grooves & stab marks	LN
0034	EMW	U	1	9	1													
	MTN1	U	1	4	1													
	MTN1	B	1	3	1			S							+			

Ctxt	Fabric	Type	No	Wt/g	MNV	Form	Rim	Base	Decoration	Glaze int	Glaze ext	Rim diam	Rim %	Abr.	Soot	Wear	Notes	Spot date
0037	EMW	B	1	5	1			S									slightly odd, may be earlier	
	GMG		1	26	1												abraded	Rom
	MCW	U	1	3	1										+			
0045	GMB		1	2	1													M2-4C
0053	BSW		1	12	1	P 4.6	R										Eve 0.07	Rom
	HOG		1	8	1		BS											
	MCW	U	5	25	3				1 IHLs									
	MCW	B	1	17	1			S							+			
	MTN1	U	3	6	1									+				
0056	ESCS	U	2	8	1									++			contains some grog?	
0061	EMWSS	U	1	12	1									+	+		shell leached	
	EMWSS	R	1	12	1	JR	SEV					240	5		+		wheel-made rim, shell leached	

Appendix 15. Worked flint catalogue (CDD 068)

Context	Cat.	Type	No.
0002	blad	blade	4
	flak	blade-like flake	1
	flak	flake	8
0003	retf	retouched flake	1
	utfl	utilised flake	1
0005	core	multi platform flake core	2
	flak	flake	3
	flak	shatter	1
0007	blad	bladelet	1
	flak	flake	7
	flak	spall	2
	pecr	awl	1
	stfr	struck fragment	2
	utfl	utilised flake	1
0009	unsk	non-struck fragment	0
	utfl	utilised flake	1
0018	core	single platform flake core	1
	flak	blade-like flake	3
	flak	flake	21
	flak	spall	3
	retb	retouched blade	1
	scpf	end/side scraper	1
	unsk	non-struck fragment	0
0020	blad	blade	6
	core	single platform blade core	1
	flak	flake	2
	retf	retouched flake	1
	utbl	utilised blade	4
	utfl	utilised flake	1
0021	core	tested piece	1
	flak	flake	3
	flak	shatter	2
0023	blad	blade	1
	flak	blade-like flake	1
	flak	flake	5
	flak	spall	2
	retf	retouched flake	1
	scpf	end scraper	1
0026	blad	blade	1
	blad	bladelet	1
	core	tested piece	1
	flak	flake	6
	retf	retouched fragment	1
0028	flak	flake	1
0037	flak	flake	3
	utbl	utilised blade	1
0045	flak	flake	1
	utfl	utilised flake	1
0056	flak	flake	1
	retf	retouched flake	1
0060	blad	blade	1

Appendix 16. Bulk finds catalogue (BAY 037)

Ctxt	Pot No	Pot Wt g	Period	CBM No	CBM Wt g	W flint No	W flint Wt g	Burnt flint No	Burnt flint Wt g	Animal bone No	Animal bone Wt g	Miscellaneous
0001						1	27					
0002	1	5	ROM			33	382	2	52	1	7	
0003						44	352	1	13			
0005								29	597			
0007						36	58	4	14			charcoal 3 @ 1g
0011						15	110	5	84			
0014						2	3					
0021						1	3					
0022						5	22					
0024						1	5	1	3			
0026	2	73	ROM	36	3313							
0027	1	12	ROM	1	2							
0029	6	76	ROM	37	474	1	6	10	114	3	7	Ae pin; SQ of mag. fe frags; 2 fe nails @ 11g
0031	1	4										
0033	2	17	ROM	13	943					1	31	mortar 1 @ 10g
0036	5	38	ROM	18	177	2	5			5	3	fired clay 1 @ 35g
0040	1	13	ROM	40	576					3	25	
0041	1	14	ROM	2	242					1	57	
0045				1	343					1	4	
0047	2	11	ROM	17	739	1	15			4	39	heated sandstone piece 1 @ 113g
0048						1	8					
0051				20	1165					2	15	
0053						2	15					
0054						1	216					
0055						9	41					

Appendix 17. Small finds catalogue (BAY 037)

Ctxt	SF	Period	Material	type	No.	wt.g.	length mm	width mm	dia	Comments	cons	x-ray
0001	1001	Rom	Ae	coin	1	9			23	Hadrian, dupondis c AD 118-124, Obv: IMP CAESAR TRAIAN[], laureate (?) bust right, Rev: in exergue		
	1007	Rom	Ae	coin	1	1			7	house of Constantine c AD 347-348, Obv: didem and draped bust right, Rev:[V]ICTORIA[2 victories on reverse		
	1008	sax	Ae	wrist clasp	1	3	25	6		Type B14a, c late 5th-6th C, (Hines, J, 1993, 53-55)		
	1015	p-med	Fe	strap loop?	1	12	40	20		rectangular shape		x-ray
	1016		Pb		2	26	40	36		amorphous piece of melted lead		
	1017	p-med	Pb	lead shot	1	28			15	rounded		
	1018	p-med	Ae	coin	1	1			16	Charles I, 'Richmond round' farthing, c 1625-34, Obv. CARO:D:MAG:BRI, Rev: FRA:ET:HIB:REX, North 1975 no 2277		
	1019	p-med	Ae	crotal bell	2	10	30	15		frags. decorated, suspension point, prob. 16-19C		
	1020	Med/p-med	Ae	strip	1	1	23	11		plate from a buckle?		
	1021	p-med	Ae	escutcheon	1	2	35	18		prob. from furniture, L18-E19C		
	1022	mod	Ae	ring	1	1			15	flat pipe ring		
0026	1002	Rom	Ae	nail cleaner	1	2	43	10		Crummy Type 2a (1983, 58 no. 1874)		
	1003	Rom	Ae	brooch	1	3	22	14		Hod Hill derivative, 1C		
	1004	preh	Ae	coin	1	2			14	Cunobeline bronze Obv: bearded head Rev: crouching lion, similar to Hobbs nos. 1991-1996, c AD 1-40	yes	
	1005	med/p-med	Ae	ring	1	2	24		25	round flat ring		
	1006		Ae	strip	1	2	30	14		AE rounded strip		
0029	1033		White metal	pin	1	0.13	25			dressmaker's pin, separate wound head, prob post-medieval		
0037	1029		Ae	stem/tube	1	3	10		6	frag. of stem or tube with small off center bore		
0045	1009		stone		1	20	67	38		unusual natural stone, discarded		
0053	1010	Rom	Ae	coin	1	5			27	possible Claudian copy, c AD 43-60, uncertain type as reverse now missing		
	1011	Rom	Ae	coin	1	5			24	Commodus radiate, c AD 175-192, Obv []L AVREL CO-MM[]VG[], bust right, Rev: []-COS[] female fig left with corncopia		
	1012	Rom	Ae	brooch	1	11				Colchester Polden Hill type with decorated bow, 1C		
	1013	Rom	Ae	finger ring	2	2			23	upper part of ring, spiral wire wound bezel		

Ctxt	SF	Period	Material	type	No.	wt.g.	length mm	width mm	dia	Comments	cons	x-ray
	1014	Rom	Ae	brooch	2	9	46	26		Colchester derivative, 1C		
	1023		Fe	buckle	1	9	30	35		rectangular with pin or bar frags.		x-ray
	1024	med	Ae	buckle	1	6	25	20		oval, center fe pin, decorated frame 14-16C		
	1025	Med/p-med	Ae	plate	1	1	16	14		plate edge fragment with small fixing hole		
	1026	mod	Ae	hinge plate	1	8	48	15		part of a hinge plate, countersunk fixing holes		
	1027		Ae		1	60	45	30		amorphous piece of cast waste		
	1028	p-med	Pb	strip	1	4	36	10		decorated ?buckle frame		
	1031		Ae	plate	1	1	12	10		square plate piece, one corner broken		
	1032		Pb	sprue	1	20	16		25	possible casting sprue		

Appendix 18. Pottery catalogue (BAY 037)

Ctxt	Fabric	Sherd type	Form	No	Wt (g)	% Eve	Comments	Spot date
0002	GROG/BSW			1	5			1C
0026	NVC	B	3 bkr	1	57			L3-4C
	BSW			1	16		sooted exterior	Rom
0027	BSW			1	12		bowl/jar, sooted exterior	Rom
0029	GX	B		1	8			Rom
	GX			2	6			Rom
	BSW			2	7			Rom
	WSOM	R	7.4 mort	1	55	4	abr. Mixed grits, white quartz, flint & ?sandstone	Rom
0031	BSW			1	4	3	abr. Bowl/jar	Rom
0033	BSW	B	6 dish	1	15		abr. Chamfered bowl/dish	M2-4C
	BSW			1	2		abr. Fragment	Rom
0036	GMB			1	7			Rom
	GX			2	24		abr	Rom
	GX			2	7		abr. oxidised, prob. Misc. snady grey ware	Rom
0040	GMG			1	13			Rom
0041	GX			1	14		pale fabric and surface ?NVG	Rom
0047	BSW			1	8		bowl/jar, sooted exterior, lime scale interior deposit	Rom
	GX			1	3			Rom

Appendix 19. Ceramic building material catalogue (BAY 037)

Ctxt	Fabric	Form	No	Wt	W	T	FlW	FlH	Fl type	ab	Notes	Date
26	fs	IMB	7	329		15				+		Rom
	fs	RBT	7	153						++		Rom
	msx	RBT	1	18						+		Rom
	fs	RBT	1	106		24				+		Rom
	fs	IMB?	1	60		18					corner	Rom
	fs	IMB?	1	84		15						Rom
	fs	IMB?	1	19		14						Rom
	fs	RBT	1	116		22				+		Rom
	fs	RBT	1	117		26						Rom
	fs	FLT	1	195		23				+	reduced surfaces	Rom
	fs	FLT	4	878		22	28	41	1		=1 tile?	Rom
	fs	FLT	1	156		19				+		Rom
	fs	RBT	1	115		30					hard, dark red, reduced core	Rom
	fs	RBT	1	682		30						Rom
	cs	RBT	4	165		30				+	=1 tile?	Rom
	mscp	RT	2	94								p-med
	msffe	RT	1	26								p-med
27	mscp	RT?	1	2						+	small, poss PAN	p-med
28	fs	IMB	30	230		15					prob mainly 1-2 tiles - laminated	Rom
29	fs	RBT	4	60						++		Rom
	fs	RBT	1	78		23						Rom
	fs	IMB?	1	84		16					slight curve, may be later RID?	Rom?
	fs	FLT	1	22						+	reduced surfaces	Rom
33	fs	IMB	5	235		15						Rom
	fs	RBT	1	119		24					brown	Rom
	fs	RBT	1	10		24						Rom
	fs	RBT	1	30		18						Rom

Ctxt	Fabric	Form	No	Wt	W	T	FlW	FlH	Fl type	ab	Notes	Date
	fs	FLT	1	40			20		1			Rom
	fs	RBT	1	23		21					reduced	Rom
	fs	FLT	1	404		18	30		1		hard	Rom
	fs	BOX	1	66							COWL, partly reduced	Rom
	mscp	LB?	1	16						++		p-med?
36	fs	RBT	15	61						++	v fragmented, some poss IMB	Rom
	fs	IMB	1	84		16						Rom
	fs	IMB	1	18		14					reduced surfaces	Rom
	fscp	RBT?	1	14						+		Rom?
40	fs	IMB	35	224		16					=1 tile? heavily fragmented	Rom
	fs	RBT	1	29		19					reduced surfaces	Rom
	fs	RBT	1	59								Rom
	fs	RBT	1	226		23						Rom
	fs	IMB	1	31		13						Rom
	msx	UN	1	7						++		?
41	fs	IMB	1	8						+		Rom
	fs	RBT	1	234		25					partly reduced, burnt	Rom
45	fs	RBT	1	343		29						Rom
47	fs	FLT	9	118						+	=1 tile, v fragmented	Rom
	fs	RBT	2	18								Rom
	fs	RBT	1	146		44						Rom
	fsfe	IMB	5	457	138	15					=1 tile, reduced surface	Rom
51	fs	IMB	1	47		15				+		Rom
	fs	FLT	16	229		25	24	42	2		=1 tile, v fragmented	Rom
	fs	RBT	2	854		44				+	cfm	Rom
	fscp	UN	1	35						++	poss LB? 1 surface sooted	?

Appendix 20. Worked flint catalogue (BAY 037)

Ctxt	Cat.	Type	s/b	No.	Wt(g)	Comp.	Cort.	Prim.	Pat.	Sharp	E.dam.	Hinge	Burnt	Non-str.	Date	Comment
0001	retf	retouched flake	s	1	0	1	1	0	0		yes	0	0	0		thickish hh fl with slight ret of part of cortical dist edge
0002	flak	flake	s	11	0	7	8	0	3	quite		0	0	0		various incl 1 qu large with facetted palt, 1 with battered pebble or poss h'st cort on its plat and hh
	core	bipolar core	s	1	54	1	0	0	1			0	0	0		sm qu chunky and glossy bluish grey pat, bl types from both ends
	corf	crested blade	s	1	0	1	0	0	1			0	0	0	?meso	long narrow with battered dorsal ridge
	blad	blade	s	7	0	5	1	0	4	quite		0	1	0	?meso/eneo	6 abr plat, neat, several small
	flak	blade-like flake	s	2	0	1	0	0	2		some	0	0	0		1 thin , 1 slightly thick irreg and with some edge damage and fe staining
	utfl	utilised flake	s	4	0	2	1	0	4		some	0	0	0		various with slight ret edges - 1 qu largish broad with thick cort plat poss used as backing and broad dist as kn?, 1 sm frag qu battered edges
	utbl	utilised blade	s	2	0	1	0	0	2			0	0	0		1 sm bladelet with prox missing and very slight use of edge, 1v neat bl with abr plat and slight ut left edge
	knff	knife	s	2	0	2	2	0	1		some	0	0	0		both slightly curving, 1- has cortex 'backing' of left sideand some chips and ut of right, 1 - slightly smaller both edges may be ut - left is slighlty concave, worn and chippedon dosal face of edge only, right has irreg chips from both faces
	scpf	scraper	s	1	0	1	1	0	0			0	0	0		irre qu thick hh with incipient

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																cones on venral face, slight/minimal ret around a slightly protruding spur
	notf	notched blade	s	1	0	1	0	0	0			0	0	0		v sm fl with sm notch ret in left side - poss delib or due to use
	retf	truncated flake	s	1	1	1	0	0	0	quite		0	0	0		sm hh fl with dist edge truncated by ret to an oblique point - tho not apparently ut at point
0003	scpf	scraper	s	1	0	1	1	0	0			0	0	0		thick squat sub circ with left dorsal side cortical and some pat and palt also pat/cort, flaking/coasre ret of edges, inclg where cortical
	utfl	utilised flake	s	1	0	1	1	0	0	yes		0	0	0		triang fl with crt along thicker left side, right edge has a few chips/poss use and straight diast edge is has VERY fine almost /serrated/ut
	utbl	utilised blade	s	1	0	1	0	0	0			0	0	0		sm slighlty curving and sqaut bl with chipped/ut edges
	pecr	piercer	s	1	0	1	0	0	1		slight	0	0	0		neat bl with slight poss ut left edge and at prox end apparntly broken forming point which s ret/ut as piercer - poss the break occurred during use - irreg fracture but tip appears ut subsequently (?as well)
	flak	flake	s	27	0	20	21	0	14	yes		0	0	0		various almost all are v thin, qu a few frags, a few wth abr plats and smooth grey flint, thinness also suggests care in kn process, 1 thicker fl shows battered dorsla ride where prev plat/cresting
	flak	blade-like flake	s	5	0	4	1	0	2	quite		0	0	0		thin most with abr plats
	blad	blade	s	6	0	5	2	0	4	yes		0	0	0	?meso/eneo	narrow, 3 abr plats 2 v sm
	core	multi	s	1	64	1	1	0	1			0	0	0		neat, dull grey pat one side,

Ctxt	Cat.	Type	s/b	No.	Wt(g)	Comp.	Cort.	Prim.	Pat.	Sharp	E.dam.	Hinge	Burnt	Non-str.	Date	Comment
		platform blade core														other with some cort less pat, blades from two ends of same face, plat edge abr but then poss abandoned as rather sm/asymm
	scpf	end scraper	s	1	0	1	1	0	1			0	0	0		qu neat hh fl with cort plat and rounded end steeply ret
0007	flak	spall	s	6	0	0	0	0	0			0	1	0		
	flak	flake	s	11	0	4	3	0	2	yes		1	4	0		thin sharp pieces, some slightly burnt
	blad	blade	s	15	0	8	0	0	4	yes		0	6	0	?meso/eneo	very fine thin narrow sm blades and bladelets, most with abr plats, some burnt an 1 or 2 with slight pinkish tinge, some may well be from same core - severla ere similar size and flint
	flak	blade-like flake	s	2	0	1	1	0	0	yes		0	1	0		similar to bls from ctxt - 1 v sm is burnt, other is thicker with some cort
	flak	shatter	s	1	0	1	1	0	0		yes	0	0	0		irreg shattered fl slightly abr - may be therm, has irreg lumpy dark cortex around edges
	pecr	piercer	s	1	0	1	0	0	1	yes		0	0	0		fine sm bl with abr plat, ret of right side at dist tip only
0011	corf	crested blade	s	1	0	1	0	0	1	yes		0	0	0	?meso/ eneo	v nice long narrow bl with abr plat and battered dorsal ridge at distal end and slight batter of dist edge suggestin gposs use as plat - ?bioplar
	blad	blade	s	1	0	1	0	0	1			0	0	0	?meso/eneo	sm bl with abr plat
	flak	flake	s	7	0	6	6	0	4	quite		3	0	0		all qu thin nut irreg in nature
	utfl	utilised flake	s	2	0	2	0	0	0			0	0	0		both v sm flakes with very slight ut of an edge
	notf	notched flake	s	1	0	1	0	0	0			0	0	0		v sm fl with tiny notch in right side
	retb	retouched blade	s	1	0	0	0	0	1			0	0	0		v sm dist frag of prob bl with ret of surviving part of right side
	mcrl	microlith	s	1	0	0	0	0	1	quite		0	0	0	meso	prox point of very fine thin narrow

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																bladelet with ret of right side to tip, this tip has a small spall from its other side which may have occurred during use
	core	core fragment	s	1	48	0	1	0	0			0	0	0		irreg as one face has sm fls struck from an edge but the whole may be part of a previous core as another partial plat survives and the other face may be fractured
0014	flak	flake	s	1	0	1	0	0	0	yes		0	0	0		v sm
	utbl	utilised blade	s	1	0	1	0	0	1			0	0	0	?meso/eneo	v sm thin bl with v slight abr plat edge an v slight ut right lat, white patina
0021	blad	blade	s	1	0	0	0	0	1		slight	0	0	0	?meso eneo	fairly neat tho both ends missing, whitish patina
0022	blad	blade	s	1	0	1	0	0	1		yes	0	0	0	?meso/eneo	sm pat white and abraded, also slight abr plat
	flak	blade-like flake	s	2	0	1	1	0	1	quite		0	0	0		1 thin with pat sim to other bl-types, 1 thicker and with pat white cort on one surface and plat
	flak	flake	s	2	0	1	0	0	1	quite		0	0	0		both sm
	unsk	non-struck fragment	s	0	0	0	0	0	0			0	0	1		discarded
0024	blad	blade	s	1	0	0	0	0	1		yes	0	1	0		medial and edge broken prob bl frag, burnt
0029	blad	blade	s	1	0	1	1	0	0		yes	0	0	0		hh
0036	flak	blade-like flake	s	1	0	1	0	0	0	quite		0	0	0		v sm
	flak	flake	s	1	0	1	1	0	0	quite		0	0	0		sm
0047	flak	flake	s	1	0	0	0	0	1	quite		0	0	0		cherty grey, plat edge abr, broad fl - dist missing
0048	flak	flake	s	1	0	1	0	0	1	quite		0	0	0		neat slightly curving, some previos flsfrom plat edge -

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																neatish core/
0053	notf	notched flake	s	1	0	0	0	0	1		some	0	0	0		qu neat fl has poss notches in each side - that in left looks morelike delib ret while in right cld be accide - but they are opposite each other…? They both post-date the patina of the piece which MIGHT suggest re-use - or accide? The dist end/tip is bro
	flak	flake	s	1	0	0	0	0	0		yes	0	0	0		dist missing
0054	core	core/tool	s	1	218	1	1	0	0		yes	0	0	0		fairly large frag wih thin grey cort on both main faces and struck around one v blunt end and from reverse on an opposite irreg end - cld be tested as core or v crude large scr or chopping type tool?
0055	retf	retouched flake	s	1	0	0	0	0	1			0	0	0		unusual - dorsal face is flaked/ret from its left edge and is quite flat, the ventral face may have split off from a tool? - there is a thin left 'edge' -unretouched and at a steep angle to the retouched face - is this a tranchet sharpening flake?
	corf	crested flake	s	1	0	1	1	0	0			0	0	0		unusual - bl likecurving and quite broad, left edge has'ret' or is former plat edge - poos irreg crested type piece??
	utbl	utilised blade	s	3	0	2	0	0	3		some	0	0	0		2 sm thin 1 with abr plat bothwith v slight ut edges, 1 larger pat white/grey with damaged edges, some post patina so cld be accidet but poss used as knife
	flak	blade-like flake	s	1	0	1	0	0	1	yes		0	0	0		neat, slightly thick
	retb	retouched	s	1	0	1	1	0	0			0	0	0		bl, slightly irreg with cort along

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		blade														part of right edge - poss act as backing, abr plat, abrubpt ret of left edge and also across dist edge - truncated
	knff	knife	s	1	0	1	1	0	1			0	0	0	?meso/eneo	bl with abr plat and cort along its thin left edge - ?backing, right edge is ut/ret
	retf	retouched flake	s	1	0	1	0	0	1			0	0	0		sm with ret part of both sides