

Standard and guidance for archaeological geophysical survey

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- Minor formatting changes made. A more thorough review of this document is currently in plan.

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Standard and guidance for archaeological geophysical survey

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STANDARD AND GUIDANCE

for archaeological geophysical survey

Introduction

This *guidance* seeks to define good practice for the execution and reporting of archaeological geophysical survey in line with the regulations of ClfA, in particular the *Code of conduct*. It seeks to expand and explain general definitions in the *Code*.

The key section of this document is the *Standard*. It is only a few lines long, and deliberately lacks detail. In part this is because it is impossible to foresee every circumstance and prescribe for every investigative method. Nor does the Institute seek to dictate to its members in detail the means by which projects are conducted, but rather to outline procedures by which outcomes or products can be attained and against which performance can be monitored. The historic environment expert is left free to make a considered selection of appropriate established techniques and to develop new methods.

If the project has failed to determine *the nature of the detectable archaeological resource within a specified area using appropriate methods and practices* because of the way in which it was conducted, the Standard has not been met. It is a 'sub-standard' project. The caveat for meeting the Standard is 'as far as is reasonably possible', because there may be good reasons why a well-conducted geophysical survey stood no chance of success.

Defining 'reasonably possible' relies on shared professional judgement and values. This is where the *guidance* section comes in. It is not binding per se, but advises on what the profession presently considers good practice. Departures from the guidance should be undertaken with caution, and it is advisable to document the reasons.

The Standard defines a required outcome and the guidance advises in broad terms how the profession currently anticipates that the end product will be reached. This document contains more detailed guidance on the legal, policy and practice requirements of the United Kingdom, Channel Islands and Isle of Man, and complements government or practitioner guidance, but it applies to ClfA members' work universally and would benefit from additional sections from those able to draft them. Professional practitioners are likely to produce their own yet more detailed handbooks and procedures documents on how they interpret and implement ClfA guidance.

The *Standard and guidance* has many potential applications, but is principally used by

- those involved in commissioning archaeological work, be they developers and their agents, planning archaeologists, or archaeologists designing their independent research, to define the quality required
- those undertaking the work, to assist in their own quality management and to show clients and peers that they are attaining a certain quality

The *Standard and guidance* applies equally to paid or unpaid archaeologists. For ClfA members and Registered Organisations compliance with the Standard is an obligation of membership/Registration: failure to meet the standard may be judged to be in conflict with the regulations through the Institute's professional conduct procedures.

Professional practice is changing. New methods are being developed, and the circumstances in which archaeological work is commissioned and conducted are subject to changing legal, administrative and ideological perspectives. Comments and recommendations on this document are welcome at any time.

Note: In this document, the term 'archaeologist' applies to all geophysical surveyors undertaking archaeological assignments.

THE STANDARD

An archaeological geophysical survey will determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices.

These will satisfy the stated aims of the project, and comply with the *Code of conduct* and other relevant regulations of ClfA.

Definition of geophysical survey

Archaeological geophysical survey uses non-intrusive and non-destructive techniques to determine the presence or absence of anomalies likely to be caused by archaeological features, structures or deposits, as far as reasonably possible, within a specified area or site on land, in the inter-tidal zone or underwater. Geophysical survey determines the presence of anomalies of archaeological potential through measurement of one or more physical properties of the subsurface.

Purpose of geophysical survey

A survey undertaken to the Standard will as far as possible inform on the presence or absence, character, extent and, in some cases, apparent relative phasing of buried archaeology, in order to make an assessment of its merit in the appropriate context, which may lead to one or more of the following:

- a. the formulation of a strategy to ensure further recording, preservation or management of the resource
- b. the formulation of a strategy to mitigate a threat to the archaeological resource
- c. the formulation of a proposal for further archaeological investigation within a programme of research

Occurrence

A geophysical survey may arise

- a. in response to a proposed development that threatens a known or potential archaeological resource
- b. as part of the planning process (within the framework of appropriate national planning policy guidance notes and/or development plan policy)

- c. as part of an Environmental Impact Assessment (EIA) (see 3.1.7 below)
- d. outside the planning process (eg ecclesiastical development, coastal erosion, agriculture, forestry and countryside management, works by public utilities and statutory undertakers)
- e. within a programme of research not generated by a specific threat to the archaeological resource
- f. in connection with the preparation of management plans by private, local or national and international bodies

An archaeological geophysical survey may therefore be instigated or commissioned by a number of different individuals or organisations, including local planning authorities, national advisory bodies, government agencies, private landowners, developers or their agents, archaeological researchers, community groups, etc.

GUIDANCE

1. Introduction

- 1.1 This guidance seeks to define best practice for the execution of a geophysical survey and its reporting in line with the regulations of ClfA, in particular the *Code of conduct*. It seeks to expand and explain general definitions in the *Code*.
- 1.2 The Standard and guidance apply to all types of geophysical survey (land-based, inter-tidal and underwater) whether generated by academic research, by local interest, through the planning process, by management proposals or by any other proposals that may affect the archaeological resource within a specified area.
- 1.3 In addition, the guidance seeks to amplify directions given in appropriate national planning policy guidelines (see Appendix 6) and be compatible with current guidelines issued by regulatory authorities.
- 1.4 This document provides guidance for work carried out within the United Kingdom, Channel Islands and Isle of Man. Although general guidance is given, this document cannot be exhaustive, particularly in its treatment of legislative issues. On the Isle of Man, archaeologists must ensure they are familiar with the specific legislation and common law pertinent to the area in which they are working. Archaeologists, commissioning bodies and others may find it useful to consult the relevant documents listed in Appendix 6 and can obtain further guidance from the appropriate advisory bodies listed in Appendix 7.

2 Principles: the Code of conduct and other regulations of the ClfA

- 2.1 An archaeologist undertaking a geophysical survey must adhere to the five major principles enshrined in the ClfA *Code of conduct*, and the rules governing those principles.
- 2.2 A member shall adhere to the highest standards of ethical and responsible behaviour in the conduct of archaeological affairs.

- 2.3 A member has a responsibility for the conservation of the historic environment.
- 2.4 A member shall conduct his or her work in such a way that reliable information about the past may be acquired, and shall ensure that the results be properly recorded.
- 2.5 A member has the responsibility for making the results of archaeological work available with reasonable dispatch.
- 2.6 A member shall recognise the aspirations of employees, colleagues and helpers with regard to all matters relating to employment, including career development, health and safety, terms and conditions of employment and equality of opportunity.

3 Procedures

3.1.1 Project identification

- 3.1.1 Within the planning framework in the United Kingdom, Channel Islands and Isle of Man the desirability of preservation of archaeological deposits is a material consideration, and consequently developers and local authorities should take into account archaeological considerations and deal with them from the beginning of the development control process.
- 3.1.2 As the desirability of preservation of archaeological remains is a material consideration in the planning process, local authorities can reasonably request an applicant to provide further information on archaeological matters so that an informed and reasonable planning decision can be taken.
- 3.1.3 Within the planning framework an appraisal (see Appendix 1 for definition) of the proposal area will be carried out to determine whether further information is required. This will normally have been undertaken by the planning archaeologists or curator (eg county, district or council archaeological officer), but may also have been carried out by the applicant or their agent.
- 3.1.4 On occasion it may be deemed sufficient to carry out desk-based assessments in order to provide information to make an informed and reasonable decision; on other occasions it will not. Under this guidance, requests for geophysical survey will generally be made by the planning archaeologist or curator.
- 3.1.5 A geophysical survey may be commissioned in advance of submission of a planning application by the applicants or through their agents. It is appropriate in these circumstances for proposals for geophysical survey to be agreed with the planning archaeologist in advance of survey work. The geophysical survey requirements must be integrated within a written statement. This must include an explicit justification for the choice of survey methodology, while retaining some flexibility should this require modification in the light of particular site conditions and the time of fieldwork (see Appendix 6 for further guidance). In such circumstances matters of confidentiality will need to be carefully reviewed by all parties involved. The planning archaeologist may also be able to offer advice to applicants on project design, should the applicants be unfamiliar with archaeological matters.
- 3.1.6 Certain developments fall within special regulations or statutes differing from the standard planning process (eg some projects initiated by public utilities, statutory

undertakers, Crown Commissioners, Ministry of Defence, etc). Certain of these organisations subscribe to codes of practice (eg water companies) or agreements (formal or informal) with the lead national archaeological bodies to take into consideration the effects of development proposals on the archaeological resource.

- 3.1.7 Environmental Impact Assessment (EIA) applies to projects potentially having significant environmental effect (as defined in EC Directive 85/337 and as implemented in the UK via the various Statutory Instruments, etc). It requires a systematic analysis of such effects before a decision to permit the project is taken. Developers are required to provide information for the deciding agency to consider in the decision-making process, and further give bodies with relevant environmental responsibilities an opportunity to comment before consent is given. EIA is mandatory in relation to certain projects, and may be extended to others. Appraisal and desk-based assessments of the archaeological element must form part of EIA and geophysical survey may also be required (see Appendix 1 for definitions).
- 3.1.8 In EIA projects, geophysical survey is usually initiated by the developers or through their advisors, rather than the local planning authority. It is expected that all proposals for geophysical survey associated with EIA projects will be agreed with planning archaeologists in advance of survey work.
- 3.1.9 In a research context, the area for potential investigation or study for geophysical survey will have been identified and selected by an archaeologist based on specific aspects or themes relating to their own defined research interests. This could include work undertaken through universities, central government agencies, local authorities, museums, independent trusts, private companies, community groups or individuals.
- 3.1.10 Management proposals by private landowners or others may also result in geophysical survey, to obtain information in order to enhance or protect the environmental or archaeological resource.
- 3.1.11 However it arises, an archaeologist should only undertake a geophysical survey which is governed by a written specification or project design (see Appendices 2 and 3) agreed by all relevant parties, as this is the tool against which performance, fitness for purpose and hence achievement of standards can be measured. The survey project manager should be aware of and ensure compliance with all necessary legal requirements (English Heritage 2008).

The specification or project design is therefore of critical importance.

3.2 Briefs/projects outlines, specifications and project designs

- 3.2.1 The planning and preparation stage of any project is key to its success. This section addresses the initial design stages of a geophysical survey, after the appraisal has determined the need for further work, in whatever circumstances.
- 3.2.2 A brief (or project outline in Scotland) is an outline of the circumstances to be addressed, with an indication of the scope of works that will be required. A brief may be produced by a curator/planning archaeologist, consultant or archaeologist. It does not provide sufficient detail to form the basis for a measurable standard, but it could form the basis for a specification or a project design.

- 3.2.3 A specification sets out a schedule of work in sufficient detail for it to be quantifiable, implemented and monitored. It should be sufficient to form the basis for a measurable standard.
- 3.2.4 A project design also sets out a schedule of works in sufficient detail for the work undertaken to be quantifiable, implemented and monitored, and therefore also forms the basis for a measurable standard. However, a project design may include additional information to a brief or specification that covers contractual details such as staffing levels or cost relevant to the commissioning but not necessarily the monitoring body. A project design may also include considerations and research questions relevant to the appropriate regional research framework. A project design may be prepared in response to a brief/project outline or specification; or it may be a research proposal independent of the planning framework (see Appendix 3).
- 3.2.5 A brief/project outline or a specification may form the basis for a project design. For a geophysical survey within the planning framework, the brief/project outline or specification will usually be prepared by the planning archaeologist or curator and issued by the commissioning body, the developers or their agents, to invited parties. The brief/project outline or a specification may be prepared by the applicants or their agents, but it is essential in a planning application or pre-determination that the planning archaeologist has agreed the proposals so that they have been accepted as 'fit for purpose'.
- 3.2.6 Briefs/project outlines, specifications and project designs must be prepared by suitably qualified, skilled and competent persons, utilising specialist advice where necessary.
- 3.2.7 In the case of EIA, the brief/project outline or specification will usually be prepared by the developers or their agents, and issued to tenderers. This may also apply to management proposals.
- 3.2.8 Proposals for geophysical survey not prompted by a threat to potential archaeological remains will normally take the form of a project design prepared by the researching archaeologist and agreed with any commissioning body. If there is no external commissioner there must nevertheless be a written design so that the validity of any models or questions posed can be properly assessed, or so that legal requirements (eg the need for a Section 42 licence) can be properly determined.
- 3.2.9 The specification or project design must be expressed in sufficiently robust terms and in sufficient detail that it can withstand challenges on archaeological or legal grounds.
- 3.2.10 In preparing a specification or a project design an archaeologist must give full consideration to all available practicable methods of survey (Annex 1) and decide upon the most appropriate and best available to meet the purpose of the work, seeking specialist advice where necessary. An archaeologist preparing a specification or project design must examine appropriate sources, be fully apprised of all relevant legislation, and abide by it.
- 3.2.11 The specification or project design must be suited to the project under consideration; any methods advocated must reflect the nature of archaeological remains likely to be found. Other considerations include 'reasonableness' in relation to presence of buildings, land use, value for money, etc. The methodology will be appropriately

matched with both with the archaeological and logistical demands of the project (see English Heritage 2008 for further details).

- 3.2.12 When preparing a specification or project design consideration should be given to the need to include appropriate contingency arrangements with respect to field procedures and thus resourcing. Some flexibility should be retained if modification is required in light of particular site conditions at the time of fieldwork (see English Heritage 2008 for further guidance and information). Commissioners and curators should be advised that overly rigid requirements might unavoidably result in a failure to meet archaeological and non-archaeological aims. Contingency arrangements should not be open-ended but should be properly specified in their own right as a function of prior knowledge of the site, the physical context of the site and the primary aims of the geophysical survey. Contractors must be in a position to justify in detail the eventual implementation of contingency arrangements. The principle of BATNEEC (best available technique not entailing excessive cost), as enshrined in EA (Environment Agency) guidance, should be used.
- 3.2.13 The specification or project design should contain, as a minimum, the following elements:
- a. non-technical summary
 - b. site location (including map) and descriptions (including conditions at time of survey)
 - c. designations (Scheduled Monument number(s))
 - d. context of the project
 - e. geological/geomorphological and topographical background
 - f. archaeological and historical background
 - g. general and specific aims of the survey
 - h. reference to relevant legislation
 - i. survey methodology
 - j. report preparation (method) including data presentation
 - k. publication and dissemination proposals
 - l. copyright
 - m. archive deposition
 - n. timetable
 - o. staffing
 - p. health and safety considerations
 - q. monitoring procedures

r. contingency arrangements (if appropriate).

- 3.2.14 The contents and different weighting of detail between specification and/or project designs are amplified in Appendices 2 and 3. Briefs/project outlines and specifications are also discussed in detail in ACAO (1993), Historic Scotland (1996a) and English Heritage (2008).
- 3.2.15 An archaeologist responding to a tender that includes a brief/project outline or specification may refer to these elements in the project design, taking care to include sufficient detail.
- 3.2.16 In all cases, the local archaeological curator (and where appropriate, the national agency curator, National Trust and MOD curators) must be informed of fieldwork in his or her area. Unless there are overriding reasons against it, local archaeological societies etc should be informed of fieldwork.
- 3.2.17 The specification or project design should identify relevant data standards for record organisation and content that will be used in information recording systems employed by the project.

3.3 Fieldwork

- 3.3.1 The specification or project design must be agreed by all relevant parties before work commences. All work must conform to the agreed specification or project design. Any variations must be agreed in writing by all relevant parties.
- 3.3.2 Sufficient and appropriate resources (staff, equipment, accommodation, etc) must be used to enable the project to be completed successfully, within the timetable, to an acceptable standard, and comply with all statutory requirements. Any contingency elements must be clearly identified and justified. It is the responsibility of the archaeologist undertaking the work to define appropriate staff levels.
- 3.3.3 All techniques used must comply with relevant legislation and be demonstrably fit for the defined purpose(s).
- 3.3.4 All staff, including subcontractors, must be suitably qualified, skilled and competent for their project roles, and employed in line with relevant legislation and ClfA regulations (see Appendix 6). The survey leader or project manager should preferably be an accredited member of ClfA or an equivalent professional body.
- 3.3.5 All staff, including subcontractors, must be fully briefed and aware of the work required under the specification, and must understand the aims and methodologies of the project.
- 3.3.6 All equipment must be suitable for its designated purpose and in sound condition, complying with Health and Safety Executive regulations and recommendations.
- 3.3.7 It should be noted that some items of equipment are subject to specific statutory controls (staff working offshore should have completed sea survival training and small vessels for marine geophysical surveys need to comply with the Marine and Coastguard Agency (MCA) code of practice, while larger vessels need to comply with Merchant Shipping Regulations – see Appendix 6).

- 3.3.8 Operators of GPR equipment are required to hold a specific radio equipment licence issued by OFCOM. It is mandatory that the surveyor is licensed, even if hiring equipment from a licensed provider. Legislation set out under the terms of the licence includes frequency limitations, the requirement to keep a detailed log of usage, and the need to apply for additional OFCOM clearance before operating within 7km of radioastronomy sites. Use of GPR equipment at defence establishments, prisons, hospitals and airfields would normally also require additional permission from the particular institution but this would normally be part and parcel of the site access arrangements. Further information can be found on the OFCOM and EuroGPR websites.

Operators of GPR equipment are required to abide by the European Code of Practice, EG 202 730, available for the EuroGPR and ETSI (European Telecommunications Standards Institute) websites.

- 3.3.9 Full and proper records (written, graphic, electronic, and photographic as appropriate) should be made for all work using pro forma record forms and sheets as applicable. Digital records created as part of the project should comply with specified data guidelines (see Annex 3). An archaeologist must ensure that digital information, paper and photographic records are stored in a secure and appropriate environment, and are regularly copied or backed up, with copies stored in a separate location.
- 3.3.10 Health and Safety regulations and requirements cannot be ignored no matter how imperative the need to record archaeological information; hence Health and Safety will take priority over archaeological matters. All archaeologists undertaking fieldwork must do so under a defined Health and Safety policy and comply with all relevant Health and Safety accreditation. Archaeologists undertaking fieldwork must observe safe working practices; the Health and Safety arrangements must be agreed and understood by all relevant parties before work commences. Risk assessments must be carried out and documented for every field project in accordance with the Management of Health and Safety at Work Regulations 1992. Archaeologists should determine whether field projects are covered by the Construction (Design and Management) Regulations and ensure that they meet all the requirements under the regulations. In addition, they must liaise closely with the principal contractor and comply with specified site rules. Archaeologists are advised to note the onerous responsibilities of the role of a planning supervisor. For further guidance refer to the bibliography (Appendix 6).
- 3.3.11 The archaeologist undertaking a geophysical survey must ensure that he or she has adequate insurance policies, public and employer's liability cover, and some relevant form of civil liability indemnity or professional liability cover.

3.4 Post-fieldwork analyses and reports

- 3.4.1 All assessment and analytical work must be carried out by suitably qualified, skilled and competent staff, who must be apprised of the project design before commencing work.
- 3.4.2 The level of recording and analysis of the data should be appropriate to the aims and purpose of the project.

- 3.4.3 All data generated from the survey should be included in the project archive.
- 3.4.4 All reports must address the aims and purposes of the project design and/or specification.
- 3.4.5 All reports should be written in a clear, concise and logical style and technical terms should be explained. Consideration should be given during the preparation of the report to the requirements of public inquiries or courts of law if appropriate.
- 3.4.6 As a minimum, an interim survey report should be submitted to the appropriate Sites and Monuments Record/Historic Environment Record, the National Monuments Record and, where appropriate, the central government conservation organisation within six months of completion of the fieldwork, or as may be specified by contractual or grant conditions. In Scotland, a summary interim report must be published in an annual, regional or national digest of fieldwork.
- 3.4.7 Reports should not include recommendations unless required by the planning archaeologist or the specification and/or project design. However, it would be reasonable for a client to seek independently the opinion of archaeological contractors. Contractors should have regard as to whether the provision of such advice is a contractual requirement and the legal implications thereof.
- 3.4.8 Reports should contain as a minimum:
 - a. non-technical summary
 - b. introductory statements
 - c. aims and purpose of the evaluation
 - d. methodology
 - e. results
 - f. conclusion
 - g. plans/plots
 - h. index to and location of digital archive
 - i. references
- 3.4.9 The contents are discussed in more detail in Annex 2.
- 3.4.10 Where the project is carried out within the planning process, the report must contain sufficient objective data to enable 'an informed and reasonable decision to be made'.
- 3.4.11 Subject to any contractual requirements on confidentiality, copies of the report must be submitted to the appropriate county Sites and Monuments Record/Historic Environment Record within six months of completion of the report.

- 3.4.12 In addition to the deposition of project reports and archive with the relevant local and national curators, an electronic record of the project details should be created through OASIS. The project record should include technical details for each technique used in the project. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and national records and published through the Archaeology Data Service ArchSearch catalogue.

3.5 Monitoring

- 3.5.1 All work must be monitored by the archaeological organisation undertaking the project. Monitoring of the results of the report will be carried out by the curator.
- 3.5.2 A monitor should be suitably qualified, skilled and competent, or have access to appropriate specialist advice.
- 3.5.3 Monitoring must be undertaken against the written specification and/or project design.
- 3.5.4 Monitors, where they are not representing the commissioning body, should bear in mind the need for flexibility, within the stated parameters, in contractual matters such as staff numbers, budgets or timetable.
- 3.5.5 Non-compliance with the agreed specification or project design must be pointed out by the monitor to the archaeologist undertaking the work, and their client if appropriate, at the earliest opportunity.
- 3.5.6 Monitors should be aware of their professional duties regarding Health and Safety, in particular advising against and reporting on bad and unsafe practice.

3.6 Archives, ownership and deposition

- 3.6.1 The requirements for archive preparation and deposition must be addressed at the outset of the project. Consultation should take place to ensure that appropriate procedures are incorporated in the specification/project design.
- 3.6.2 Geophysical survey archive comprises log sheets, digital data and the final report. A formal archiving process should be in place, following a written procedure in line with appropriate good practice guides and recommendations. Generators of digital geophysical data should have a strategy in place to allow for the adequate storage, security and long-term accessibility of this digital data. Requirements for digital archiving may be imposed through the commissioning or specification process where conformity to a policy or archiving agency is necessary.
- 3.6.3 Subject to confidentiality arrangements specified for the project, the archaeologist, either during fieldwork or as soon as possible after its conclusion, should prepare a structured description of the project suitable for publication or inclusion in national and local data archives.

3.7 Other considerations

- 3.7.1 It is advisable for geophysical survey projects to be governed by a written contract or agreement to which the specification or project design may be attached. Such

contracts or agreements should include reference to the defined area of study outlined on a map; to the brief/project outline, specification or project design (see 3.2); to conditions for access; programme, method and timetable for payment (including any retentions); copyright arrangements; and be signed and dated by all parties.

- 3.7.2 It is normal practice for both the copyright and ownership of the paper and digital archive from the archaeological work to rest with the originating body (the organisation undertaking the work). These arrangements may be varied by contract, and for the avoidance of doubt it is advisable to include statements on ownership and copyright in a written contract or agreement.
- 3.7.3 Material copied or cited in reports should be duly acknowledged, and all copyright conditions (such as those for Ordnance Survey maps and the National Grid) observed.
- 3.7.4 All aspects of publicity must be agreed at the outset of the project between the commissioning body and the archaeological organisation or individual undertaking the project.
- 3.7.5 The archaeologist undertaking the work must respect the requirements of the client or commissioning body concerning confidentiality, but the archaeologist must emphasise his or her professional obligation to make the results of archaeological work available to the wider archaeological community within a reasonable time.

Annex 1: Field techniques

There is a wide range of techniques available for geophysical survey. In many instances several techniques may be valid for the requirements of the brief/project outline, and it will be necessary to explain the selection criteria. The methods selected must be fit for the purpose defined. All fieldwork should be conducted under the principle of repeatability; in other words, that, within reason, the data obtained should be capable of independent duplication (English Heritage 2008). Correct observance should be made of any legal constraints on site – for instance, the requirement of a Section 42 Licence for survey over scheduled monuments and other protected places, the licence needed for survey on National Trust land (English Heritage 2008) and GPR licences.

This Standard covers the following methods of geophysical survey:

- a. magnetometer survey
- b. earth resistance (resistivity) survey
- c. ground penetrating radar
- d. electromagnetic methods
- e. topsoil magnetic susceptibility survey
- f. other geophysical methods

Further information on selection of techniques is set out in *Geophysical Survey in Archaeological Field Evaluation* (2008).

Annex 2: Report contents

The specific requirements of any report will necessarily vary according to the scope of works, the nature of the results or other factors. However, the following sections will occur in most reports:

Non-technical summary

This should outline in plain, non-technical language the principal reason for the work, its aims and main results. It should include reference to authorship and commissioning body.

Introductory statements

These could include acknowledgements, circumstances of the project such as planning background, the archaeological background, an outline nature of work, the site description (including size, geology and topography, location), when the project was undertaken and by whom.

Aims and objectives

These should reflect or reiterate the aims set out in the project design or specification.

Methodology

The methods used and reasons for this choice, including the detail of any variation to the agreed project design or specification, should be set out carefully and explained as appropriate. The methodology should also include the date(s) of field work and grid location; the geophysical instruments used; their configuration and sample intervals; the method(s) of data capture, data processing and presentation.

Results

The format of this section will depend on the clarity and complexity of the results. A factual account of the survey results, followed by a section on their interpretation and discussion, can be used; alternatively, a blend of objective description and explanatory interpretation drawing upon supporting information from other sources may be presented. However, anomaly-by-anomaly narrative detail is often tedious and should be avoided. Nevertheless, this section should demonstrate that the archaeological potential of all anomalies located during the survey has been considered and the maximum use should be made of data plots and interpretation plans in this regard. Since the cause of anomalies often cannot be unambiguously determined based on geophysical measurements alone, the text should also be clear about the degree of uncertainty pertaining to inferences drawn from the results.

Conclusions

The conclusions should address the survey results with reference to the original aims. It is appropriate to include a section that sums up and interprets the results, and conclusions may be drawn, where necessary, about the need for future survey or research. Other elements should include a confidence rating on techniques used, or on limitations imposed by particular factors (eg weather or problems of access). Recommendations on further work may also be required by the archaeologist, but in most circumstances within the planning framework this will be the responsibility of the relevant planning archaeologist or curator.

Archive location

The final destination of the archive (records and data) should be noted in the report.

Appendices

These should contain essential technical detail and supporting information.

Plans/plots

As a minimum, the following plans/plots should be included:

- a. survey grid location (1:2500 minimum)
- b. plot(s) of minimally processed data (1:1000 preferred minimum)
- c. minimally enhanced X-Y traces of magnetic data, where appropriate
- d. plot(s) of enhanced data (1:1000 preferred minimum), grey tone or dot density
- e. interpretation diagram (1:1000 preferred minimum)

References and bibliography

A list of all sources used should be appended to the report, including electronic sources.

Other

Contents list, disclaimers.

Annex 3: Recommendations for digital archives

Archiving of geophysical data is dealt with in the Archaeology Data Service document *Geophysical Data in Archaeology: a Guide to Good Practice* (Schmidt 2002). Contact details for the Archaeology Data Service are included in Appendix 7.

Geophysical surveyors, and their clients, face a responsibility to ensure that a copy of the full survey report is deposited with the relevant Sites and Monuments Record/Historic Environment Record. For Scotland and its offshore waters, copies of the full survey report and supporting archive should be deposited with the Royal Commission on the Ancient and Historical Monuments of Scotland. For geophysical surveys requiring a Section 42 Licence it will usually be a condition of consent that a copy of the survey report be sent to both the relevant Historic England Heritage Regional Office and to the Geophysics Team at Fort Cumberland within a fixed period (usually three to six months) after completion of the fieldwork.