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THE ENGLISH HERITAGE GEOPHYSICAL SURVEY DATABASE: PART I: STRUCTURE AND DEFINITIONS

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Summary

This document, Part I, is the first of two reports detailing the design and implementation of the English Heritage Geophysical Survey Database. This database is intended to store detail of all geophysical surveys undertaken by the Archaeometry Branch of the Ancient Monuments Laboratory, as well as information about all other geophysical surveys undertaken in England for archaeological purposes of which the Branch is aware. It has been implemented as a relational database using Oracle version 7 running on the Laboratory's database server and public access is provided to much of the information via the Internet using a World Wide Web front end. The purpose of this first report is to document definitions for the structure and content of the database at an abstract level; it also provides necessary background to the project and outlines considerations that influenced the design adopted. As far as possible, the main document avoids details of the practical realisation of the database in Oracle but information about the SQL scripts used to create the database and the constraints and checks necessary to ensure its integrity is provided in appendix 2. No mention is made of the user interfaces provided to update and interrogate the database; discussion of these is deferred until Part II.

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The English Heritage Geophysical Survey Database: Part I: Data Structure and Definitions.

1. Introduction

1.1 Overview

This document, Part I, is the first of two reports detailing the design and implementation of the English Heritage Geophysical Survey Database. This database is intended to store detail of all geophysical surveys undertaken by the Archaeometry Branch of the Ancient Monuments Laboratory, as well as information about all other geophysical surveys undertaken in England for archaeological purposes of which the Branch is aware. It has been implemented as a relational database using Oracle™ version 7 running on the Laboratory's database server and public access is provided to much of the information via the Internet using a World Wide Web front end.

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This report is divided into three sections and two appendices, the contents of which may be summarised as follows:

Section 1: **Introduction**. An overview of the report and background to the development of the database.

Section 2: **The logical data structure of the database**. This section provides a top-level view of the database structure. It discusses the entities required to model geophysical survey information, the tables that were defined to represent these entities and the relationships identified between them.

Section 3: **The data dictionary**. A more detailed look at the actual data stored in each table of the database. This section lists the data type and defines the content of each column in the database. The listing is organised by table for reference with the previous section.

Appendix 1: **The lookup tables**. Many columns in the database require their content to be drawn from a standard list of terms. A lookup table is provided for each such standard list. This appendix defines all the terms included in each lookup table and refers to the definitive sources for each list.

Appendix 2: **Implementation details**. The database is implemented using the Oracle version 7 relational database management system. This appendix lists the SQL scripts used to construct the database. It also lists the constraints and table triggers defined to maintain the integrity of the data stored.

Having thus provided an overview of the documentation as a whole, this first section continues with an outline of the background to the project and a summary of the main considerations influencing the database design.

1.2 Project Background and Goals

The Geophysical Survey Database project was initiated in 1994 when a need to unify and curate the archive of geophysical survey information accumulated by the Archaeometry Branch was identified. The Branch has a history of involvement in archaeological geophysics stretching back to the mid 1960s and, given the technological changes that have taken place during this period, it is not surprising that a number of different paper and electronic record systems have been employed over the years, none of which contains a comprehensive record of the Branch's work.

Thus, the database was primarily intended to act as an index of all the geophysical surveys of archaeological sites carried out by the Branch, from which information useful to archaeologists could be made available. However, during the conception phase of the project three further potential benefits of such a database were recognised and consideration of these has influenced the implementation that has been adopted.

The most important benefit was the possibility that the database might be used to make records of Archaeometry Branch work publicly available in fulfilment of its duty as an agency of the UK government. For this reason, public access via the Ancient Monuments Laboratory's JANET computer network connection was deemed to be important. This has resulted in the development of a World Wide Web front end to the database as the primary user interface, making information available to anyone with access to an Internet connection. Discussion of this interface will be incorporated into Part II of this report.

A second benefit was perceived in relation to the Branch's increasing role in monitoring developments in archaeological geophysics and in providing advice on the subject to others. At present it is often difficult to find out whether a particular monument has ever been geophysically surveyed, or even how many geophysical surveys are commissioned each year for archaeological purposes, without canvassing all the organisations with an involvement in archaeological prospecting.

Hence, it was intended that the database be flexible enough to contain at least basic details of the geophysical surveys carried out by other organisations, whenever the Archaeometry Branch becomes aware of them. In this way, the database might eventually reflect a national picture of geophysical prospecting in archaeology and, as a beginning, a programme has been initiated to record all applications made to English Heritage under Section 42 of the Ancient Monuments and Archaeological Areas Act, 1979 to carry out geophysical surveys over Scheduled Ancient Monuments (SAMs).

Finally, it is hoped that the database can evolve into a valuable first point of enquiry for questions pertaining to archaeological geophysics in England. Thus, decisions about what information should be recorded for each survey have been influenced both by research questions (such as: have any surveys ever been carried out over grange *[a medieval monastic farm]* sites?), as well as by evaluation considerations (for example: has any geophysical survey work previously been done in the vicinity of the recently proposed route for a new road?).

In pursuance of these aims an initial one year design and development phase has now been completed and a flexible database structure has been established to which survey data is now being added. To date, over 750 survey visits have been recorded reflecting the majority of Archaeometry Branch prospecting back to the early 1970s and work is in hand to add data for the outstanding surveys. The World Wide Web query interface was added in April 1995 allowing external access to the database via JANET and this is attracting an average of 450 queries per week at present. The following subsection outlines some of the design issues that were encountered during the development phase and explains how the final database implementation accommodates them.

1.3 Database Design Issues

The final database design evolved over a one year development phase from an initial relational database application set up using Oracle™ version 7 on the laboratory's database server. This preliminary design was modified after consideration of a large representative sample of the geophysical survey reports that the database was intended to record. These included reports of both the Archaeometry Branch's own surveys and those carried out by a number of other practitioners.

1.3.1 The entities modelled

Careful consideration was given to the type of information that should go onto the database, and, after consultation with other bodies such as the National Monuments Record (RCHME) and colleagues and practitioners in British archaeological geophysics, a data model for geophysical surveys was defined. This model identified the principle entities required in geophysical survey records and these map directly onto the main tables defined in the database: locational details (eg. site name, National Grid Reference, etc.); survey procedures (eg. instrument type, sampling interval, etc.); physical attributes (eg. geology, associated monuments, etc.); bodies concerned (eg. surveyor, client, etc.); and details of any survey reports or associated bibliography. It was also agreed that the database should allow text to be added to record comments, and summaries of results; separate tables were defined for these free text fields for implementational efficiency.

The crucial information, which was considered fundamental to recording each geophysical survey as a unique event, was that it should be located by both a geographical component and a time component (ie National grid coordinates and an event date). Initially these place and time components were stored in separate tables: a 'Survey Visit' table and a 'Site table', concluding that a site could be revisited several times, and thus having a one to many relationship between Site and Survey Visit. However, this was found to be unduly inflexible as a database structure, especially as "sites" usually grow over the years with successive return visits and the view has since been adopted that each visit is effectively a distinct "site" even if the NGR coordinates are exactly the same as those of a previous visit (In fact it is very unlikely that two surveys at a particular place will cover exactly the same bounded piece of ground).

1.3.2 Many-to-many relationships

Several of the entities involved in recording geophysical survey have a potential many-to-many relationship with this central survey visit entity. For instance, many archaeological monuments might be covered by a single survey but, equally, many different survey visits might cover the same monument. The same relationship is true of the underlying geologies encountered on a survey and of bibliographic references relevant to a survey. To cope with this situation in a relational database it was necessary to add linking tables between the main survey visit table and the tables containing the attribute data. Usually this was achieved by constructing the link table from the primary keys of each of the main tables that are to be linked. The logical data structure described in section 2 explains how these tables fit into the database structure. All the tables have been normalised so that each has a primary key, either a single unique identifier field or a combination of fields that make each entry unique.

1.3.3 Datatypes used

The following ORACLE data types (ORACLE, 1992) were used initially for the database fields.

CHAR - fixed-length character data of length size.
NUMBER - variable-length numeric data.
DATE - fixed-length date and time data
LONG - Variable-length character data up to 2 gigabytes.

CHAR and LONG data types were used initially as opposed to the now recommended VARCHAR2 data type, a variable length character data field, as the latter was not compatible with the front-end 'Approach for Windows' initially used to view the data. However, it was found that the CHAR data type caused certain problems for the Open Database Connectivity (ODBC) driver that was subsequently used to connect the Oracle server to more flexible relational database management systems such as the Microsoft Access™ system currently used (Linford and Cottrell, *forthcoming*). The CHAR data type also adds blank spaces to make each record entry the same length, so it is inefficient for fields with variable length data. Consequently the whole database was rebuilt substituting most of the CHAR data types for VARCHAR2 data types and trimming the right padded blanks off the already extant data.

A complete listing of the datatypes used for each field in the database may be found in the data dictionary contained in section 3.

1.3.4 Consistency of terms used

To maintain consistency, many of the fields allow only certain terms to be used. These are listed in separate look-up tables and constraints applied through the Oracle system (Referential Constraints) to reject any other term. The lists of terms come from a variety of sources. Many were chosen by the compilers as the best represention of common usage within the field, and others taken from appropriate data standards. Such standards were easier to find in the case of archaeological monuments (cf. RCHME (1993), RCHME and English Heritage (1995)), than with other fields such as geology where descriptions have changed over time. A full list of terms and their derivation can be found in Appendix 1.

1.3.5 Integrity constraints

Integrity constraints have been defined throughout the database to ensure the consistency of the data recorded. Generally these take one of four forms: NOT NULL constraints which enforce data entry in mandatory fields; CHECK constraints to ensure that the value entered is drawn from a set of allowed terms (defined in one of the look-up tables mentioned in section 1.3.3); UNIQUE and PRIMARY KEY constraints that ensure that

duplicate entries do not occur; and FOREIGN KEY constraints that ensure that a field which refers to data stored in another table references a record which actually exists. Other more complex constraints can be applied by the use of database triggers. These allow an arbitrary PL/SQL procedure to be executed each time that data is inserted into a table to ensure it complies with the required data entry rules. A list of all the constraints and triggers used in the database can be found in Appendix 2.

1.3.6 Security issues

Information pertaining to certain geophysical surveys was deemed too sensitive to be made publicly available through the JANET accessible World Wide Web interface. This situation usually arises when it is thought that treasure hunters might be interested in a site and thus revelation of its location and possible contents could lead to unlawful excavation and thus damage to the archaeological remains. For this reason a "privacy code" field was added to the survey visit table which is referenced by the World Wide Web interface code to determine how much information should be made available about a particular site. The field provides a sliding scale of accessibility whereby access to all or some of the data pertaining to a particular site may be restricted.

1.4 Summary

The above discussion has attempted to give a brief overview of the issues that were considered when designing the database and indicates where more information may be found about each of the topics discussed. The section which follows leads on from this discussion to review the purposes of the main tables in the database and describe the relationships between them. It should be noted that in the following sections the relational database terms 'row' and 'column' are used throughout to refer respectively to a record in the database and to a field within a record.

2. The Logical Data Structure

2.1 Introduction

As mentioned in the previous section the Geophysical Survey Database adopts a relational model to represent survey information and the logical data structure is shown in figure 1. In this diagram, each of the 26 tables that comprise the database is depicted as a rectangle containing the name of the table. The shaded tables store information about entities that are of importance when recording details of a geophysical survey. For example, the report table contains a set of details for all the reports written about any of the surveys in the database, whilst the survey_personnel table contains entries for each person who has been involved with the surveys.

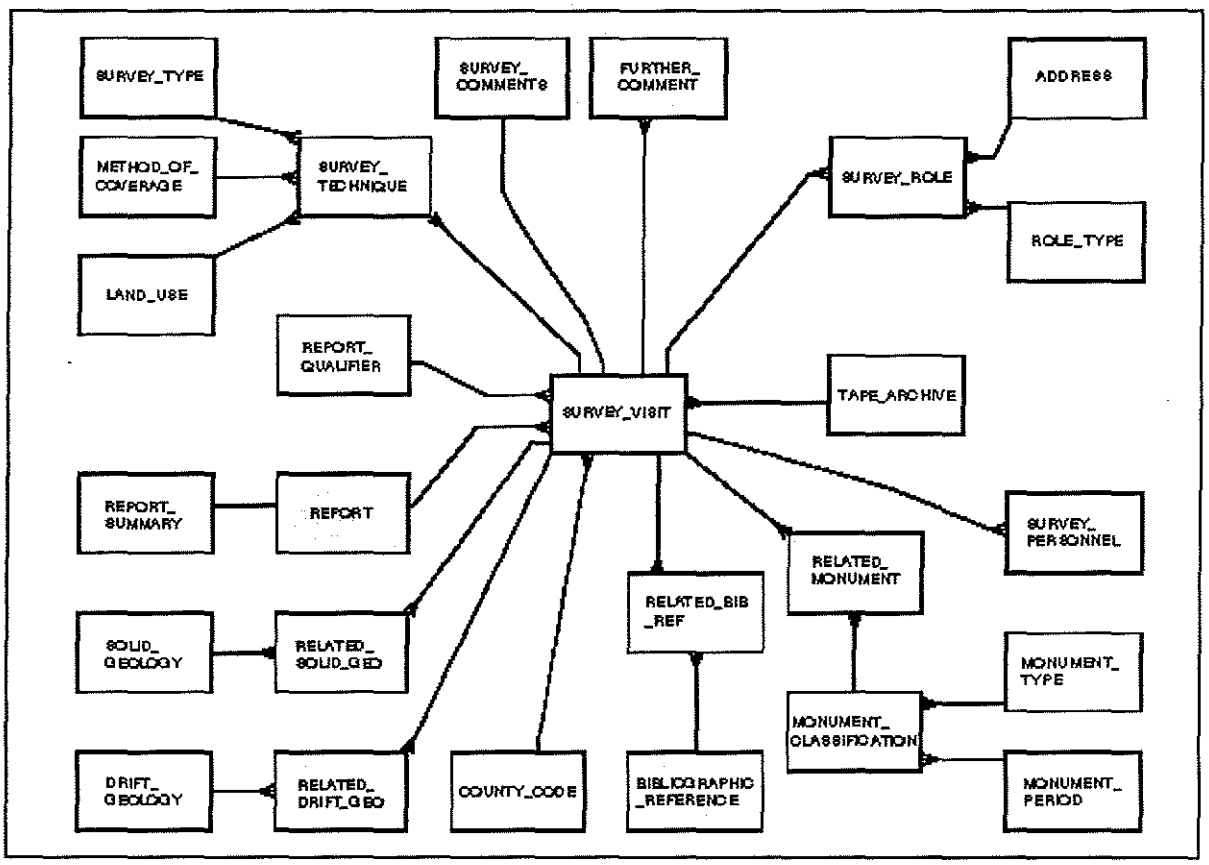

Figure 1; *Logical data structure of the geophysical survey database.*

The tables represented by unshaded rectangles in Figure 1 are lookup tables, each of which contains a list of standard terms used by a column in one of the tables described above. For instance, when recording the county in which a geophysical survey took place in the survey_visit table (in its county_code column), one of the standard county codes listed in the county_code table must be used. Appendix 1 provides listings of the terms defined for each lookup table and identifies the sources from which the lists were taken.

The relationships between tables are depicted in Figure 1 as lines linking two tables together. Usually, each such line will be flared into a "crow's foot" at one end, representing a one-to-many relationship between two tables. This indicates that one record in the table at the unflared end of the line will be associated with a variable number of entries (zero, one or many) in the table at the flared end. Thus, for each survey_visit recorded, a variable number of survey_personnel will have been involved, typically two, three or four people. In two instances the relationship lines do not have a "crow's foot" at either end, this is the case for the link between report and report_summary tables and between survey_visit and survey_comments tables. In these instances a one-to-one relationship is signified; each record in the table at one end of the line will be associated with a maximum of one record in the table at the other end.

The remaining discussion in this section will focus on giving an overview of the important entities modelled by the database (shaded tables). Detailed definitions of the columns in each table are provided in Section 3, the data dictionary.

2.2 Survey_visit table

This is the central table of the database and records the fundamental information required to make a meaningful database entry. Hence, surveys for which little information is known will, at the very least, have a partially completed row in this table even if no information can be entered in any of the other database tables. Such minimal entries are often recorded when a survey is known to have been carried out but a written report, from which detailed information is usually drawn, is not available.

Each record in this table records what might be described as a "survey event" where a defined area of archaeological interest is visited and geophysically investigated over a particular, unbroken period of time. These survey event records are intended to record where, when and why a geophysical survey took place. The exact area investigated is deliberately left vague owing to the difficulties in precisely defining an archaeological site. These difficulties are compounded in the case of geophysical survey where several different survey techniques may be employed during a visit each of which might cover different, but possibly overlapping, areas of land.

It should be noted that, with the above definition, return visits to the same archaeological site are considered to be different survey visits because they occurred at different times. Usually, all visits considered to apply to the same site are given the same survey name and the feature distinguishing them is the date of each visit.

As survey visits are the primary entities recorded in the database, the implementation contains referential constraints which prevent rows being added to other tables that refer to survey visits not recorded in survey_visit table. The tables that are exempted from such constraints are the lookup tables, report (and report_summary), monument_classification

and bibliographic_reference tables. The reason in the latter three cases is that it is desirable to be able to record known reports, monuments and references even if they are not currently relevant to any of the survey visits in the database.

2.3 Survey_comment table

This table stores any additional comments about a survey visit that cannot be accommodated in any of the fields in survey_visit table. Each survey visit entry will have zero or one corresponding entries in this table. In an idealised database this table would be replaced by an extra free-text column in survey_visit table. However, for search efficiency in Oracle™ v7, it is better if long free-text columns are stored in separate tables.

2.3 Survey_technique table

This table records details of each geophysical technique employed during a survey. There is a one-to-many relationship between this table and survey_visit table; hence, if both resistivity and magnetometer surveys were carried out during a particular visit then this table will contain two rows relating to that visit, one for each of the techniques used. A composite key is required to uniquely identify each row, which consists of the survey visit number to which this technique applies and a technique number, which begins at 1 for the first technique added for a particular survey visit and is incremented by one for each successive technique inserted for the visit.

2.4 Report and report_summary tables

Report table records information about reports written about geophysical surveys. In general each survey visit will have a report written about it, but it is quite common for a single report to summarise the work of two or more visits. This is often the case for large area surveys where several return trips can be made to complete all the geophysical work required. Thus, there is a many-to-one relationship between this table and survey_visit table. It should be noted that it is also conceivable that more than one report may be written about the same survey visit, perhaps an interim report followed by a final report. This would suggest a potential many-to-many relationship to be resolved between survey visits and reports. However, multiple reports pertaining to the same work rarely occur in practice and it was decided to record only the most definitive report about each visit, rather than introducing a link table.

The database also records the full text of each report summary and this is stored in the report_summary table as a variable length string of free text. In an ideal database the material in this table would be stored in an additional column in report table but it is separated into its own table for implementational reasons as described above in section 2.3 for survey_comments table.

2.5 Survey_role table

Each survey visit will have a number of different people or organisations associated with it, who fulfil the various roles in commissioning and carrying out a geophysical survey. Typically, three such roles are involved, the client, the surveyor and the EH regional inspector, so a survey visit record will usually have three associated rows in this table, one for each role. However, as it is possible for a survey to have multiple clients and surveyors and it may be necessary to define new roles in future, it was decided to create a separate table for this information rather than adding client, surveyor and EH_inspector columns to the survey_visit table.

2.6 Survey_personnel table

For each row in the survey visit table there will be several rows entered in this table, one for each participant in the surveying team. This information is usually only recorded for surveys carried out by the Archaeometry Branch as for other organisations the information is often not readily available.

2.7 Related_solid_geo and related_drift_geo tables

These two tables store respectively, the solid and drift geologies encountered during a survey visit. Clearly, in both cases more than one geological type may be encountered on a particular survey visit, hence this information is stored in separate tables.

2.8 Bibliographic_reference and related_bib_ref tables

Bibliographic references relevant to the archaeology of a site surveyed on a particular visit are recorded in the bibliographic_references table. Whilst there may be more than one reference pertinent to a particular visit, it is also true that a particular reference may be relevant to more than one survey visit. Thus, there is a many-to-many relationship between survey visits and bibliographic references. In the relational model, two tables cannot be directly linked by a many to many relationship and a link table must be created which resolves the many-to-many link into two one-to-many links. In the case under discussion this table is related_bib_ref which contains one row for each instance where a particular reference is pertinent to a particular survey visit.

2.9 Monument_classification and related_monument tables

Monument_classification table contains entries detailing archaeological monuments covered by the surveys done in survey visits. Such monuments may be recognised monuments (scheduled ancient monuments or monuments recorded in the National Archaeological Record) or features identified either by the geophysical survey or by subsequent excavation. In all cases standard terms are used to describe the monument and the sources for these are listed in Appendix 1.

As with bibliographic references there is clearly a many-to-many relationship between survey visits and monuments as one geophysical survey can obviously cover more than one monument whilst any particular monument may be surveyed more than once. The related_monument table resolves this relationship in the same way that the related_bib_ref table does for bibliographic references.

2.9 Further_comment table

This table exists so that additional comments may be made retrospectively about particular survey visits. Thus, if an area covered by a particular survey is subsequently excavated this will throw additional light on the results of the survey and a comment, perhaps referring to a fuller discussion elsewhere, can be recorded here. Any number of further comments may be added about a particular visit, so there is a many-to-one relationship with survey visit.

The distinction should be noted between the comments recorded in this table and those recorded in survey_comments table. Survey_comments table is intended for a single comment about each survey visit, provided at the time the survey is added to the database, detailing any unusual circumstances pertaining to the geophysical survey work that could not be adequately recorded in any of the other columns of survey_visit table (for example: weather conditions). Whilst the further_comment table is intended to store information which augments the interpretation of a survey, usually such extra detail is only available retrospectively.

2.10 Summary

This section has provided an overview of the entities modelled by the database and discussed their role and importance in making consistent computer records of geophysical surveys. It has avoided going into detail about precisely what is recorded about each entity (the columns of each table) as this is the preserve of the following section, which defines the data dictionary.

3. The Data Dictionary

On the following pages the contents of each table are listed. The listing consists of a series of printed tables each of which lists and defines the columns that comprise one of the database tables. The headings used in these printed tables are explained below:

Column Mnemonic: The column name used for this column in the database implementation. Mnemonics are all upper case and, if they consist of more than one word, the words are joined by the underscore (_) character. Where a column mnemonic is printed in bold it indicates that it comprises part or all of the primary key for the table.

Column Name: The actual name of the column, a more readable alternative to the column mnemonic hopefully suggestive of the purpose of the column.

Oracle Data Type: The data type used to store data for this column in the database. This will be one of the types available in the Oracle™ version 7 database system used to implement the database. Where the data type has a user specified maximum length (for instance the VARCHAR2 data type), this is indicated in brackets after the type name.

Definition: Defines the contents of the column or, in other words, the type of information intended to be stored in it.

Entry Rule: Indicates the types of characters that are allowed to be entered into the column. For instance, a column with a Positive Integer entry rule would only allow character strings consisting entirely of the digit characters (0-9) to be entered.

Entry Class: Defines, using code letters, the constraints imposed by the database on entries to the column. A code letter of **U** indicates that entries in the column must be unique, in other words no two rows in a table may specify the same value for a unique column. A code letter of **M** indicates that the column is mandatory; when adding a row to a table, such mandatory columns may not be left blank.

Examples: Where useful, one or more examples of actual data that has been entered in the column is given.

SURVEY_VISIT - Each record in this table describes a unique event at which a geophysical survey was carried out. Such an event, referred to here as a 'visit', is defined by place and time and each entry should have in addition to a name and county a location, expressed as an NGR coordinate, and encompassing dates when the it took place.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	Unique system number for each survey visit record.	Positive integer	U M	
SURVEY_NAME	Survey Name	VARCHAR2 (50)	Name given to a survey where geophysical survey has been carried out. This may often correspond to the name used to refer to the site in a following Report.	Alphanumeric upper case	M	DORCHESTER BY-PASS; ST.GILES HOSPITAL
COUNTY_CODE	County Code	CHAR(2)	Two character codes for each county of England, following those suggested as a data standard by the RCHME (1993), with additional codes for Scotland and Wales.	Alphabetic upper case		OX
SURVEY_START	Survey date start	DATE	Date that survey visit commenced.	Alphanumeric		26/04/94
SURVEY_END	Survey date end	DATE	Date that survey visit ended.	Alphanumeric		28/06/94
DATE_CERT	Date Certainty	VARCHAR2 (1)	Indicator of the certainty of the survey dates. This would either contain a "?" or be left null.	Alphanumeric		
VISIT_PURPOSE	Purpose of visit	VARCHAR2 (2000)	Short free text description of reasons for the survey.	Alphanumeric mixed case		
PROJECT_TITLE	Project Title	VARCHAR2 (50)	Name of a project that encompasses a particular survey visit.	Alphanumeric upper case		RAUNDS AREA PROJECT
EH_JOB_NO	English Heritage Job Number	VARCHAR2 (6)	Internal Service Request Job Number used by English Heritage.	Positive integer		23456
AML_SURVEY_NO	AML Geophysical Survey No.	VARCHAR2 (6)	Internal number given to each survey by the AML Geophysics section prior to 1986.	Alphanumeric upper case		G34/83

Table Continued

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
REPORT_STATUS	Report status	VARCHAR2 (30)	Term to describe report status of the survey as per agreed list.	Alphanumeric upper case		FULL REPORT; ARCHIVE ONLY
REPORT_ID	Report Identifier	NUMBER	See REPORT table.	Positive integer		
NGR100KM_ SQUARE	NGR 100 km square	CHAR (2)	The two letters which uniquely identify the 100km square, as defined by the OS, that contains the centre of the site.	Alphabetic upper case		SK
NGR_EASTING	NGR Easting	VARCHAR2 (3)	Conventional grid reference recording the easting component, relative to the 100 km origin expressed as a string of numbers. Precision to the nearest 100m ie. to 3 digits.	Positive integer		678
NGR_NORTHING	NGR Northing	VARCHAR2 (3)	Conventional grid reference recording the northing component, relative to the 100 km origin expressed as a string of numbers. Precision to the nearest 100m.	Positive integer		328
NGR_NO_EAST	NGR Easting relative to false origin	NUMBER	Easting Component expressed as a numeric string relative to the National Grid false origin. (the SW corner of the primary National Grid 500 km Square "S"). Automatically calculated from NGR Easting.	Positive integer		467800
NGR_NO_NORTH	NGR Northing relative to false origin	NUMBER	Northing Component expressed as a numeric string relative to the conventional UK false origin. Automatically calculated from NGR Northing.	Positive integer		332800
PRIVACY_CODE	Privacy Code	NUMBER	Numeric indicator to flag sensitive surveys. This allows the administrator to limit access to some or all of the data relating to a particular survey.	Positive integer	M	

Table Continued

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
PRIMARY_ARCHIVE	Primary Archive Location	VARCHAR2 (80)	Organisation or individual holding the primary archive from the survey, ie raw data, original notes etc.	Alphanumeric upper case		ANCIENT MONUMENTS LABORATORY; BARTLETT A

SURVEY_COMMENTS - This contains a free text field linked to the Survey visit table, but stored in a separate table to improve SQL performance. Each entry must refer to a Survey Visit Number

SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table	Positive integer	U M	
COMMENTS	Survey Comments	LONG	Text field to cover additional information about a particular survey visit that might not be included in a Report Summary, or in the absence of a such a summary.	Alphanumeric mixed case	M	

SURVEY_ROLE - This table contains the names of parties involved in the survey and their respective roles be it as client, surveyor, or any other capacity. Each entry must refer to a Survey Visit Number.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
ROLE_ID	Survey Role Record Identifier	NUMBER	Unique record identifier and primary key.	Positive integer	U M	
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
TYPE	Role type	VARCHAR2 (20)	Term for a party's role in relation to the survey.	Alphanumeric upper case	M	SURVEYOR; CLIENT
NAME	Role Name	VARCHAR2 (80)	Name of organisation or individual having an interest in the survey in one of the above capacities.	Alphanumeric upper case	M	ANCIENT MONUMENTS LABORATORY; TRUST FOR WESSEX ARCHAEOLOGY.

SURVEY_PERSONNEL - Table for AMLAB purposes to record the surveying personnel involved in each AMLAB visit. Each entry must refer to a Survey Visit Number.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
PERS_ID	Survey Personnel Record Identifier	NUMBER	Unique record identifier and primary key.	Positive integer	U M	
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
NAME	Survey Personnel	VARCHAR2 (30)	Name of surveyor taking part on the particular survey visit.	Alphabetic upper case (Surname Initials)	M	PAYNE A: COTTRELL P M

SURVEY_TECHNIQUE - Each record in this table refers to a particular methodology of surveying used on a particular survey visit. That methodology is defined by type, recording method, instrument type and configuration if appropriate, and sample intervals. Each entry must refer to a Survey Visit Number which in combination with the Technique number forms a unique primary key.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
TECHNIQUE_NO	Technique number	NUMBER	Sequential number used to identify each separate technique used on a particular survey visit. Always starts at "1" for each survey visit.	Positive integer	M	
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
SURVEY_TYPE	Survey Type	VARCHAR2 (50)	Single term describing the type of geophysical survey taken from an agreed list of terms.	Alphanumeric upper case	M	MAGNETOMETER; RESISTIVITY.
METHOD_OF_COVERAGE	Method of Coverage	VARCHAR2 (30)	Term describing if and how the data from a particular survey type has been recorded, taken from an agreed list of terms.	Alphanumeric upper case		SCAN; RECORDED GRID; SPOT SAMPLE.
TRAVERSE_SEPARATION	Survey Traverse Separation	VARCHAR2 (6)	Distance between traverses when the survey has been undertaken using a regular recorded grid.	Alphanumeric mixed case		1m
READING_INTERVAL	Reading Interval	VARCHAR2 (6)	Distance between readings along a traverse.	Alphanumeric mixed case		0.5m
INSTRUMENT_TYPE	Instrument Type	VARCHAR2 (30)	Generic term that describes the particular type of instrument used.	Alphanumeric upper case		FLUXGATE GRADIOMETER; FIELD LOOP
PROBE_CONFIGURATION	Resistivity Probe Configuration	VARCHAR2 (20)	Term that describes the arrangement of the probes in a resistivity array.	Alphanumeric upper case		TWIN-PROBE; WENNER

Table Continued

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
PROBE_SPACING	Resistivity Probe Spacing	VARCHAR2 (6)	Distance between the relevant adjacent probes of a resistivity array depending on the configuration being used.	Alphanumeric mixed case		0.5m; 1m
ADD_REMARKS	Additional Remarks	VARCHAR2 (1000)	Free text field for any extra details concerning a particular survey technique record. This could be used for unusual configurations or sampling strategies, weather conditions, equipment failures etc.	Alphanumeric mixed case.		
LAND_USE	Land Use	VARCHAR2 (50)	A term that describes the state of the surveyed land at the time of the survey. List of agreed terms.	Alphanumeric upper case		INTER-TIDAL; ARABLE.
AREA_SURVEYED	Area Surveyed	NUMBER (3,1)	Area to the nearest tenth of a hectare covered by a particular survey technique.	Positive integer		4.2

REPORT - Table of written reports that have been generated from the results of particular geophysical survey visits. Each entry must have a report title.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
REPORT_ID	Report identifier	NUMBER	Unique record identifier and primary key.	Positive integer	U M	
TITLE	Report Title	VARCHAR2 (120)	Full Title of Report.	Alphanumeric upper case	M	GEOPHYSICAL SURVEY IN THE STONEHENGE AREA 1976 - 1979
REPORT_SERIES	Report Series	VARCHAR2 (50)	Name of the series that a report appears in.	Alphanumeric upper case		AMLAB REPORTS (NEW SERIES)
SERIES_NO	Series Report Number	VARCHAR2 (12)	Number given by the authors of the report that uniquely identifies a report from a particular series.	Alphanumeric mixed case		49/92
REPORT_DATE	Report Date	DATE	Date of report completion.			
AUTHOR	Author	VARCHAR2 (50)	Writer of the Report.	Alphabetic mixed case		Payne A; Linford N and Cole M
HOLDER	Report Holder	VARCHAR2 (80)	Body holding copies of report. The body from whom copies should be requested.	Alphanumeric upper case		ANCIENT MONUMENTS LABORATORY
URL	Uniform Resource Locater	VARCHAR2 (80)	Character string that identifies the computer address and file name of a hypertext document containing the text of the report.	Alphanumeric mixed case		http://www.eng-h.gov.uk/reports/oldwinch

REPORT_SUMMARY - Extension of the Report Table using the same unique report identification number as its primary key. The table is separate for operational reasons.

REPORT_ID	Report identifier	NUMBER	Unique record identifier and primary key.	Positive integer	U M	
SUMMARY	Report Summary	LONG	Summary of the results, either as entered in the report, or a compiler's synopsis.	Alphanumeric mixed case	M	
COMPILER_SYNOPSIS	Compiler Synopsis	VARCHAR2(1)	Yes or No column to flag compiler synopsis.	Upper Case	M	Y

Monument Classification Table - Each record in this table contains details of any archaeological monuments which fall within the boundaries of, or are associated with a survey. Such monuments are classified by type and period and, if applicable, are linked to their respective Scheduled Monument and National Monument Record numbers.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
MONUMENT_ID	Monument Identifier	NUMBER	Unique system number that identifies each record.	Positive integer	U M	
MONUMENT_NAME	Monument Name	VARCHAR2 (60)	Commonly used name for monument.	Alphanumeric upper case.		WHISPERING KNIGHTS
MONUMENT_TYPE	Monument Type	VARCHAR2 (50)	Term by which a monument has been classified. Terminology is derived from the "Thesaurus of Monument Types" RCHME/English Heritage (1995).	Alphanumeric upper case	M	BARROW; VILLA; HILL FORT.
MONUMENT_ CERTAINTY	Monument Certainty	VARCHAR2 (1)	Indicator of the certainty of the monument's type. Column can contain a "?" or "NULL".	Alphanumeric mixed case		
MONUMENT_PERIOD	Monument Period	VARCHAR2 (3)	Coded field describing the period to which the monument belongs. Codes are as used by RCHME for NAR and are listed with their legends in a separate look-up table.	Alphabetic upper case	M	ME; RO; PM;
PERIOD_PRECISION	Period Precision	VARCHAR2 (1)	Indicator of certainty of period. Either a "?" or null.	Alphanumeric mixed case		
SAM_NO	Scheduled Ancient Monument identifier	VARCHAR2 (10)	Alphanumeric string based on County Code and Monument no. that uniquely identifies the monument within the SAM system.	Alphanumeric mixed case		ST137b
RSM_NO	Scheduled Monument National Number	NUMBER	Number which uniquely identifies each monument in the Record of Scheduled Monuments ie. those scheduled under the Monuments Protection Programme.	Positive integer		12345
NAR_NO	National Archaeological Record Ref. Number	VARCHAR2 (12)	Alphanumeric string which uniquely identifies an RCHME recorded monument.	Alphanumeric upper case		SU 96 NE 34; LINEAR 102; RRX 27

RELATED_MONUMENT - Linking table to relate a Survey Visit record to a Monument Record, using the primary keys from each table to form a unique, composite primary key.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
MONUMENT_ID	Monument Identifier	NUMBER	See MONUMENT_CLASSIFICATION table.	Positive integer	M	

SOLID_GEOLOGY - Table containing code and description of underlying solid geology types.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
CODE	Solid Geology Code	VARCHAR2 (6)	Numerical Code that relates to a descriptive term for the underlying solid geology at the site. The codes are taken from the 1:625000 Geological Map of the United Kingdom (Solid Geology) 3rd Edition, 1979.	Positive integer	U M	95
DESCRIPTION	Solid Geology Description	VARCHAR2 (60)	Descriptive term for the underlying solid geology at the site that corresponds to the above code in the 1:625000 Geological Map of the United Kingdom (Solid Geology) 3rd Edition, 1979.	Alphanumeric upper case	M	GREAT OOLITE

DRIFT_GEOLOGY - Table containing description of underlying drift geology types.

DRIFT_ID	Drift Geology Type Identifier	NUMBER	Unique system number and primary key for each record.	Positive integer	U M	
TERM	Drift Geology Term	VARCHAR2 (60)	Descriptive term for any underlying drift deposits at the site. The terms are taken from the 1:625000 Quaternary map of the United Kingdom, 1st Edition, 1977, with some additions. See the lists of terms at the end of the report.	Alphanumeric upper case	M	RIVER TERRACE DEPOSITS; ALLUVIUM

RELATED_DRIFT_GEO and RELATED_SOLID_GEO - These two tables relate a survey visit record to tables containing details of the underlying geologies to be found at a particular survey site. Each entry must have a number or code representing the appropriate geological classification and an associated Survey Visit Number to form a unique, composite primary key.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
SOLID_GEOLOGY	Solid Geology Code	VARCHAR2 (6)	Code as defined in SOLID_GEOLOGY table.	Positive integer	M	95

SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
DRIFT_ID	Drift Geology Type Identifier	NUMBER	See DRIFT_GEOLOGY table.	Positive integer	M	

FURTHER_COMMENTS - Table for added information pertaining to a particular survey such as details of subsequent excavation, survey, or other intervention on the site that might add to the interpretation of that survey. The comment should be dated and attributed to its author. Each entry must have a Survey Visit Number as a foreign key.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
FC_ID	Further Comment Record Identifier	NUMBER	Unique system number and primary key for each record.	Positive integer	U M	
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
COMMENT_DATE	Comment Date	DATE	Date the comment is added to the database. This can be automatically generated.	Alphanumeric	M	
AUTHOR	Comment Author	VARCHAR2 (15)	Name of person adding the comment.	Alphanumeric mixed case (Surname Initial)	M	
COMMENT_DETAIL	Comment Detail	LONG	Descriptive field for comments on any intervention at, or concerning, a site that has relevance to the interpretation of the survey carried out there.	Alphanumeric mixed case	M	

BIBLIOGRAPHIC_REFERENCE - Table of references to select bibliographic sources that are considered to have direct relevance to a particular survey. At present these are limited to publications where results or interpretations from a survey have been included in the work.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
BIB_REF_NO	Bibliographic Reference Number	NUMBER	Unique system number that identifies each record.	Positive integer	U M	
AUTHOR	Author	VARCHAR2 (50)	Author or authors of the publication cited.	Alphabetic mixed case. (Surname, Initials); etc.		David, A E U; Linford, P, and Cottrell, P,
YEAR	Year of publication	VARCHAR2 (4)	Year of publication in full.	Positive integer		1984
REFERENCE	Bibliographic Reference	VARCHAR2 (1000)	Full reference to the publication, with the exception of the author and year. Reference should be set out in the manner suggested in the English Heritage pamphlet 'Academic and Specialist Publications. Preparing your text for publication'.	Alphanumeric mixed case	M	The Stonehenge Environs Project, English Heritage Archaeological Report No. 16, London.

RELATED_BIB_REF - Table to relate a bibliographic reference to a particular survey visit using the primary keys from each table to form a composite primary key.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
SURVEY_VISIT_NO	Survey Visit Number	NUMBER	See SURVEY_VISIT table.	Positive integer	M	
BIB_REF_NO	Bibliographic Reference Number	NUMBER	See BIBLIOGRAPHIC_REFERENCE table.	Positive integer	M	

ADDRESS - Table containing the addresses of any party involved in the survey. This will invariably be an interested party from the 'Survey Role' table, or an archive holder listed in either the SURVEY_VISIT or REPORT tables and will be linked to these tables by the appropriate field. In some cases an entry may refer to another entry for address details where a body has changed its name or become part of another organisation since the survey took place.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
ADDRESS_ID	Address	NUMBER	Unique system number that identifies each record.	Positive integer	U M	
NAME	Name	VARCHAR2 (80)	Name of the body or person whose address details appear in the entry.	Alphabetic upper case	M	
POSTAL_ADDRESS	Postal Address	VARCHAR2 (1000)	Full postal address of the above body or person, or a reference to another entry in the table if the name of the body has changed.	Alphanumeric upper case		
TELEPHONE	Telephone	VARCHAR2 (15)	Full telephone no. including code.	Alphanumeric		
FAX	Number	VARCHAR2 (15)	Full fax no. including code.	Alphanumeric		
E_MAIL	Electronic mail address	VARCHAR2 (30)	Full Email address.	Alphanumeric mixed case		P.Cottrell@eng-h.gov.uk

TAPE_ARCHIVE - An internal table to record the details of electronic data from a survey that has been archived onto magnetic tape. Each entry is defined by the survey it refers to and the directory that the survey data has been assigned to and consequently must have a Survey Visit Number as a foreign key.

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
TAPE_ID	Tape identifier no.	NUMBER	Unique system number that identifies each record.	Positive integer	U M	
SURVEY_VISIT_NO	Survey Visit Number	Number	See SURVEY_VISIT Table.	Positive integer	M	
DIRECTORY	Directory	VARCHAR2 (20)	Computer directory that holds an amount of data from a particular survey visit.	Alphanumeric lower case	M	
TAPE_NO	Tape Number	NUMBER	Assigned number of the tape that the data has been archived to.	Positive integer		
TAPE_SUFFIX	Tape Suffix	VARCHAR2 (3)	Three letter suffix that along with the Tape number gives the tape a unique identifier.	Alphabetic lower case		
ARCHIVE_DATE	Archive Date	DATE	Date that the data is transferred to archive.	Alphanumeric		

Look-Up Tables

The following tables contain lists of terms or codes currently acceptable for entry into certain fields within the main database tables. Their purpose is to act as look-up lists and to preserve the integrity of the fields in which they are used by the application of referential constraints.

COUNTY_CODE

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
CODE	County Code	CHAR(2)	Abbreviation, derived originally from the National Census, that can be used in the COUNTY_CODE field of the SURVEY_VISIT table. See lists of terms at the back of the report for derivation.	Alphabetic upper case	U M	CO
COUNTY	County Name	VARCHAR2 (25)	Name of County indicated by one of the above codes.	Alphabetic mixed case	U M	Cornwall

REPORT_QUALIFIER

QUALIFIER	Report Qualifier	VARCHAR2 (30)	Term that can be used in the REPORT_STATUS field of the SURVEY_VISIT table. See lists of terms at the back of the report for derivation.	Alphanumeric upper case	U M	DRAFT REPORT; ARCHIVE ONLY

ROLE_TYPE

ROLE_TYPE	Role Type	VARCHAR2 (20)	Term that can be used in the TYPE field of the SURVEY_ROLE table. See lists of terms at the back of the report for derivation.	Alphanumeric upper case	U M	CLIENT; SURVEYOR

SURVEY_TYPE

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
TERM	Survey Type	VARCHAR2 (50)	Term that can be used in the SURVEY_TYPE field of the SURVEY_TECHNIQUE table. See lists of terms at the back of the report for derivation.	Alphanumeric upper case	U M	MAGNETOMETER

METHOD_OF_COVERAGE

TERM	Survey coverage method	VARCHAR2 (30)	Term that can be used in the METHOD_OF_COVERAGE field of the SURVEY_TECHNIQUE table. See lists of terms at the back of the report for derivation.	Alphanumeric upper case	U M	RECORDED GRID; SCAN

LAND_USE

TERM	Land Use	VARCHAR2 (50)	Term that can be used in the LAND_USE field of the SURVEY_TECHNIQUE table. See lists of terms at the back of the report for derivation.	Alphanumeric upper case	U M	ARABLE;

MONUMENT_TYPE

Column Mnemonic	Column name	Oracle Data Type (size)	Definition	Entry Rule	Entry Class	Examples
MONTY_ID	Monument type Id	NUMBER	Unique system number that identifies each record. Used to help manage the large list of terms in this table.	Positive integer	U M	
TERM	Monument Type	VARCHAR2 (50)	Term that can be used in the MONUMENT_TYPE field of the MONUMENT_CLASSIFICATION table. See lists of terms at the back of the report for derivation.	Alphanumeric upper case	U M	ABBEY; HILLFORT

MONUMENT_PERIOD

PERIOD_ID	Monument Period Id	NUMBER	Unique system number that identifies each record.	Positive integer	U M	
CODE	Period Code	VARCHAR2 (3)	Code that represents a period definition, and can be used in the MONUMENT_PERIOD field of the MONUMENT_CLASSIFICATION table. See lists of terms at the back of the report for derivation.	Alphabetic upper case	U M	NE; EM
LEGEND	Period Legend	VARCHAR2 (30)	Definition of the period represented by one of the above codes.	Alphabetic mixed case	U M	Neolithic; Early Medieval

Appendix 1) Lists of terms used in look-up tables

The following lists are of terms or codes currently acceptable for entry into certain fields within the main database tables. The lists are kept in the database as separate look-up tables so that a control can be kept on those fields. Although some of the lists are based on data standards described below, many of the lists have been compiled by the authors. The terms have either appeared as a result of classifying the data so far encountered or have been anticipated as terms that might appear in the future. Thus the lists are by no means exhaustive and likely to be updated as and when necessary.

County Code:	Abbreviations taken from 'Recording England's Past. A Data Standard for the National Archaeological Record' RCHME (1993), derived originally from the National Census. Two additions have been made to cover surveys in Scotland and Wales.
Report Qualifier:	List of terms considered acceptable by the compilers.
Role Type:	List of terms considered acceptable by the compilers.
Survey Type:	List of terms considered acceptable by the compilers.
Method of Coverage:	List of terms considered acceptable by the compilers.
Land Use:	List of terms considered acceptable by the compilers.
Monument Type*:	Classification of monument using terms found in the 'Thesaurus of Monument Types', RCHME and English Heritage (1995).
Monument Period:	Codes representing a list of period definitions, both of which are taken from terms used by the RCHME for the NAR (RCHME, 1993).
Solid Geology:	Numerical codes relating to a descriptive term, both of which are taken from the '1:625000 Geological Map of the United Kingdom (Solid Geology)' 3rd Edition, 1979
Drift Geology:	Terms taken from the '1:625000 Quaternary map of the United Kingdom', 1st Edition, 1977.

**A list of Monument Types is not attached as this table already numbers over 100 entries and is likely to grow.*

COUNTY CODE

CODE	COUNTY
AV	Avon
BD	Bedfordshire
BK	Berkshire
BU	Buckinghamshire
CB	Cambridgeshire
CH	Cheshire
CI	Channel Islands
CL	Cleveland
CO	Cornwall
CU	Cumbria
DO	Dorset
DR	Derbyshire
DU	Durham
DV	Devon
ES	East Sussex
EX	Essex
GC	Gloucestershire
GM	Greater Manchester
HA	Hampshire
HT	Hertfordshire
HU	Humberside
HW	Hereford and Worcester
IM	Isle of Man
IW	Isle of Wight
KE	Kent
LA	Lancashire
LE	Leicestershire
LI	Lincolnshire
LO	Greater London
MR	Merseyside
ND	Northumberland
NF	Norfolk
NN	Northamptonshire
NT	Nottinghamshire
NY	North Yorkshire
OX	Oxfordshire
SA	Shropshire
SC	Scotland
SF	Suffolk
SI	Isles of Scilly
SO	Somerset
ST	Staffordshire
SU	Surrey
SY	South Yorkshire
TW	Tyne and Wear
WA	Warwickshire
WI	Wiltshire
WL	Wales
WM	West Midlands
WS	West Sussex
WY	West Yorkshire

REPORT QUALIFIER

QUALIFIER

ARCHIVE ONLY
DRAFT REPORT
FULL REPORT
LETTER REPORT
THESIS OR DISSERTATION

ROLE TYPE

TYPE

CLIENT
SURVEYOR
EH INSPECTOR

SURVEY TYPE

TERM

ELECTRO-MAGNETIC SURVEY
GROUND PENETRATING RADAR
MAGNETIC SUSCEPTIBILITY
MAGNETOMETER
RESISTIVITY
RESISTIVITY PROFILE

METHOD OF COVERAGE

TERM

MULTIPLE TRAVERSE
RECORDED GRID
SCAN
SINGLE TRAVERSE
SPOT SAMPLES
TOTAL COVERAGE

LAND USE

TERM

ALLOTMENT
ARABLE
ARABLE AND PASTURE
ARABLE AND WOODLAND
BUILT OVER
CHURCHYARD
COASTLAND - ABOVE HIGH WATER
COASTLAND - INTER-TIDAL
GARDEN
GRASSLAND - PASTURE
GRASSLAND - UNDIFFERENTIATED
HEATHLAND
LAWN
MOORLAND
ORCHARD
PARK
PLAYING FIELD
WASTE GROUND
WOODLAND

MONUMENT PERIOD

CODE	LEGEND
LPA	Lower Palaeolithic
MPA	Middle Palaeolithic
UPA	Upper Palaeolithic
PA	Palaeolithic
EME	Early Mesolithic
LME	Late Mesolithic
ME	Mesolithic
ENE	Early Neolithic
MNE	Middle Neolithic
LNE	Late Neolithic
NE	Neolithic
EBA	Early Bronze Age
MBA	Middle Bronze Age
LBA	Late Bronze Age
BA	Bronze Age
EIA	Early Iron Age
MIA	Middle Iron Age
LIA	Late Iron Age
IA	Iron Age
EPR	Early Prehistoric (Palaeolithic-Mesolithic)
LPR	Later Prehistoric (Neolithic-Iron Age)
PR	Prehistoric
RO	Roman (43 - 410 AD)
EM	Early Medieval (410 - 1066)
MD	Medieval (1066 - 1540)
PM	Post Medieval (1540 -1901)
MO	Modern (1901 - Present)
UN	Unknown Period

SOLID GEOLOGY

NB: This is a list of Solid Geology terms that have appeared in the database so far, and not a complete list of all the classifications on the OS 1:625000 maps of the United Kingdom.

CODE	DESCRIPTION
1	Undifferentiated gneiss of the Lewisian complex
30	Gneiss, mica schist
31	Ultrabasic rock
32	Gabbro and allied types
34	Granite, syenite, granophyre & allied types
37	Rhyolite, trachyte, felsite, elvans, and allied types
60	Precambrian
61	Torridonian sandstone and grit
64	Lower Cambrian
64-6	Cambrian
65	Middle Cambrian
66	Upper Cambrian, including Tremadoc
68	Llanvirn & Arenig
69	Llandeilo
70	Caradoc
70-71	Ashgill and Caradoc undifferentiated
71	Ashgill
72	Llandovery
73	Wenlock
74	Ludlow
75	Lower old red sandstone (including Downtonian)
75-8	Devonian undifferentiated
76	Lower Devonian
77	Middle Devonian (England)
77-8	Middle/upper Devonian undifferentiated
78	Upper Devonian & Upper Old Red Sandstone
79	Basal Conglomerate
80	Tournaisian & Visean ("Carboniferous Limestone series")
81	Namurian ("Millstone Grit series")
81-3	Upper Carboniferous undifferentiated
82	Lower Westphalian (A+B)
82-3	Westphalian
83	Upper Westphalian (C+D)
84	Westphalian & ? Stephanian, undivided of "Barren Red"
85	Permian basal breccias, sandstones and mudstones
86	Magnesian Limestone
87	Permian mudstones
88	Budleigh Salterton Pebble Beds
89	Permian & Triassic sandstones - undifferentiated
90	Triassic mudstones
91	Lower Lias
92	Middle Lias
93	Upper Lias
94	Inferior Oolite
94-5	Oolite - undifferentiated
95	Great Oolite
96	Cornbrash
97	Oxford Clay and Kellaways Beds
98	Corallian
98-9	Ampthill and Kimmeridge Clay
99	Kimmeridge Clay
100	Portland Beds
101	Purbeck Beds
102	Hastings Beds
102-5	Lower Cretaceous - undifferentiated
103	Weald Clay
104	Lower Greensand
105	Upper Greensand and Gault
106	Chalk (including Red Chalk)
107	Oldhaven, Blackheath, Woolwich & Reading & Thanet Beds
108	London Clay
109	Barton, Bracklesham & Bagshot Beds
110	Bovey Formation, St Agnes Sands, etc.
111	Hamstead Beds and Bembridge Marls
112	Lenham Beds
113	Coralline Beds
114	St Erth Beds (Cornwall)
115	Norwich Crag, Red Crag & Chillesford Clay

DRIFT GEOLOGY

TERM

ALLUVIUM

BLOWN SAND

BOULDER CLAY AND MORAINIC DRIFT

BRICKEARTH, MAINLY LOESS

CLAY WITH FLINTS

COLLUVIUM

CRAG

GLACIAL SAND AND GRAVEL

LACUSTRINE CLAYS, SILTS AND SANDS

PEAT

RAISED BEACH AND MARINE DEPOSITS

RIVER TERRACE DEPOSITS

SAND AND GRAVEL OF UNCERTAIN AGE OR ORIGIN

Appendix 2) SQL Scripts and Triggers

The database has been implemented in Oracle™ Version 7 and the PL/SQL scripts used to create it have been kept for reference so that the database design can be easily recreated in future. The database is constructed in three stages: first a series of scripts are run to build the tables that comprise the data structure; then a second series of scripts are run which add constraints to the tables; finally a third set of scripts install sequences and table triggers which provide unique sequence numbers and ensure data integrity.

Code for the three sets of scripts is located in the directory **/usr/local/web/SDB/BuildDB**, available on most UNIX computers in the Ancient Monuments Laboratory network, in subdirectories **1tabsql**, **2consql** and **3trigsql** respectively.

A2.1 Table Creation scripts

sdb1.sql	Creates table: SURVEY_VISIT
sdb2.sql	Creates table: SURVEY_COMMENTS
sdb3.sql	Creates table: SURVEY_ROLE
sdb4.sql	Creates table: SURVEY_PERSONNEL
sdb5.sql	Creates table: SURVEY_TECHNIQUE
sdb6.sql	Creates table: REPORT
sdb7.sql	Creates table: REPORT_SUMMARY
sdb8.sql	Creates table: MONUMENT_CLASSIFICATION
sdb9.sql	Creates table: RELATED_MONUMENT
sdb10.sql	Creates table: SOLID_GEOLOGY
sdb11.sql	Creates table: DRIFT_GEOLOGY
sdb12.sql	Creates table: RELATED_SOLID_GEO
sdb13.sql	Creates table: RELATED_DRIFT_GEO
sdb14.sql	Creates table: FURTHER_COMMENT
sdb15.sql	Creates table: BIBLIOGRAPHIC_REFERENCE
sdb16.sql	Creates table: RELATED_BIB_REF
sdb17.sql	Creates table: ADDRESS
sdb18.sql	Creates table: TAPE_ARCHIVE
sdb19.sql	Creates table: COUNTY_CODE
sdb20.sql	Creates table: REPORT_QUALIFIER
sdb21.sql	Creates table: ROLE_TYPE
sdb22.sql	Creates table: SURVEY_TYPE
sdb23.sql	Creates table: METHOD_OF_COVERAGE
sdb24.sql	Creates table: LAND_USE
sdb25.sql	Creates table: MONUMENT_TYPE
sdb26.sql	Creates table: MONUMENT_PERIOD

A2.2 Scripts to add integrity constraints

addcon1.sql	Adds constraints to table: ADDRESS
bibcon1.sql	Adds constraints to table: BIBLIOGRAPHIC_REFERENCE
cccon1.sql	Adds constraints to table: COUNTY_CODE
dgcon1.sql	Adds constraints to table: DRIFT_GEOLOGY
fccon1.sql	Adds constraints to table: FURTHER_COMMENT
fccon2.sql	Adds constraints to table: FURTHER_COMMENT
fccon3.sql	Adds constraints to table: FURTHER_COMMENT
moncon1.sql	Adds constraints to table: MONUMENT_CLASSIFICATION
moncon2.sql	Adds constraints to table: MONUMENT_CLASSIFICATION
mpcon1.sql	Adds constraints to table: MONUMENT_PERIOD
mtcon1.sql	Adds constraints to table: MONUMENT_TYPE
mtcon2.sql	Adds constraints to table: MONUMENT_TYPE
rbibcon1.sql	Adds constraints to table: RELATED_BIB_REF
rdgcon1.sql	Adds constraints to table: RELATED_DRIFT_GEO
repcon1.sql	Adds constraints to table: REPORT
rmoncon1.sql	Adds constraints to table: RELATED_MONUMENT
rsgcon1.sql	Adds constraints to table: RELATED_SOLID_GEOLOGY
rsumcon1.sql	Adds constraints to table: REPORT_SUMMARY
rsumcon2.sql	Adds constraints to table: REPORT_SUMMARY
rsumcon3.sql	Adds constraints to table: REPORT_SUMMARY
scomcon1.sql	Adds constraints to table: SURVEY_COMMENTS
scomcon2.sql	Adds constraints to table: SURVEY_COMMENTS
sgcon1.sql	Adds constraints to table: SOLID_GEOLOGY
spcon1.sql	Adds constraints to table: SURVEY_PERSONNEL
spcon2.sql	Adds constraints to table: SURVEY_PERSONNEL
srcon1.sql	Adds constraints to table: SURVEY_ROLE
srcon2.sql	Adds constraints to table: SURVEY_ROLE
stcon1.sql	Adds constraints to table: SURVEY_TECHNIQUE
svcon1.sql	Adds constraints to table: SURVEY_VISIT
svcon2.sql	Adds constraints to table: SURVEY_VISIT
tacon1.sql	Adds constraints to table: TAPE_ARCHIVE
tacon2.sql	Adds constraints to table: TAPE_ARCHIVE

A2.3 Scripts to add sequences and triggers

Note that the scripts should be run in the order listed here as the later scripts depend on the existence of objects created by the earlier ones. Also pre-existing data should be loaded before these scripts are run so that the sequences are initiated with the correct starting numbers.

sequences.sql	Creates the sequences for automatic insertion of unique ID numbers to various tables.
ngrutil.sql	Installs procedures to convert 2-letter NGR 100km grid square codes into numeric coordinates. This is used by the triggers added to the SURVEY_VISIT table.
triggers.sql	Installs triggers for integrity checking and automatic unique ID number insertion on various tables.

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