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HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix HE-006-00000

Historic environment

Generic written scheme of investigation for non-intrusive archaeological survey

M212

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Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

A report prepared for High Speed Two (HS2) Limited:

ARUP+ ERM | FOSTER + PARTNERS | JACOBS
RAMBOLL | TYPSA | COSTAIN

MWJV
Mott MacDonald | WSP

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Contents

Tables

1 Summary

1.1.1 This report is an appendix to the historic environment assessment, it provides a generic written scheme of investigation (WSI) for non-intrusive archaeological survey undertaken for the HS2 Phase 2b Proposed Scheme.

1.1.2 As set out in the Environmental Impact Assessment Scope and Methodology Report (SMR) (Volume 5, Appendix: CT-001-00001) field visits are proposed as a minimum requirement of the Environmental Impact Assessment (EIA) for the Proposed Scheme. The scope of non-intrusive survey will be developed and agreed in consultation with the appropriate Archaeological Advisory Service (AAS) stakeholders (see Section 2.2).

1.1.3 This WSI provides a generic method for:

- field visits;
- geophysical survey;
- surface artefact collection; and
- metal detector survey.

1.1.4 This WSI does not include a method for field visits undertaken to assess the setting of heritage assets, which is provided in the HS2 Ltd Technical Note: Historic Environment Guidance for authors on the assessment of setting, which is part of the SMR (Volume 5, Appendix: CT-001-00001). Also, this WSI does not include a method for intrusive archaeological investigations.

1.1.5 The aim of non-intrusive archaeological survey is to establish, as far as possible using the specified technique, the presence/absence, extent and character of buried archaeological remains along the route of the Proposed Scheme.

1.1.6 The type, scope and method of non-intrusive survey is dependent upon asset or area specific requirements for further information regarding archaeological potential, with a view to determining the assessment of effect and defining appropriate mitigation. The ability to undertake non-intrusive archaeological survey is dependent on securing access to land suitable for this purpose within the available timescale.

1.1.7 Area and asset specific survey may comprise one or more of the non-intrusive techniques detailed in this WSI i.e. field visits, geophysical survey, surface artefact collection, and/or metal detector survey. These techniques form part of the evaluation phase of investigative works associated with the historic environment undertaken prior to the Environmental Statement (ES) being deposited, subject to land access.

2 Introduction

2.1 Scope of the generic written scheme of investigation

2.1.1 This document provides a generic WSI for non-intrusive archaeological survey and presents a general statement of objectives, standards and structure for the planning, implementation and reporting of non-intrusive geophysical survey, surface artefact collection, field visits and metal detector survey, including an explanation of technical terms and a generic specification for analysis, dissemination and archive deposition.

2.1.2 The document provides a structured model and guidance for ensuring that a consistent approach is applied to the design and management of non-intrusive archaeological survey undertaken in relation to the Proposed Scheme.

2.1.3 For the purposes of this document the term 'archaeology' is taken to refer to below ground resources, including remains of archaeological, palaeoenvironmental and geoarchaeological importance.

2.1.4 This document conforms with the following standards and guidance comprising:

- Standard and guidance for archaeological geophysical survey[1];
- Code of Conduct[2];
- Standard and guidance for historic environment desk-based assessment[3];
- Standard and guidance for archaeological field evaluation[4];
- Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives[5];
- Understanding the Archaeology of Landscapes. A guide to good recording practice[6];

[1] Chartered Institute for Archaeologists (2020a), *Standards and guidance for archaeological geophysical survey*. Available online at: https://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_3.pdf.

[2] Chartered Institute for Archaeologists (2019b), *Code of Conduct*. Available online at: https://www.archaeologists.net/sites/default/files/CodesofConduct.pdf.

[3] Chartered Institute for Archaeologists (2020c), *Standard and guidance for historic environment desk-based assessment*. Available online at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf.

[4] Chartered Institute for Archaeologists (2020d), *Standards and guidance for Archaeological field evaluation*. Available online at: https://www.archaeologists.net/sites/default/files/CIfAS&GFieldevaluation_1.pdf.

[5] Chartered Institute for Archaeologists (2020e), *Standards and guidance for the creation, compilation, transfer and deposition of archaeological archives*. Available online at: https://www.archaeologists.net/sites/default/files/CIFAS&GArchives_2.pdf.

[6] Historic England (2017), *Understanding the Archaeology of Landscapes. A guide to good recording practice* (Second Edition). Available online at: https://historicengland.org.uk/images-books/publications/understanding-archaeology-of-landscapes/heag142-understanding-archaeology-of-landscapes/.

- Managing Significance in Decision-Taking in the Historic Environment. Historic Environment Good Practice Advice in Planning: 2[7];
- English Heritage Management of Research Projects in the Historic Environment: The MoRPHE Project Manager's Guide[8];
- The Setting of Heritage Assets. Historic Environment Good Practice Advice in Planning Note 3. Historic England (Second Edition)[9];
- Our Portable Past, Guidance for Good Practice (Third Edition)[10]; and
- Managing Change in the Historic Environment; Setting[11].

2.2 Roles and responsibilities

2.2.1 The following organisations and individuals are referred to in this document:

- HS2 Ltd is the company responsible for developing and promoting the UK's new high-speed rail network. HS2 Ltd has technical representation, through a number of technical specialists within their Infrastructure Directorate;
- Professional Services Consultants (PSC) refers to any organisation appointed by HS2 Ltd to undertake work on their behalf. It is understood that to provide specialist archaeological field surveys, the PSC may employ sub-consultants;
- Archaeological Advisory Service (AAS) relates to the county, city or regional archaeological organisation that provides an advisory role to the relevant local planning authorities; and
- the Chartered Institute for Archaeologists (CIfA) is the body that champions professionalism in archaeology, by setting standards and promoting best practice.

2.2.2 Surveys will be undertaken by an appropriately qualified and experienced contracted PSC. Topic Lead refers to the relevant head of discipline for historic environment, or their nominated deputy. Project Manager refers to the lead person responsible for a specific survey and will be the appropriately qualified person from the relevant PSC.

[7] Historic England (2015a), *Managing Significance in Decision-Taking in the Historic Environment. Historic Environment Good Practice Advice in Planning:* 2. Available online at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/.

[8] Historic England (2015b), *English Heritage Management of Research Projects in the Historic Environment: The MoRPHE Project Manager's Guide*. Available online at: https://historicengland.org.uk/images-books/publications/morphe-project-managers-guide/.

[9] Historic England (2017c), *The Setting of Heritage Assets. Historic Environment Good Practice Advice in Planning: 3,* (Second Edition). Available online at: https://content.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.pdf/.

[10] Historic England (2018), *Our Portable Past, Guidance for Good Practice,* (Third Edition). Available online at: https://content.historicengland.org.uk/images-books/publications/ourportablepast/heag177-our-portable-past.pdf/.

[11] Historic Environment Scotland (2016), *Managing Change in the Historic Environment Setting*. Available online at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549.

2.2.3 In terms of temporal scope, this document refers to archaeological surveys undertaken as part of the environmental assessment and reported in the ES.

2.3 Background to the Proposed Scheme

2.3.1 An overview of the Proposed Scheme is provided in Volume 1, Introduction and methodology.

2.3.2 The overall framework within which archaeological work will be undertaken will be set out in the Environmental Minimum Requirements (EMR) for the Proposed Scheme.

3 Survey aims and objectives

3.1 General aims

3.1.1 The general aim of any archaeological investigation is to determine and better understand the nature, function, character and extent of an archaeological site.

3.2 Overall survey aims

3.2.1 The overall aims of non-invasive archaeological survey are:

- to identify, investigate and characterise heritage assets with archaeological interest known or potentially present within the area to be surveyed;
- to undertake a programme of analysis and synthesis of the results of survey work; and
- to disseminate the results of the survey work through deposition of an ordered archive at suitable repositories for both physical and digital material, and the deposition of a series of detailed reports and Geographic Information System (GIS) data at the Historic Environment Record (HER).

3.3 Field visit aims

3.3.1 The aims of the field visits are:

- to establish the presence/absence, extent and character of known heritage assets within the survey area;
- to identify any as yet unknown heritage assets;
- to identify ground conditions and any relevant health, safety or environmental factors that could limit options for further field survey techniques; and
- to identify additional locations of archaeological potential not previously recorded.

3.4 Geophysical survey aims

3.4.1 The aims of geophysical survey, so far as reasonably practicable, are:

- to identify the presence of buried archaeological remains or suspect anomalies in the survey area in order to assist with the definition of the archaeological resource;
- to clarify the extent and layout of known sites of archaeological interest within or adjacent to the study area;
- to clarify the extent and layout of previously unknown buried archaeological remains within the survey area; and
- to interpret any geophysical anomalies identified by the survey.

3.5 Surface artefact collection and metal detector survey aims

3.5.1 The aims of surface artefact collection and metal detector survey, so far as reasonably practicable, are:

- to systematically identify archaeological artefacts within the survey area in order to assist with the definition of the archaeological resource;
- to clarify the extent and layout of known sites of archaeological interest within the study area; and
- to clarify the presence/absence, extent and layout of previously unknown sites of archaeological interest within the study area.

4 Prioritising archaeological survey areas

4.1.1 Areas for non-invasive archaeological survey will be selected with reference to the HS2 Ltd Technical Note: Historic Environment – Risk based approach to prioritising archaeological surveys, which is part of the SMR (Volume 5, Appendix: CT-001-00001). This approach utilises desk-based assessment in the prioritisation of land parcels for archaeological survey.

4.1.2 The risk-based approach divides the landscape into archaeological character areas (ACA) and then, within these, defines archaeological sub zones (ASZ). ASZ are then assigned a level of risk associated with the likely presence of archaeological remains based on the results of desk-based assessment. Table 1 presents the criteria used to assess risk.

Table 1: Criteria to define archaeological risk rating

Ranking	Risk rating	Criteria to define rank/risk rating
1	High	An area where there is no, or only limited, site-specific data available to characterise the archaeological resource, but data from other sources, (e.g. remote sensing, boreholes and historic landscape analysis), indicates the potential for significant remains to be present.
2	Medium	An area where there is no site-specific data available to characterise the archaeological resource and no available data from other sources.
3	Low	An area where the archaeological resource is very well understood and sufficient data is available to characterise the resource and to inform the assessment.
4	None	An area where the archaeological resource is known to have been removed by past activity and the chances of encountering buried archaeology is reduced to essentially nil.

5 Mobilisation

5.1.1 Prior to the commencement of survey, a health and safety risk assessment for each survey area will be completed. Dynamic risk assessments will be undertaken upon arrival at each survey area as required. Each location will be subject to inspection to assess whether ground conditions (e.g. crop cover, weathering, ploughing regime) are suitable for survey and if a condition survey is required (subject to the requirements of the employer). Surveying of locations may be rescheduled if conditions are considered unsuitable or unsafe.

5.1.2 It may not be possible to access all areas of proposed survey locations. All surveys will be limited only to those areas for which access has been prearranged. It may also be necessary to amend survey areas in the field in response to access issues or ground conditions.

5.1.3 Prior to mobilising to site for geophysical survey, surface artefact collection or metal detector survey, the survey teams should create a unique code for each survey undertaken; these should be in the format *CAxx_SSnnn*, where CAxx is the community area code, SS is the type of survey (GP – geophysical survey, AC – surface artefact collection, MD – metal detector survey) and nnn is the consecutive site number within a given community area, (e.g. MA01_GP001, LA05_AC012).

5.1.4 HS2 Ltd will reference these codes and will use them in discussions with the relevant bodies in determining event numbers or codes for the Proposed Scheme, where relevant.

5.1.5 Some surveys may require individual features within a given site to be numbered. For remote sensing survey features should be numbered and labelled using the code in the format *CAxx_RSnnn*, where *CAxx* is the community area code and *nnn* is the consecutive feature number within a given community area, (e.g. MA01_RS001). For other surveys, the feature codes should be in the format *CAxx_SSnnn.zzz*, where CAxx_SSnnn is the site code, and zzz is the consecutive feature number. Where appropriate, the same number should be applied to a group of features. For example, congruent groups of features such as a series of ridge and furrow geophysical anomalies forming a cohesive group should be given a single number rather than each anomaly be numbered separately.

6 Methodology

6.1 Introduction

6.1.1 A daily pro-forma record shall be completed during the course of each survey. This shall include:

- the date;
- personnel;
- National Grid Reference;
- weather conditions;
- land use/field conditions;
- ground visibility;
- any other factors with the potential to influence survey results (e.g. geological conditions, previous land use); and
- any interactions with members of the public during the course of the survey.

6.2 Field visits

6.2.1 During initial field visits, notes will be made of any visible earthworks within proposed survey locations; these will be recorded in the pro forma daybook. Record photographs will also be taken of each survey area.

6.2.2 Field visits shall be undertaken for as much of the land required for the construction of the Proposed Scheme as possible, and may include:

- vantage point surveys from publicly accessible viewpoints; and
- windscreen surveys.

6.2.3 Suitable land for field visits shall include:

- land where permission to enter has been granted;
- land that has not been extensively disturbed by modern development or industry (e.g. landfill);
- land that is not under tall crop or scrub at the time of survey (status of crop or scrub presence shall be reviewed periodically); and
- land that is safe to enter.

6.2.4 Further prioritising may take place on the basis of the risk model. It is expected that land shall be included in the field visits whether the archaeological risk is determined to be high, medium or low, given that an aim of the survey is to establish the presence/absence, extent and character of known heritage assets within the survey area.

6.2.5 Land will, however, particularly be prioritised for field visits where it meets the following criteria:

- access for survey is available and permission to enter the land has been granted;
- it has been ploughed and weathered or otherwise suitably cultivated; and
- areas of high risk where there is no, or only limited, site specific data available to characterise archaeological assets, but data from other sources (for example remote sensing, boreholes and historic landscape analysis) indicates the potential for encountering significant archaeological remains.

6.2.6 Within the survey areas, the location and, where applicable, extent of all features identified on the field visit is to be recorded. All identified earthworks will be surveyed to standards required for a Level 1 survey in accordance with guidance produced by Historic England (formerly known as English Heritage)[6]: 'A Level 1 record comprises a mainly visual record supplemented by information needed to identify the archaeological feature's location, possible date and type. Surveys at this level provide essential core information accompanied by a simplified cartographic record at 1:10000 of the location and extent of the recorded features.'

6.3 Geophysical survey

6.3.1 Detailed (gradiometer) surveys will be conducted using appropriate instrumentation, with a minimum sample interval of 0.25 transects.

6.3.2 Detailed positional data will be collected using an appropriate Global Positioning System (GPS) in alignment with standard and guidance. Positional data should be obtainable to an accuracy greater than 0.1m as required by European Archaeological Council[12] guidelines.

6.3.3 For some survey areas, a cart-based gradiometer system may be used. This system acquires locational data by way of a GPS-feed, negating the requirement for pre-prepared survey grids. This GPS-feed receives real-time corrections from a base station unit, providing positioning to at least 0.1m, in accordance with current standards and guidance[1,12,13].

6.3.4 As much of each survey area will be surveyed as is practical. Obstructions (such as vegetation, trees, crops, electricity pylons, fences, drains, roads, farming equipment etc.) may prevent the total area being surveyed. Photographs will be taken of any areas unsuitable for survey as a record of the reasons for this and to accompany notes.

6.3.5 Areas surveyed will be tied into the National Grid using GPS survey equipment. This will allow the surveyed area to be relocated at a later date.

[12] Europae Archaeologiae Consilium (2016), *EAC Guidelines for the Use of Geophysics in Archaeology Questions to Ask and Points to Consider*. Available online at: http://www.archprospection.org/sites/archprospection.org/files/EAC_Guidelines_2_Geophysics.pdf.

[13] Historic England (2008), *Geophysical Survey in Archaeological Field Evaluation,* (2nd edition). Available upon request from Historic England.

6.3.6 Where gradiometer readings are stored in the memory of instruments, these will be regularly downloaded to an appropriate secure network for back-up, processing and interpretation. In addition, records of ground and weather conditions will be made in the field, as well as any notable surface features in relation to the survey grid.

6.3.7 Any markers, such as canes, flags and ranging rods will be removed from site on completion of each survey.

Post survey requirements

6.3.8 Raw data will not be altered. The process employed for visualisation should allow a minimally processed plot to enable verification of the extent to which processing may have masked features.

6.3.9 The data will be processed using both commercially available and in-house software where appropriate, enabling greyscale and interpretative trace plots to be produced.

6.3.10 In some instances, gradiometer surveys will not be deemed an appropriate method of investigation as a result of incompatible geology or unsuitable ground conditions. When this occurs, instrumentation for other non-invasive survey techniques will be considered, such as earth resistance (with a minimum reading interval of 0.25m) or ground penetrating radar (with a minimum reading interval of 0.05m). The methodologies for these alternative surveys will reflect the best practice guidelines for the respective techniques.

6.3.11 An interpretation of the geophysical anomalies will be presented in a series of drawings using the following categories:

- archaeology - definitive/probable;
- archaeology - possible;
- industrial/burnt-fired;
- extraction;
- agricultural historic;
- agricultural modern;
- natural;
- ferrous;
- magnetic disturbance;
- uncertain; and
- modern service.

6.3.12 This interpretation will be undertaken using specified software, with the report figures generated from GIS. The PSC will ensure all software used is compatible with software in use by HS2 Ltd.

6.4 Surface artefact collection

6.4.1 The survey area will be walked in a series of transects, to be determined on a site-by-site basis, allowing the systematic identification of archaeological features. All encountered archaeological features within the survey area will be recorded and assigned a unique identification number.

6.4.2 The surface artefact collection survey will use a mobile platform loaded with a bespoke database that makes use of look-up tables (where appropriate) to maintain compliance for field entry. Fields will include, but are not limited to:

- a unique feature identifier;
- photograph number and direction (detailed photographs taken of recorded archaeological features will contain a 1m or 2m scale bar where appropriate);
- monument type[14];
- physical description;
- grid reference;
- dimensions;
- interpretation; and
- assessment of significance.

6.4.3 All artefacts (including bone) shall be recovered, except those of clearly modern origin. For bulk ceramic building material and industrial waste, a sufficient sample should be collected to characterise the material present, with the RTK Global Navigation Satellite System (GNSS) used to record the location of the sample and the extent of the artefact scatter.

6.4.4 In the event that any artefact found during the survey is deemed to be 'treasure' (as defined under the provisions of the 1996 Treasure Act[15] in England or Treasure Trove in Scotland), the PSC will immediately notify the Project Manager who will immediately notify HS2 Ltd of the discovery (once the find has been catalogued and verified). HS2 Ltd will inform landowners of the finds which have been made. HS2 Ltd will comply in full with the provisions of Treasure Act 1996 or in Scotland with Treasure Trove requirements[16].

6.4.5 On the completion of the survey, all materials, grid pegs and other equipment used during the survey will be removed and the survey areas and associated working areas left in a clean and tidy condition.

[14] Historic England (2015d), *Historic England Thesauri*. Available online at: http://thesaurus.historicengland.org.uk/frequentuser.htm.

[15] *The Treasure Act 1996*. Her Majesty's Stationery Office, London. Available online at: https://www.legislation.gov.uk/ukpga/1996/24/contents.

[16] Historic Environment Scotland directs users to the Treasure Trove Scotland website for further information about the Treasure Trove system in Scotland. Available online at: https://treasuretrovescotland.co.uk/.

Post survey requirements

6.4.6 Upon completion of survey, all artefacts will be cleaned (where appropriate), bagged, assessed, conserved and packaged in accordance with best professional practice, and at all times adhering to the guidelines of the relevant local archive (where applicable).

6.4.7 All artefacts recovered during the surface artefact collection will be examined by appropriately qualified specialists, aided by experienced staff capable of assessing/analysing the different classes and types of material, as required.

6.4.8 Where required, the conservation of artefacts will be undertaken by appropriately qualified conservation specialists.

6.4.9 The distribution of the collected and identified artefacts will be plotted on a map at an appropriate scale using AutoCAD and GIS.

6.4.10 A finds selection policy will be prepared as part of the reporting stage following standard guidelines[5,17]. This will make recommendations for the selective disposal of those finds categories that are considered to have little or no potential for further research and do not meet the criteria for 'treasure', as set out in the 1996 Treasure Act[15]. Examples of this could include un-datable material such as animal bone, burnt stone, and post-medieval and undiagnostic ceramic building material. Disposal of finds will also take account of the surface artefact collection provenance. A quantification of the artefacts should be included in landowner agreements regarding transfer of ownership of finds.

6.5 Metal detector survey

6.5.1 A series of transects should be established within the individual fields to be surveyed. These transects will generally be aligned parallel to the longest boundary of the individual field being surveyed and spaced at 10m intervals. Closer or wider spacing of transects may also be considered as appropriate and should be applied iteratively should a survey indicate the presence of concentration of metallic responses (for example the location of a coin hoard or falls of shot).

6.5.2 Metal detecting should progress along each transect. Each sweep of the metal detector should cover a width of approximately 2m (1m each side of the transect). The search head should be kept as close to the ground surface as possible.

6.5.3 The survey should initially target non-ferrous metals only, due to the potential for a large number of ferrous metal signals across most land. Should concentrations of medieval or earlier material be identified, then further detecting for all metals may be necessary in those specific areas.

6.5.4 Artefacts should be removed from the ground using a trowel or other technique as appropriate for conservation. No artefacts should be removed from a depth greater than the

[17] Society of Museum Archaeologists (1993), *Selection, Retention and Dispersal of Archaeological Collections.*

plough soil (approximately 300mm). Artefacts should be labelled with a unique identification number and their individual locations plotted using a GNSS. Artefacts of undoubted modern date should be collected and bagged together by transect and a single identification number allocated.

6.5.5 Artefact distribution plots and associated commentary reports will be produced at survey completion. Artefact concentrations can suggest areas of the site for further archaeological investigation and can inform any archaeological investigation strategies, if appropriate.

Post survey requirements

6.5.6 Upon completion of survey, all artefacts will be cleaned (where appropriate), bagged, assessed, conserved and packaged in accordance with best professional practice, and at all times adhering to the guidelines of the relevant local archive (where applicable).

6.5.7 All artefacts recovered during the metal detector survey will be examined by appropriately qualified specialists, aided by experienced staff capable of assessing/analysing the different classes and types of material, as required.

6.5.8 Where required, the conservation of artefacts will be undertaken by appropriately qualified conservation specialists.

6.5.9 The distribution of the collected and identified artefacts will be plotted on a map at an appropriate scale using AutoCAD and GIS.

7 Reporting

7.1 Overall reporting

7.1.1 Overall reporting for all survey techniques will be presented in the relevant HS2 Ltd report templates and will contain information appropriate to the survey technique:

- Contents page;
- Introduction, to include standardised text adapted as appropriate, and comprising:
  - Relevant standards and guidance;
  - Survey technique;
  - General locations surveyed; and
  - Dates of survey;
- Survey objectives:
  - Aims of the fieldwork; and
  - Objectives of the fieldwork;
- Survey methodology:
  - Data collection;
  - Data processing;
  - Data presentation; and
  - Assumptions and limitations;
- Survey locations, including:
  - Overview of the archaeological background;
- Survey results, containing:
  - Description and interpretation of results;
- Conclusions (to include justified recommendations for further work); and
- Figures (produced using appropriate GIS figure templates. The figures shall be produced at an appropriate, legible scale. Draft figures should be provided to HS2 Ltd for review and to agree the appropriate scale, if necessary).

7.1.2 Authors are required to follow the report template structures and refer to supplementary guidance notes.

7.1.3 Field visit results will be incorporated into the historic environment baseline reporting for the ES.

7.1.4 The results of the geophysical surveys undertaken to date are presented in Background Information and Data (BID), Historic environment field survey reports, BID HE-004[18].

7.1.5 Reporting should be presented by survey technique and local archaeological advisory body area, including a clear reference to the survey location and community area.

Reporting geophysical survey

7.1.6 Throughout the course of the geophysical survey, the results will be compiled into a series of illustrated reports for each community area. The results will be discussed in the overall context of the relevant community area, describing the survey results and interpretation. Reporting will conform to the appropriate guidance, for example Chartered Institute for Archaeologists guidelines[1].

7.1.7 As survey work is in progress greyscale plots demonstrating results will be provided by the PSC on a weekly basis for information. These are intended to provide an understanding of progress and inform discussion of any potential archaeological features.

7.1.8 Final reporting shall include drawings produced using GIS figure templates showing:

- a minimally processed/unprocessed plot;
- greyscale plots; and
- interpretative plots.

7.1.9 The final issue of reports shall be in accordance with HS2 Ltd document control processes and will comprise:

- a PDF (Portable Document Format) copy of the report;
- text of the report in Microsoft Word format;
- figures in the format in which they were produced; and
- data comprising:
  - all processed raw data from survey work in an appropriate format which aligns with CIfA standard and guidance;
  - GIS datasets in Esri shapefile or file geodatabase format, as specified in data dictionaries (Annex A); and
  - metadata comprising the supply of a data sheet on format of grids, meshes and composites or their equivalent.

7.1.10 To ensure consistency across survey reporting for the Proposed Scheme all survey drawings should adhere to the conventions specified in the appropriate GIS figure templates. PSC

[18] High Speed Two Ltd (2022), High Speed Rail (Crewe - Manchester), *Background Information and Data, Historic environment field survey reports,* BID HE-004. Available online at: https://www.gov.uk/government/collections/hs2-phase-2b-crewe-manchester-environmental-statement.

must not introduce new or alter the existing layers. Should any additional layers be deemed necessary approval will be sought from HS2 Ltd.

7.1.11 The required GIS attribute data is defined in data dictionaries presented in Annex A.

7.1.12 An online access to the index of archaeological investigations form (OASIS)[19] shall be completed for each survey event. Electronic copies of the form will only be uploaded upon the written instruction of HS2 Ltd.

7.1.13 HS2 Ltd will issue copies of the final report to the relevant Archaeological Advisory Service and Historic England or Historic Environment Scotland.

Reporting surface artefact collection and metal detector survey

7.1.14 The results of the surface artefact collection and metal detector survey will be compiled into a fully illustrated report using the relevant HS2 Ltd document template to describe the survey results and interpretation. This will conform to CIfA Standard and guidance for archaeological field evaluation[4].

7.1.15 The final issue of reports shall be produced in accordance with HS2 Ltd document control requirements and will comprise:

- a PDF copy of the report;
- the text of the report in Microsoft Word format;
- a database complied of all plotted finds;
- figures in the format in which they were produced; and
- AutoCAD and GIS data in Esri format.

7.1.16 Copies of the final report will be issued to HS2 Ltd for submission to the relevant AAS and Historic England or Historic Environment Scotland. All accompanying data supplied must adhere to HS2 Ltd Geographic Information Metadata standards.

7.1.17 An OASIS form is to be completed for each event. Electronic copies of the form will only be uploaded upon the written instruction of HS2 Ltd.

7.1.18 HS2 Ltd will issue copies of the final report to the relevant AAS, and Historic England or Historic Environment Scotland as appropriate.

[19] OASIS, national online inventory of archaeological investigations. Available online at: https://oasis.ac.uk/form/.

8 Archive

8.1.1 An ordered, indexed, and internally consistent site archive will be prepared in accordance with Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation, Archaeology Data Service (ADS) Guidelines for Depositors[20], CIfA guidelines[5] and any guidelines for deposition prepared by an appropriate museum.

8.1.2 The archive created from this phase of work will form part of the larger project archive and will be held by the PSC until the conclusion of the project (or until instructed by HS2 Ltd to deposit the archive). Agreement will be sought for the deposition of the archive with an appropriate museum, to be decided at a later date in consultation with the relevant AAS.

[20] Archaeology Data Service (2015), *Guidelines for Depositors.* Available online at: https://archaeologydataservice.ac.uk/advice/guidelinesForDepositors.xhtml.

9 Engagement

9.1.1 Location specific written schemes of investigation will be prepared for submission to the relevant AAS by HS2 Ltd. Engagement will be undertaken with the AAS by HS2 Ltd during the course of the surveys, as appropriate and agreed with the AAS.

10 Personnel

10.1.1 The surveys will be undertaken by suitably qualified archaeological personnel (see Section 11). Details of nominated personnel and proposed replacements in the following roles can be made available (on request) to HS2 Ltd:

- overall project management;
- day-to-day management;
- lead surveyor; and
- assistant surveyor(s).

10.1.2 The performance of survey teams will be monitored by the relevant Project Manager who, in turn, is responsible for reporting to the relevant Topic lead. The Topic Lead has ultimate responsibility for the maintenance of quality standards for all work.

10.1.3 Reporting will be authored, assured for standards and consistency by the PSC in advance of provision to HS2 Ltd for review.

10.1.4 All nominated staff must be appropriately qualified and experienced for their project role.

11 Standards

11.1.1 All works affecting heritage assets undertaken in connection with HS2 works will be carried out by suitably qualified, experienced and competent individual professionals and organisations (the PSC). HS2 Ltd require that all such works have appropriate regard to national planning policy, archaeology and built heritage standards, national guidelines and codes of practice appropriate to the project; this includes publications by Historic England, the CIfA and the Institute of Historic Building Conservation.

11.1.2 The PSC will endorse the CIfA Code of Conduct[2].

11.1.3 All core staff must be employed in line with the CIfA Code of Conduct and be members of the CIfA or be appropriately and equivalently qualified for the task to be undertaken.

11.1.4 The PSC will operate a project management system that is ISO 9001 accredited, or equivalent to. Projects will be managed in accordance with appropriate guidance, for example Historic England guidelines outlined in the document Management of Research Projects in the Historic Environment[8].

11.1.5 All non-intrusive surveys will be undertaken under the direction of the PSC's Project Manager who is responsible for ensuring that the work is compliant with the quality standards of the PSC organisation and HS2 Ltd.

12 Health, safety and environment

12.1 Risk assessment

12.1.1 A risk assessment will be provided for each survey area. The risk assessment will be prepared in accordance with the following.

12.1.2 Health and Safety considerations are of paramount importance in conducting all non-intrusive archaeological survey fieldwork. Safe working practises will override archaeological considerations at all times.

12.1.3 The HS2 Ltd Health and Safety Policy[21] places health and safety as one of the core values of the organisation. The policy is guided by a series of principles which inform the approach taken to health and safety which includes:

- an holistic approach – safety integrated into all activities;
- safety leadership – setting standards and expectations for health and safety management and behaviours;
- the belief that everyone working on the project has the right to go home unharmed;
- to view health like safety;
- deliver a railway with safety at its heart;
- develop a culture of safe decision making and acting to mitigate risks wherever and whenever they occur;
- develop HS2 Ltd to be a safe organisation where safety is always the first consideration; and
- personal accountability where everyone understands and is empowered to take responsibility for their own (and others) health and safety.

12.1.4 All work will be carried out in accordance with the Health and Safety at Work Act 1974[22] and the Management of Health and Safety at Work (Amended) Regulations 2006[23]; with all other relevant Health and Safety legislation, regulations and codes of practice in force at the time and with the relevant internal guidance documents.

[21] High Speed Two Ltd (2017f), *HS2 Safe at heart. Health and Safety Policy*. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/657224/hs2_health_and_safety_policy.pdf

[22] *Health and Safety at Work Act 1974. SI 1974 c.37.* Her Majesty's Stationery Office, London. Available online at: https://www.legislation.gov.uk/ukpga/1974/37/contents.

[23] *Management of Health and Safety at Work (Amended) Regulations 2006*. Her Majesty's Stationery Office, London. Available online at: https://www.legislation.gov.uk/uksi/2006/438/contents/made.

12.2 Welfare

12.2.1 Surveyors will make use of local amenities where there are no welfare facilities on site. These will be identified within a site-specific risk assessment for each survey area. The survey team must carry drinking water, wet wipes and antibacterial gel at all times, along with a First Aid kit.

12.3 Emergency procedures and incident reporting

12.3.1 In the event of an accident, the survey team will follow the specific procedure set out within the relevant internal guidance notes.

12.4 Supervision

12.4.1 The survey team will report their progress daily to their Project Manager. Progress reports will be made by the PSC to agreed persons within HS2 Ltd.

12.5 Environment

12.5.1 The following precautions are required:

- field gates must be left in the same condition as found, and secured if necessary;
- litter must be removed from site; and
- noise must be kept to a minimum.

12.5.2 The risk assessments will include consideration of other environmental effects, for example in relation to protected species, and the survey teams will be expected to liaise with other relevant disciplines as necessary in the preparation of the risk assessments.

13 List of acronyms

13.1.1 The acronyms used in the text are shown in Table 2.

Table 2: List of acronyms

Acronym	Title
AAS	Archaeological Advisory Service
ADS	Archaeology Data Service
CIfA	Chartered Institute for Archaeologists
EAC	European Archaeology Council
EMR	Environmental Minimum Requirements
ES	Environmental Statement
GIS	Geographic Information System
GPS	Global Positioning System
GPR	Ground Penetrating Radar
GNSS	Global Navigation Satellite System
HER	Historic Environment Record
HS2	High Speed Two
LPA	Local Planning Authority
OASIS	Online Access to the Index of Archaeological Investigations
PSC	Professional Services Consultant
RTK	Real Time Kinematic
WCML	West Coast Mainline
WSI	Written Scheme of Investigation • GWSI – Generic Written Scheme of Investigation • LSWSI – Location-specific Written Scheme of Investigation

Annex A: Data dictionary

1 Remote sensing interpretation

The remote sensing survey interpretation data should be provided as two feature classes:

- HIS_ORI_XXXX_CH_RemoteSensing_Ln – the data consists of interpretative categories represented as lines; and
- HIS_ORI_XXXX_CH_RemoteSensing_Ply – the data consists of interpretative categories represented as polygons.

In the above, XXXX should be the relevant Community Area code, e.g. *MA01*.

Table A 1: Remote sensing interpretive categories represented as lines (HIS_ORI_XXXX_CH_RemoteSensing_Ln)

Field	Description
OBJECTID	Unique identifier (this is automatically populated)
Contract	The name of the contract that the record is taken against (e.g. C861)
Company	The name of the company that the record is taken against (e.g. ARP)
StaffInit	This is the name of the GIS processor
CapturDate	This is the date that the record is captured
GazetteerID	N/A
ChngeAncest	This is the stage of the project in which the data is supplied for
Route	Leave blank
eB_Document	This is the EB reference number (e.g. HS2-HS2-GI-GDD-000-000001)
ESDB_Link	This is a html link to the EB document
HS2_DateDelivery	Leave blank
HS2_Processor	Leave blank
CreatedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is created.
CreatedBy	This should be automatically populated through Track Editor. This should populate your windows name credentials.
LastEditedBy	This should be automatically populated through Track Editor. This should populate the last person who edited the record through windows name credentials.
LastEditedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is modified.
ChngeAncestDef	This is the definition of the Change Ancestry Field
RSfeatureID	This should be the name of the remote sensing survey feature, in the format *CAxx_RSnnn*, e.g. *MA01_RS001*.
RSType	This should be the type of interpretative category, category expressed as a four-letter code, including one of the following: • BANK - bank; • DTCH - ditch; • LRFD - levelled ridge and furrow direction;

Field	Description
	• ERFD - extant ridge and furrow direction; • SERV - modern service; • STRC - structure; • NMPF - NMP feature; and • NMPD - NMP ridge and furrow direction.
RSperiod	This should be the period code, including one of the following: • UND – undated; • PREH – prehistoric; • PAL – Palaeolithic; • MES – Mesolithic; • NEO – Neolithic; • BA – Bronze Age; • IA – Iron Age; • RB – Roman; • EMED – early medieval; • MED – medieval; • PMED – post-medieval; and • MOD – modern.
Easting	This should be the integer value of the easting coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Northing	This should be the integer value of the nothing coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Shape_Length	Automatically populated length in metres

Table A 2: Remote sensing interpretive categories represented as polygons (HIS_ORI_XXXX_CH_RemoteSensing_Ply)

Field	Description
OBJECTID	Unique identifier (this is automatically populated)
Contract	The name of the contract that the record is taken against (e.g. C861)
Company	The name of the company that the record is taken against (e.g. ARP)
StaffInit	This is the name of the GIS processor
CapturDate	This is the date that the record is captured
GazetteerID	N/A
ChngeAncest	This is the stage of the project in which the data is supplied for
Route	Leave blank
eB_Document	This is the EB reference number (e.g. HS2-HS2-GI-GDD-000-000001)
ESDB_Link	This is a html link to the EB document
HS2_DateDelivery	Leave blank
HS2_Processor	Leave blank
CreatedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is created.
CreatedBy	This should be automatically populated through Track Editor. This should populate your windows name credentials.

Field	Description
LastEditedBy	This should be automatically populated through Track Editor. This should populate the last person who edited the record through windows name credentials.
LastEditedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is modified.
ChngeAncestDef	This is the definition of the Change Ancestry Field
RSfeatureID	This should be the name of the remote sensing survey feature, in the format *CAxx_RSnnn*, e.g. *MA01_RS001*.
RSType	This should be the type of interpretative category, category expressed as a four-letter code, including one of the following: • BANK - bank; • DTCH - ditch; • LRIF - levelled ridge and furrow; • ERIF - extant ridge and furrow; • EXTN - extent of area; • CUTF - large cut feature; • SERV - modern service; • STRC - structure; • HACH - T-hachure; and • NMPF - NMP feature.
RSperiod	This should be the period code, including one of the following: • UND – undated; • PREH – prehistoric; • PAL – Palaeolithic; • MES – Mesolithic; • NEO – Neolithic; • BA – Bronze Age; • IA – Iron Age; • RB – Roman; • EMED – early medieval; • MED – medieval; • PMED – post-medieval; and • MOD – modern.
Easting	This should be the integer value of the easting coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Northing	This should be the integer value of the nothing coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Shape_Length	Automatically populated length in metres
Shape_Area	Automatically populated areas in metres

2 Geophysical survey interpretation

The geophysical survey interpretation data should be provided as four feature classes:

- HIS_ORI_XXXX_CH_GeoPhysInterpretation_Pt – the data consists of interpretative categories represented as points;
- HIS_ORI_XXXX_CH_GeoPhysInterpretation_Ln – the data consists of interpretative categories represented as lines;
- HIS_ORI_XXXX_CH_GeoPhysInterpretation_Ply – the data consists of interpretative categories represented as polygons; and
- HIS_ORI_XXXX_CH_GeoPhysSurveyArea_Ply - the data consist of polygon boundaries to the geophysical survey areas.

In the above, XXXX should be the relevant Community Area code, e.g. *MA01*.

Table A 3: Geophysical survey interpretation data presented as points (HIS_ORI_XXXX_GeoPhysInterpretation_Pt)

Field	Description
OBJECTID	Unique identifier (this is automatically populated)
Contract	The name of the contract that the record is taken against (e.g. C861)
Company	The name of the company that the record is taken against (e.g. ARP)
StaffInit	This is the name of the GIS processor
CapturDate	This is the date that the record is captured
GazetteerID	N/A
ChngeAncest	This is the stage of the project in which the data is supplied for
Route	Leave blank
eB_Document	This is the EB reference number (e.g. HS2-HS2-GI-GDD-000-000001)
ESDB_Link	This is a html link to the EB document
HS2_DateDelivery	Leave blank
HS2_Processor	Leave blank
CreatedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is created.
CreatedBy	This should be automatically populated through Track Editor. This should populate your windows name credentials.
LastEditedBy	This should be automatically populated through Track Editor. This should populate the last person who edited the record through windows name credentials.
LastEditedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is modified.
ChngeAncestDef	This is the definition of the Change Ancestry Field
GeoPhysSiteID	This should be the name of the geophysical survey area/site, in the format *CAxx_GPnnn*, e.g. *MA01_GP001*.
GPType	This should be the type of interpretative category expressed as a four-letter code, including one of the following: • ARDI – archaeology definitive/discrete;

Field	Description
	• ARCH – archaeology probable; • POAR – archaeology possible; • EXTR – extraction; • FERR – ferrous anomaly; • MADI – magnetic disturbance; and • UNCE – anomaly of uncertain origin.
GPperiod	This should be the period code, including one of the following: • UND – undated; • PREH – prehistoric; • PAL – Palaeolithic; • MES – Mesolithic; • NEO – Neolithic; • BA – Bronze Age; • IA – Iron Age; • RB – Roman; • EMED – early medieval; • MED – medieval; • PMED – post-medieval; and • MOD – modern.
GPfeatureID	This should be the name of the geophysical feature/feature group, in the format *CAxx_GPnnn.zzz*, e.g. *MA01_GP001.001*.
Easting	This should be the integer value of the easting coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Northing	This should be the integer value of the nothing coordinate in metres (British National Grid projection, GCS_OSGB_1936)

Table A 4: Geophysical survey interpretation data presented as lines (HIS_ORI_XXXX_GeoPhysInterpretation_Ln)

Field	Description
OBJECTID	Unique identifier (this is automatically populated)
Contract	The name of the contract that the record is taken against (e.g. C861)
Company	The name of the company that the record is taken against (e.g. ARP)
StaffInit	This is the name of the GIS processor
CapturDate	This is the date that the record is captured
GazetteerID	N/A
ChngeAncest	This is the stage of the project in which the data is supplied for
Route	Leave blank
eB_Document	This is the EB reference number (e.g. HS2-HS2-GI-GDD-000-000001)
ESDB_Link	This is a html link to the EB document
HS2_DateDelivery	Leave blank
HS2_Processor	Leave blank
CreatedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is created.

Field	Description
CreatedBy	This should be automatically populated through Track Editor. This should populate your windows name credentials.
LastEditedBy	This should be automatically populated through Track Editor. This should populate the last person who edited the record through windows name credentials.
LastEditedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is modified.
ChngeAncestDef	This is the definition of the Change Ancestry Field
GeoPhysSiteID	This should be the name of the geophysical survey area/site, in the format *CAxx_GPnnn*, e.g. *MA01_GP001*.
GPType	This should be the type of interpretative category expressed as a four-letter code, including one of the following: • ARDI – archaeology definitive/discrete; • ARCH – archaeology probable; • POAR – archaeology possible; • OLFB – historic field boundary; • RIFU – ridge and furrow; • DRAN – modern drain; • PLGH – modern plough marks; • NATU – natural; • UNCE – anomaly of uncertain origin; • SERV – modern service (including overhead); and • PIPE – modern buried pipe.
GPperiod	This should be the period code, including one of the following: • UND – undated; • PREH – prehistoric; • PAL – Palaeolithic; • MES – Mesolithic; • NEO – Neolithic; • BA – Bronze Age; • IA – Iron Age; • RB – Roman; • EMED – early medieval; • MED – medieval; • PMED – post-medieval; and • MOD – modern.
GPfeatureID	This should be the name of the geophysical feature/feature group, in the format *CAxx_GPnnn.zzz*, e.g. *MA01_GP001.001*.
Easting	This should be the integer value of the easting coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Northing	This should be the integer value of the nothing coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Shape_Length	Automatically populated length in metres

Table A 5: Geophysical survey interpretation data presented as polygons HIS_ORI_XXXX_GeoPhysInterpretation_Ply

Field	Description
OBJECTID	Unique identifier (this is automatically populated)
Contract	The name of the contract that the record is taken against (e.g. C861)
Company	The name of the company that the record is taken against (e.g. ARP)
StaffInit	This is the name of the GIS processor
CapturDate	This is the date that the record is captured
GazetteerID	N/A
ChngeAncest	This is the stage of the project in which the data is supplied for
Route	Leave blank
eB_Document	This is the EB reference number (e.g. HS2-HS2-GI-GDD-000-000001)
ESDB_Link	This is a html link to the EB document
HS2_DateDelivery	Leave blank
HS2_Processor	Leave blank
CreatedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is created.
CreatedBy	This should be automatically populated through Track Editor. This should populate your windows name credentials.
LastEditedBy	This should be automatically populated through Track Editor. This should populate the last person who edited the record through windows name credentials.
LastEditedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is modified.
ChngeAncestDef	This is the definition of the Change Ancestry Field
GeoPhysSiteID	This should be the name of the geophysical survey area/site, in the format *CAxx_GPnnn*, e.g. *MA01_GP001*.
GPType	This should be the type of interpretative category expressed as a four-letter code, including one of the following: • ARDI – archaeology definitive/discrete; • ARCH – archaeology probable; • POAR – archaeology possible; • INBF – industrial/burnt-fired; • EXTR – extraction; • OLFB – historic field boundary; • RIFU – ridge and furrow; • DRAN – modern drain; • PLGH – modern plough marks; • NATU – natural; • FERR – ferrous anomaly; • MADI – magnetic disturbance; • UNCE – anomaly of uncertain origin; • SERV – modern service (including overhead); and • PIPE – modern buried pipe.
GPperiod	This should be the period code, including one of the following: • UND – undated;

Field	Description
	• PREH – prehistoric; • PAL – Palaeolithic; • MES – Mesolithic; • NEO – Neolithic; • BA – Bronze Age; • IA – Iron Age; • RB – Roman; • EMED – early medieval; • MED – medieval; • PMED – post-medieval; and • MOD – modern.
GPfeatureID	This should be the name of the geophysical feature/feature group, in the format *CAxx_GPnnn.zzz*, e.g. *MA01_GP001.001*.
Easting	This should be the integer value of the easting coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Northing	This should be the integer value of the nothing coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Shape_Length	Automatically populated length in metres
Shape_Area	Automatically populated areas in metres

Table A 6: Geophysical survey data; polygon boundaries to the geophysical survey areas (HIS_ORI_XXXX_CH_GeoPhysSurveyArea_Ply)

Field	Description
OBJECTID	Unique identifier (this is automatically populated)
Contract	The name of the contract that the record is taken against (e.g. C861)
Company	The name of the company that the record is taken against (e.g. ARP)
StaffInit	This is the name of the GIS processor
CapturDate	This is the date that the record is captured
GazetteerID	N/A
ChngeAncest	This is the stage of the project in which the data is supplied for
Route	Leave blank
eB_Document	This is the EB reference number (e.g. HS2-HS2-GI-GDD-000-000001)
ESDB_Link	This is a html link to the EB document
HS2_DateDelivery	Leave blank
HS2_Processor	Leave blank
CreatedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is created.
CreatedBy	This should be automatically populated through Track Editor. This should populate your windows name credentials.
LastEditedBy	This should be automatically populated through Track Editor. This should populate the last person who edited the record through windows name credentials.
LastEditedAt	This should be automatically populated through Track Editor. This should populate the date of when the record is modified.
ChngeAncestDef	This is the definition of the Change Ancestry Field

Field	Description
GeoPhysSiteID	This should be the name of the geophysical survey area/site, in the format *CAxx_GPnnn*, e.g. *MA01_GP001*.
Easting	This should be the integer value of the easting coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Northing	This should be the integer value of the nothing coordinate in metres (British National Grid projection, GCS_OSGB_1936)
Shape_Length	Automatically populated length in metres
Shape_Area	Automatically populated areas in metres

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High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA
Freephone: 08081 434 434
Minicom: 08081 456 472
Email: HS2enquiries@hs2.org.uk