

A303 Amesbury to Berwick Down

Archaeological Geophysical Survey Design Brief

Arup Atkins Joint Venture

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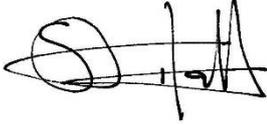
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1 Summary

- 1.1.1 This design brief sets out the requirements for an archaeological geophysical survey to inform the PCF Stage 2 Options Assessment Phase for the A303 improvement scheme. The brief will be used to develop a Written Scheme of Investigation (WSI) by an archaeological contractor who will carry out the survey. The survey will assess the potential for undiscovered buried archaeological remains to survive within the area identified for potential tunnel options and include associated preliminary construction works areas between Amesbury and Berwick Down.
- 1.1.2 Six specific survey locations are proposed based on the potential for future enabling and construction impacts associated with these options to directly affect the Avebury and Stonehenge World Heritage Site (WHS) (specifically within the Stonehenge WHS). A further two survey locations are proposed to cover possible waste soil relocation sites adjacent to Winterbourne Stoke. These eight survey areas do not constitute the total envisaged survey requirements for the options screening process, which may require widening in due course based on further desk-based research and screening exercises undertaken for PCF Stage 1.
- 1.1.3 A combination of dual survey methods are proposed based on advice from Historic England and previous survey results within the WHS indicating significantly greater confidence in cross-technique interpretation.
- 1.1.4 Provisional dates for undertaking the surveys between mid to late April 2016 are proposed subject to statutory and landowner consents.

2 Background

2.1 Purpose

- 2.1.1 A PCF Stage 2 assessment of potential impacts on cultural heritage for the A303 improvement scheme is being undertaken. The first stage is to design and carry out a programme of geophysical survey in order to determine, by non-intrusive technique, what are the likely risks to as yet undiscovered buried archaeological remains that may survive along the approximate route options corridor. The information will be one part of a larger data gathering exercise that will inform design proposals and wider environmental disciplines for selection of the final route options.
- 2.1.2 The surveys will be sited in an area of high archaeological importance, both inside and outside of the WHS boundary. Within the WHS itself there over ninety scheduled monuments set within its prehistoric landscape, which UNESCO has determined to be of Outstanding Universal Value under criteria (i, ii & iii). As such any impact on buried archaeological remains within the WHS has the potential to adversely affect the OUV of the WHS. The aims of the surveys are therefore to:
- Determine the presence/absence of potentially significant archaeology within the WHS and wider proposed assessment corridors.
 - Define the extent and character of any features within each survey site.

- Produce an interpretative report on the findings of the survey to inform the options screening process.

2.2 Location

- 2.2.1 The location of the eight geophysical surveys are displayed in Appendix A, Figure 1 below.
- 2.2.2 The majority of surveys are located to the south of the A303 and include SE1 and SW1 to SW4. A further three areas are located north of the A303, covering NE1 to NE2 and NW4. These locations reflect current tunnel options route alignments, together with possible soil management/storage option areas. Details of the location, measured area and number of scheduled monument within these sites are summarised in the table below:

Table 1. Site Survey Information

Survey Map Reference	OS National Grid Reference	Measured Area (m ²)	Known Designated Heritage Assets
SW1	SU 10872 41293	455,450	3
SW2	SU 10159 40708	183,250	0
SW3	SU 09412 40989	691,590	2
SW4	SU 06978 40693	222,560	0
SE1	SU 14214 41855	189,410	5
NE1	SU 15587 42248	51,290	0
NE2	SU 14359 42202	460,990	9
NW4	SU 07387 41087	54,020	0

2.3 Archaeological context

- 2.3.1 Four of the survey sites are situated within the WHS (SW2 SW1 SE1 and NE2). The other four (SW4, NW4, SW3 and NE1) are situated outside of the boundary. All survey sites are located within a landscape containing nationally and regionally important multi-period archaeology. Historic England’s National Mapping Programme (aerial photographic interpretation) shows the area contains a high density of archaeological features surrounding the current A303, many of which are likely to be of national and possibly even international significance in terms of their contribution to the Avebury and Stonehenge World Heritage Site’s ‘Outstanding Universal Value’ (OUV).
- 2.3.2 Historic England has undertaken a wide range of geophysical survey techniques across the WHS. The results have been reported and provide sufficiently robust information to inform the options screening process in this area and are therefore excluded from this survey programme. A further series of geophysical surveys and field evaluations have been undertaken across the former proposed Winterbourne Stoke northern bypass route (map ref. NW1-NW3) and likewise do not require surveying at this stage.

2.4 Site conditions

- 2.4.1 The area is situated on chalk down land and is in an area typically well-drained. The areas to be surveyed are mostly flat high-land, though SE1 and the area around West Amesbury has some gradient changes due to the River Avon.

3 Proposed Geophysical Survey

3.1 Methodology

- 3.1.1 The surveys will be carried out using a combination of the following geophysical survey methods:
- Magnetometry
 - Ground Penetrating Radar (GPR)
- 3.1.2 GPR will be used only to provide additional finer screening of suspected features through review of the magnetometry survey and any corroborating information. This will be particularly useful for assessing areas at depths below +1m where the magnetometry is significantly less effective in recording smaller features.
- 3.1.3 The survey areas will be tied into the National Grid using Global Positioning System (GPS) survey equipment. Grid intersections will have an accurate location of $\pm 0.1\text{m}$.

Magnetometry

- 3.1.4 Magnetometry surveys will be conducted over 30m x 30m grids with a sample interval of 0.2m along transects at 1m spacings. This will produce a sample density of $\sim 0.2\text{m}$ by 0.5m resulting in 10 readings per m^2 . Sensors sample rates will depend on method of surveying. For example if assuming 1m/s for a walking survey, then 5hz (reading per second) would be necessary. A sensor sample rate of 16Hz will be set if utilizing ATV for data collection travelling as 3.2m/s.
- 3.1.5 Navigation and positional control will be achieved using a Global Navigation Satellite System (GNSS) or an Real Time Kinematic (RTK) GPS to locate grid nodes to an accuracy of greater than 0.1m as required by Historic England guidelines *Geophysical Survey in Archaeological Field Evaluation, April 2008*.
- 3.1.6 A selection of grid points will be re-occupied after the data has been acquired and checked to confirm the accuracy of the stake location and that no disturbance has occurred.

Ground Penetrating Radar

- 3.1.7 Data will be acquired at a 0.075m x 0.075m sample interval across a continuous wave stepped frequency range from 60MHz to 2.99GHz in 4MHz increments using a dwell time of 2ms.
- 3.1.8 A GNSS will be used to provide continuous positional control for the survey.

Survey Reporting

3.1.9 The processing of data is to be kept to a minimum and raw data will not be altered. All reporting will be in line with Historic England’s guidelines (2008).

3.2 Programme

3.2.1 The following tables set out a draft programme of geophysical surveys, to be undertaken during April and May 2016. Landowner(s) are confirmed for each site together with anticipated fieldwork duration.

Table 2. Survey inside the WHS

Location to be surveyed	Estimated Duration
NE2 (Park Farm & National Trust)	Takes approx. 1-3 days per survey area, but no return visit necessary afterwards.
SE1 (Park Farm)	Takes approx. 1-2 days, but no return visit necessary afterwards.
SW1 (Boreland Farm)	Takes approx. 1-3 days, but no return visit necessary afterwards
SW2 (Druid’s Lodge Estate)	Takes approx. 1-3 days per survey area, but no return visit necessary afterwards

Table 3. Survey outside the WHS

Location to be surveyed	Estimated Duration
NE1 (unknown land owner)	Takes approx. 1-2 days, but no return visit necessary afterwards.
SW3, SW4 (unknown land owner)	Takes approx. 1-5 days per survey area, but no return visit necessary afterwards
NW4 (unknown land owner)	Takes approx. 1-5 days, but no return visit necessary afterwards

Appendix A - Geophysical Survey Map

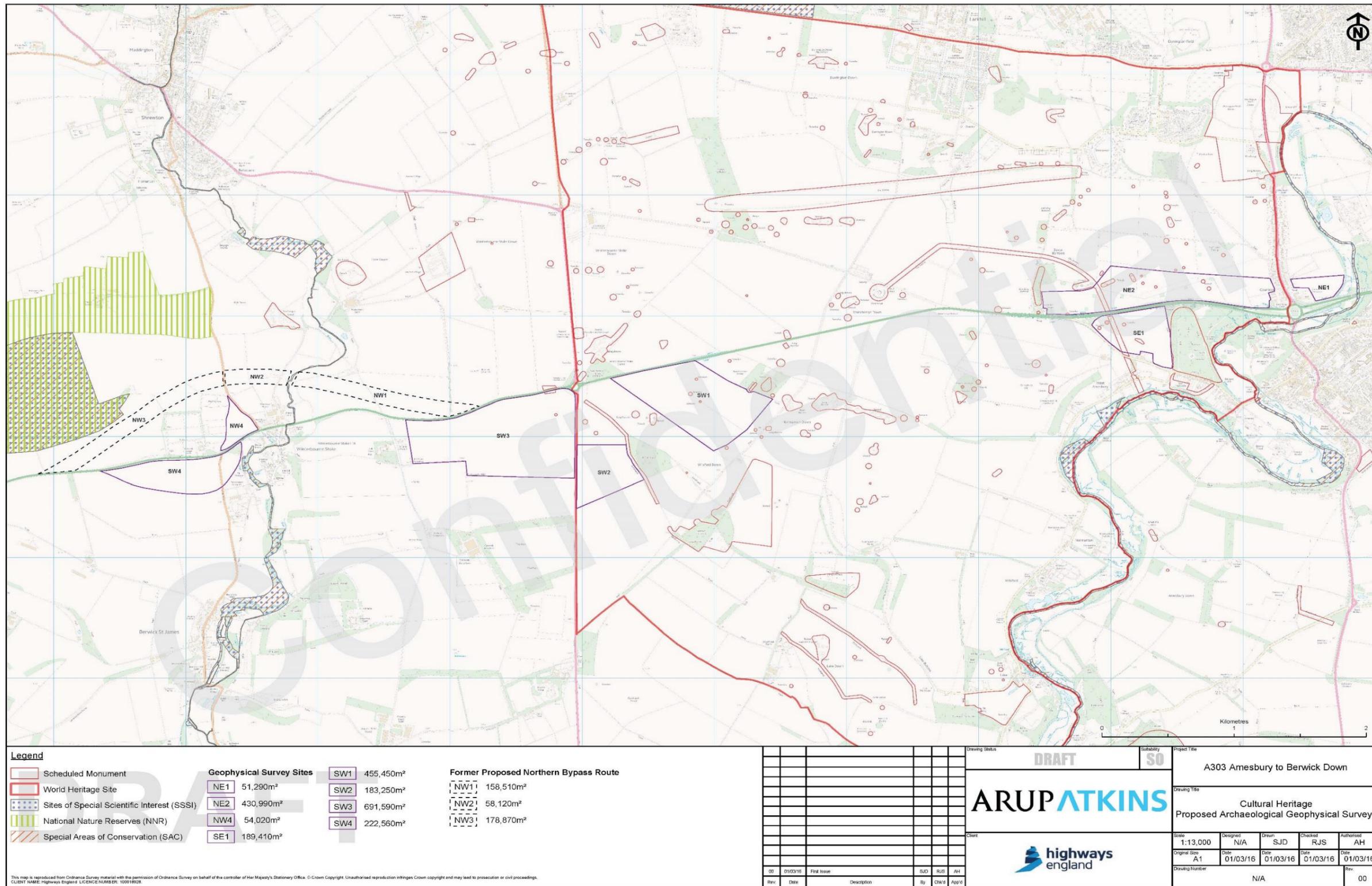


Figure 1 Cultural Heritage
Proposed Archaeological Geophysical Surveys

Abbreviations List

HE	Historic England
WHS	World Heritage Site
OUV	Outstanding Universal Value
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
RTK	Real Time Kinematic

References

Historic England (2008), *Geophysical Survey in Archaeological Field Evaluation*,
<https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/>