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Remote Sensing

Stonehenge Southern WHS Survey: Normanton Down, Wiltshire, Report on Geophysical Surveys, October and November 2015

Neil Linford, Paul Linford and Andrew Payne

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STONEHENGE SOUTHERN WHS SURVEY, NORMANTON DOWN, WILTSHIRE

REPORT ON GEOPHYSICAL SURVEYS, OCTOBER AND NOVEMBER 2015

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SUMMARY

Caesium magnetometer and Ground Penetrating Radar (GPR) surveys were conducted over Normanton Down, Wilsford cum Lake, Wiltshire, as part of the Stonehenge World Heritage Site (SWHS) Southern Landscape Project. The vehicle towed caesium magnetometer survey (74.7ha) covered all accessible areas over a large portion of the down, including the stone curlew reserve out of the nesting season, and confirmed the majority of known monuments on the down. However, some monuments identified from cropmark evidence appear to have suffered from plough damage where they were not protected by fencing prior to the reversion from arable to grass. High sample density GPR survey (16.5ha) covered a number of extant monuments and areas of interest identified from the magnetic data, including the North Kite earthworks where a number of buried stones or pits appear underneath the course of the northern ditch.

CONTRIBUTORS

The geophysical fieldwork was conducted by Neil Linford, Paul Linford and Andrew Payne.

ACKNOWLEDGEMENTS

The authors are grateful to the landowners Rachel Hosier and Peter Bailey, who kindly allowed access for the survey to take place, and to the Royal Society for the Protection of Birds (RSPB) for coordinating our activity on the site outside of the stone curlew nesting season.

ARCHIVE LOCATION

Fort Cumberland, Portsmouth.

DATE OF SURVEY

The fieldwork was conducted between 19th to 23rd October and 2nd to 6th November 2015 and the report completed on 18th March 2016. The cover image shows the caesium magnetometer survey in progress over the North Kite, with the partially surviving earthwork bank visible in the background.

CONTACT DETAILS

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INTRODUCTION

Caesium magnetometer and Ground Penetrating Radar (GPR) surveys were conducted over Normanton Down, Wilsford cum Lake, Wiltshire, as part of the Stonehenge World Heritage Site (SWHS) Southern Landscape Project (RASMIS 7238, Historic England Action Plan 2.2.2. Discover our hidden heritage), which aims to provide advance intelligence of any potential nationally important undesignated sites within the southern SWHS, following the Government announcement in December 2014 to prioritise a road improvement scheme for the A303 trunk road (Bowden 2015b). In addition, there are significant Heritage at Risk and Development Management drivers as our understanding of the resource within the southern SWHS is less well developed than that to the north of the current A303, where landscape-scale research projects have taken place within the recent past (Bowden 2015a).

The current survey was conducted during a first tranche of fieldwork in autumn 2015 that included available sites selected from within the Priority 1 study area (Figure 1, Linford *et al.* 2015b, 2015c, 2015d). This report provides an initial summary of the geophysical survey results for circulation before compilation of a more synthetic overview report, drawing out and integrating key findings from the project as a whole.

A group of 14 Bronze Age round barrows are found at the site forming the Normanton Down barrow cemetery (AMIE UID 219537) on a ridge to the north, which also includes the Bush Barrow (AMIE UID 943060) to the west and a further group of eight bowl, disc and saucer barrows to the east. Further Bronze Age barrows are found to the south of the main group together with a Neolithic Long Barrow (AMIE UID 219705) and mortuary enclosure (AMIE UID 219834), linear earthworks and the North Kite earthworks (AMIE UID 219578) to the south of the survey area. A more detailed description of the Normanton Down barrows within the wider landscape is provided by Barrett and Bowden (2010).

The site is situated on Upper Cretaceous Seaford Chalk geology over which shallow well drained calcareous silty soils of the Andover 1 Association have developed, with head deposits of clay, sand, silt and gravel in small coombes and valleys (Geological Survey of England and Wales 1950; Soil Survey of England and Wales 1983). The site slopes gently from the Normanton Down barrow group to the south and east, and was down to grass used for the stone curlew reserve to the west and as grazing over Springbottom Farm to the east. Some areas used previously for pig rearing were too rough to be surveyed. Weather conditions during the field work were mixed with some unsettled periods of blustery rain.

METHOD

Magnetometer survey

Magnetometer data was collected along the instrument swaths shown on Figure 2 using an array of six Geometrics G862 caesium vapour sensors mounted on a non-magnetic sledge (Linford *et al.* 2015a). The sledge was towed behind a low-impact All Terrain Vehicle (ATV) which housed the power supply and data logging electronics. Five sensors were mounted 0.5m apart in a linear array transverse to the direction of travel and, vertically, ~0.25m above the ground surface. The sixth was fixed 1.0m directly above the centre of this array to act as a gradient sensor. The sensors sampled at a rate of 25Hz resulting in an along-line sample density of ~0.15m given typical ATV travel speeds of 3.5-4.0m/s. As the five non-gradient sensors were 0.5m apart, successive survey swaths were separated by approximately 2.5m to maintain a consistent traverse separation of 0.5m. Navigation and positional control were achieved using a Trimble R8 Global Navigation Satellite System (GNSS) receiver mounted on the sensor platform 1.75m in front of the central sensor and a second R8 base station receiver established using the Ordnance Survey VRS Now correction service. Sensor output and survey location were continuously monitored during acquisition to ensure data quality and minimise the risk of gaps in the coverage.

After data collection the corresponding readings from the gradient sensor were subtracted from the measurements made by the other five magnetometers to remove any transient magnetic field effects caused by the towing ATV. The median value of each instrument traverse was then adjusted to zero by subtracting a running median value calculated over a 50m 1D window (see for instance Mauring *et al.* 2002). This operation corrects for slight biases added to the measurements owing to the diurnal variation of the Earth's magnetic field and any slight directional sensitivity of the sensors. A linear greyscale image of the combined magnetic data is shown superimposed over the base Ordnance Survey (OS) mapping in Figure 4 and minimally processed versions of the range truncated data (± 150nT/m) are shown as trace plots and a histogram equalised greyscale image in Figures 6, 7 and 8 respectively.

In Figure 15 the interpretation of larger anomalies detected by the magnetic survey was conducted by expert visual inspection but the smaller pit anomalies were too numerous to be amenable to this approach. Hence, an automated algorithm based on a refinement of the method described by Blakely and Simpson (1986) was used to determine the pit outlines shown in the figure.

Ground Penetrating Radar survey

A 3d-Radar MkIV GeoScope Continuous Wave Stepped-Frequency (CWSF) Ground Penetrating Radar (GPR) system was used to conduct the survey collecting data with a multi-element GX1820 vehicle towed, ground coupled antenna array (Linford *et al.* 2010). A roving Trimble R8 Global Navigation Satellite System (GNSS) receiver, together with a second R8 base station receiver established using the Ordnance Survey VRS Now correction service, was mounted on the GPR antenna array to provide continuous positional control for the survey collected along the instrument swaths shown on Figure 3. Data were 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 for the survey of Springbottom Farm and 6MHz for the Royal Society for the Protection of Birds (RSPB) stone curlew reserve, both using a dwell time of 2ms. A single antenna element was monitored continuously to ensure data quality during acquisition together with automated processing software to produce real time amplitude time slice representations of the data as each successive instrument swath was recorded in the field (Linford 2013).

Post acquisition processing involved conversion of the raw data to time-domain profiles (through a time window of 0 to 70ns), adjustment of time-zero to coincide with the true ground surface, background and noise removal, and the application of a suitable gain function to enhance late arrivals. Representative profiles from the GPR survey are shown on Figure 9. To aid visualisation amplitude time slices were created from the entire data set by averaging data within successive 2.4ns (two-way travel time) windows for Springbottom Farm and 3.3ns for the RSPB reserve (e.g. Linford 2004). An average sub-surface velocity of 0.0968m/ns was assumed following constant velocity tests on the data, and was used as the velocity field for the time to estimated depth conversion. Each of the resulting time slices, shown as individual greyscale images, therefore represents the variation of reflection strength through successive ~0.16m intervals from the ground surface in Figures 10-12, and ~012m in Figures 13 and 14. Further details of both the frequency and time domain algorithms developed for processing this data can be found in Sala and Linford (2012).

Due to the size of the resultant data set a semi-automated algorithm has been employed to extract the vector outline of significant anomalies shown on Figure 16. The algorithm uses edge detection to identify bound regions followed by a morphological classification based on the size and shape of the extracted anomalies. For example, the location of possible pits is made by selecting small, sub circular anomalies from the data set.

RESULTS

Magnetometer survey

A graphical summary of the significant magnetic anomalies, [**m75-103**] discussed in the following text, superimposed on the base OS map data, is provided in Figure 15.

Despite a relatively weak magnetic response significant anomalies have been detected, although there is some modern disturbance due, in part, to a number of ferrous agricultural water supply pipes [**m75**] that cross the site. Some of the areas previously used for the outdoor pig rearing unit were also too rough to be covered by the survey and it is possible that the concentration of strong, discrete responses [**m76**] is also due to the same source. One of four rectangular game covers [**m77**] shown on the historic mapping is also replicated in the magnetic data (OS Historic County Mapping Series: Wiltshire 1919 - 1939 Epoch 4), together with evidence for a, presumably, brick built well house [**m78**] (OS Historic County Mapping Series: Wiltshire 1843 - 1939 Epochs 1-4).

A prominent EW plough pattern also survives over the Springbottom farm holdings which reverted to down land from arable more recently. Two linear anomalies, one positive [**m79**] and one negative [**m80**], run orthogonal to the main plough pattern and may represent either former field boundaries or headlands. As [**m80**] meets a ferrous water supply to the south it is also possible that this is due to a plastic agricultural pipe run. There is also faint long linear anomaly [**m81**] which correlates with an interrupted ditch (AMIE UID 1365468) of unknown date with traces of a bank at intervals along its length is visible as a cropmark on aerial photographs.

The majority of barrows survive as extant monuments that were too high to be covered by the towed magnetometer system, often with traces of the original ferrous fencing also being replicated in the data, for example at [**m82**] surrounding Wilsford 6 and 7, and the octagonal fence line at [**m83**] around Wilsford 24A. The mound of the Wilsford 12 round barrow (AMIE UID 943184) was low enough to be covered by the survey and revealed an incomplete ditch type response [**m84**], approximately 14m in diameter best defined to the south and west of the monument.

Fragments of the ditches surrounding both Wilsford 27 and 28 (AMIE UID 943209 and 943220) are evident at [**m85**] and [**m86**], together with more complete coverage [**m87**] and [**m88**] over the lower mounds of Wilsford 28A and 29 (AMIE UID 943221 and 943223). Little additional detail is evident from [**m87**] and [**m88**], perhaps due to the previous excavation of both barrows by Colt Hoare in the early C19th and the more recent apparent accumulation of ferrous litter. Despite being close to the ferrous stock fence around the edge of

the field the majority of ditch [**m89**] surrounding Wilsford 31 (AMIE UID 219558) has been detected, although the central anomalies may again relate to antiquarian excavations. Perhaps more remarkably a magnetic anomaly [**m90**] associated with the rectangular Neolithic mortuary enclosure (AMIE UID 219834) has been revealed, although the response is degraded by the presence of two buried pipes and the apparent incorporation of ferrous material into the northern ditch circuit, presumably following the complete excavation of the monument in 1959.

In the field to the east, the complete ditch circuits surrounding Wilsford 24A [**m91**] and the Wilsford (South) 25 bell barrow [**m92**] have been recorded, together with a fragment [**m93**] around Wilsford (South) 26 (AMIE UIDs 933100, 933039 and 933042 respectively). There is, however, no convincing magnetic anomaly associated with the location of the Wilsford (South) 24b bowl barrow (AMIE UID 219567) which appears not to have survived intensive ploughing. The bowl barrow (AMIE UID 1363368) recorded by aerial photography immediately south of Wilsford 23 together with a series of additional linear ditch and pit alignments shown on cropmarks have also failed to produce any discernible magnetic response.

The site falls into a dry valley to the south where the ploughed out remains of the North Kite earthworks are found on the boundary between Normanton and Wilsford Downs. A broad rectilinear anomaly [**m94**] marks the course of the ditch together with a more subtle response [**m95**] to a possible outer palisade. The eastern return of the North Kite has been obscured by the presence of a ferrous pipe and falling within one of the inaccessible areas previously used for pig rearing, however it is possible that part of the palisade [**m95**] has been detected. A weak linear anomaly [**m96**] respects [**m94**] from the west and possibly represents a continuation of the long linear earthwork found on the aerial photography, that was also partially recorded over the Diamond field (Linford *et al.* 2015b,; Figure 11, [m25]). The course of [**m96**] continues east, but becomes more obscured by the ferrous litter associated with the pig farm and, with the exception of a possible faint linear fragment [**m97**], appears to have been ploughed out where the cropmark evidence suggests it should cross the field boundary on to Normanton Down (*cf* Figure 17).

The dry valley continues around to the east of the site where a geomorphological anomaly [**m98**] is similar to the response of other Head deposits accumulated in valley bottoms (Linford *et al.* 2009). Some faint, linear and curvilinear anomalies [**m99-102**] in this area may, possibly, represent fragments of a field system together with a tentative sub-circular response [**m103**] which may also be associated with settlement activity.

Ground Penetrating Radar survey

A graphical summary of the significant GPR anomalies, [**gpr70-103**] discussed in the following text, superimposed on the base OS map data, is provided in Figure 16.

Significant reflections have been recorded throughout the 70ns two-way travel time window, although later reflections beyond ~40ns become more highly attenuated. The very near surface data between 0 and 3.3ns (0.0 - 0.16m) has responded to the micro-topography of the site with vehicle and animal ruts [**gpr70**] being particularly evident, for example where the sheep runs coalesce underneath the shelter offered by the hawthorn tree growing on the western bank of the Wilsford 20 disc barrow (Figure 13). Animal burrows [**gpr71**] are visible in the data between 3.3 and 9.9ns (0.16 - 0.48m) and appear to be particularly concentrated on the mounds of the upstanding monuments.

The local geomorphology, presumably gently dipping bands of weathering, marl or flint bedding within the chalk appear as series of high amplitude, amorphous reflectors [**gpr72**] that migrate laterally throughout the amplitude time slices. The orientation of [**gpr72**] varies across the down with the topography, running both parallel to the contours on the flatter ground and orthogonal to them on the steeper slopes. The ferrous agricultural water supply pipes [**m75**] have been replicated in the radar data as high amplitude linear anomalies [**gpr73**], between approximately 16.5 and 23.1ns (0.8 to 1.12m).

The central mound of Wilsford 28 appears as a circular high amplitude anomaly [**gpr74**] on Figure 10 approximately 15m in diameter, with the surrounding ditch [**gpr75**] producing a more complex response. The outer ditch does not appear to be circular, or indeed complete in the deeper time slices, and shows some tentative evidence for the presence of large pit-type anomalies [**gpr76**] approximately 3m across on the berm to the north of the monument. However, some interference due to the original fence line [**gpr77**] protecting the monument from ploughing and the response to Wilsford 28a [**gpr78**], apparently cut into the SE of the larger barrow, limits a more complete interpretation. Both Wilsford 28a [**gpr78**] and Wilsford 29 [**gpr79**] produce less distinct anomalies suggesting whilst both survive as extant earthworks some plough damage has occurred. Whilst a number of linear anomalies [**gpr80**] are found within this area, some of these appear to dip gently between 9.9 and 32.0ns (0.48 to 1.58m) and are perhaps more likely to be associated with the geomorphological responses [**gpr72**]. A series of discrete, pit-type or tree-throw responses are also evident between 13.2 and 32.0ns (0.64 - 1.58m).

Whilst there are no known monuments recorded in the area to the north of the Bush barrow, preliminary results from the magnetic survey suggested the possibility of some anomalous activity. The radar results (Figure 11) show an

extensive network of animal burrows throughout the near surface and it is possible that this may, in part, account for the magnetic response (cf Linford *et al*. 2015d,; Figure 12, [m57]). From 9.9ns (0.48m) onwards a series of high amplitude anomalies [**gpr72**], including a gently dipping linear response [**gpr81**], appear most likely to be related to the geomorphology. Discrete pit-type responses again occur from between 13.2 and 32.0ns (0.64 - 1.58m) and a highly tentative, circular anomaly [**gpr82**], approximately 10m across, is found immediately to the north of [**gpr81**].

The sediments in the bottom of the dry valley to the south of the site have produced diffuse, high amplitude reflections [**gpr83**] on Figure 12, which are cut by both a series of near-surface ruts also evident in the magnetic data, and a low amplitude response to the North Kite ditch [**gpr84**] visible between 9.9 and 51.8ns (0.48 - 2.54m). Anomaly [**gpr84**] is approximately 4m wide and is flanked to the west by a more subtle response [**gpr85**] that correlates with the putative palisade [**m95**]. The course of the long linear earthwork is also evident at [**gpr86**] and is, perhaps, slightly better defined to the east of the North Kite where the corresponding magnetic anomaly [**m96**] is obscured by ferrous detritus. Between 16.5 and 25.4ns (0.78 - 1.26m) the northern arc of [**gpr84**] appears as two parallel 1m wide ditches separated by 4m, before conjoining into a single anomaly. This segment of the North Kite earthwork also contains some evenly spaced, discrete high amplitude reflectors [**gpr87**] between 16.5 and 32.0ns (0.78 to 1.58m), possibly buried stones or pits, approximately 1m in diameter, incorporated into the monument. The geomorphological response partially obscures the data in this area, although two sub-circular anomalies [**gpr88**] may, perhaps, also be significant. A high amplitude, discrete anomaly [**gpr89**] is associated with an area of ferrous disturbance in the magnetic data and seems likely to be of more recent, possibly agricultural origin. A tentative ditch-type anomaly [**gpr90**] is also found to the east of the North Kite, possibly part of a former field system, but does not correlate with any cropmark or earthwork evidence.

The near-surface data between 0.0 and 16.5ns (0.0 - 0.78m) on Figure 13 clearly indicates the impact of ploughing on the Wilsford barrows 19-22 and 24, although the geophysical response to the barrow ditches [**gpr91-95**] appears to have survived better than the plough degraded earthworks, particularly to the south of the group (cf Barrett and Bowden 2010,; Figure 13). The two barrows with the lowest surviving mounds, Wilsford 19 and 24, have produced the most subtle geophysical response [**gpr91**] and [**gpr95**], presumably due to a combination of plough attrition and subsequent fence lines. However both [**gpr91**] and [**gpr95**] appear more ovoid than the recorded earthworks, and are slightly elongated along the line of the barrow group that doesn't seem to be entirely due to the subsequent agricultural damage.

The three disc barrows covered by the survey, Wilsford 20-22, are much better defined by low amplitude responses to the ditches [**gpr92-94**] throughout the data set, together with a high amplitude anomalies due to the surrounding banks of the monuments evident between 9.9 and 28.7ns (0.32 - 1.42m). Some internal detail is visible within [**gpr92-94**] between 35.3 and 48.5ns (1.74 - 2.38m) due, perhaps, to more reflective basal deposits towards the bottom of the narrowing ditch sections. Anomalies within [**gpr92-94**] correlate with the internal platforms and possible antiquarian evidence recorded by Barrett and Bowden (2010). A tentative circular anomaly [**gpr96**] is found between Wilsford 20 and 21 between 6.6 and 16.5ns (0.32 – 0.78m), but is relatively shallow and potentially related to more recent animal activity.

Beyond the main barrow group a highly tentative anomaly [**gpr97**] may indicate the location of Wilsford 24a, but the survival of this monument appears questionable. A distribution of discrete anomalies between 16.5 and 25.4ns (0.78 – 1.26m) are, most likely, related to possible pits or tree-throws, including a linear distribution [**gpr98**] which may partially correlate with the row of seven large pits identified from aerial photography (AMIE UID 1120015). Some fragmented linear anomalies [**gpr99**] are also found and may be associated with linear ditches identified from cropmarks passing through the Normanton barrow group (AMIE UID 1120012). However, both [**gpr98**] and [**gpr99**] follow a similar orientation to the geomorphological responses [**gpr72**] which might complicate the interpretation of this data.

Whilst it is difficult to discern any convincing response to the rectangular game cover at [**m77**] some wall-type anomalies are found at [**gpr100**] on Figure 14 correlate with the remains of the well house [**m78**]. Other fragmentary linear responses [**gpr101-103**] enhance the cropmarks and magnetic anomalies and are suggestive of former field systems or enclosures.

CONCLUSIONS

The caesium magnetometer survey has successfully covered the majority of Normanton Down available for survey, and has largely confirmed the known distribution of monuments. More targeted GPR coverage, provided useful information regarding the survival of the barrows and, in comparison to the recent earthwork survey, illustrates the impact of ploughing on the landscape before the current reversion to pasture. Some of the monuments identified from aerial photography that lie beyond the former fenced areas protected from ploughing have not produced a discernible geophysical response, suggesting their subsurface survival is poor. The long, linear ditches crossing the down shown on cropmarks have proved difficult to identify with one magnetic response appearing to be more suggestive of a track way, although a series of discrete GPR anomalies to the north of the main barrow group may well be related to a Roman pit alignment. Some further detail has also been revealed to

the south of the site over the North Kite earthworks, possibly suggesting the presence of buried stones or pits along the course of the northern ditch segment.

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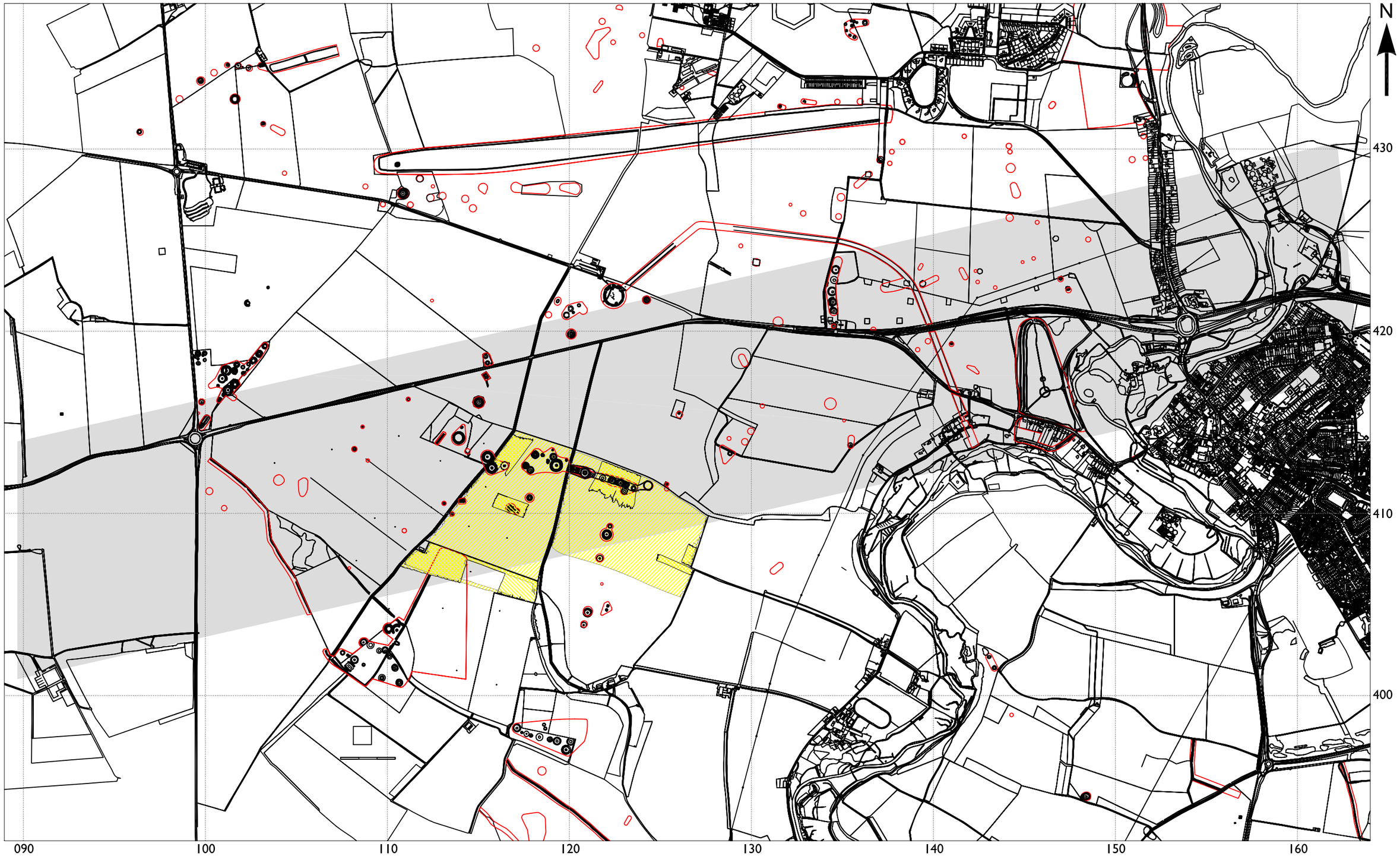
Figure 1

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Location of geophysical survey within Priority 1 project area, October and November 2015



0 1500m
1:20000

Scheduled areas

Stonehenge Southern World Heritage Site Survey: Priority 1 project area

Caesium magnetometer survey area

GPR survey area

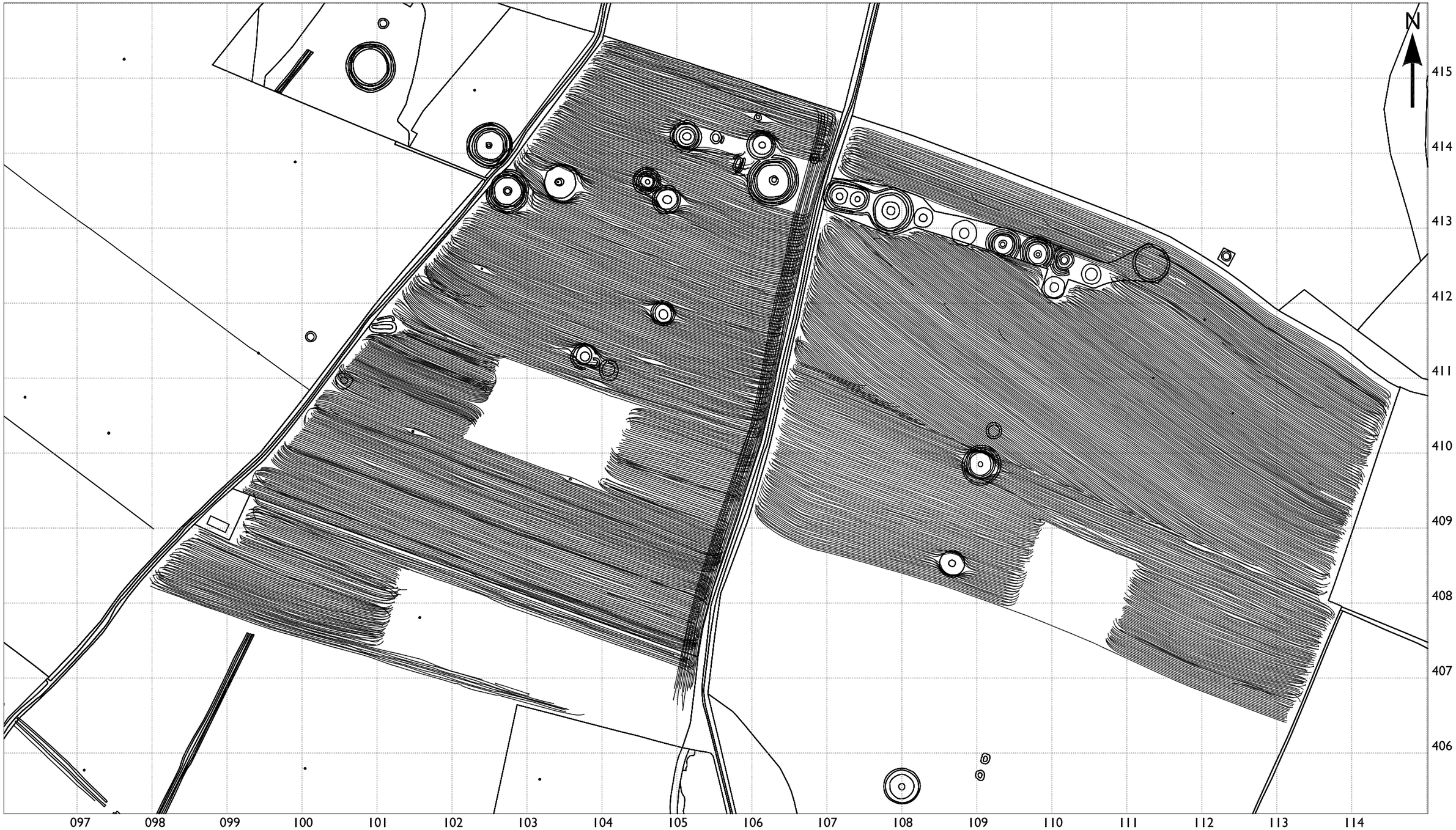
Historic England

Geophysics Team 2015

Figure 2

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Location of caesium magnetometer survey swaths, October and November 2015



0 300m

1:5000

Caesium magnetometer survey swaths

Geophysics Team 2015

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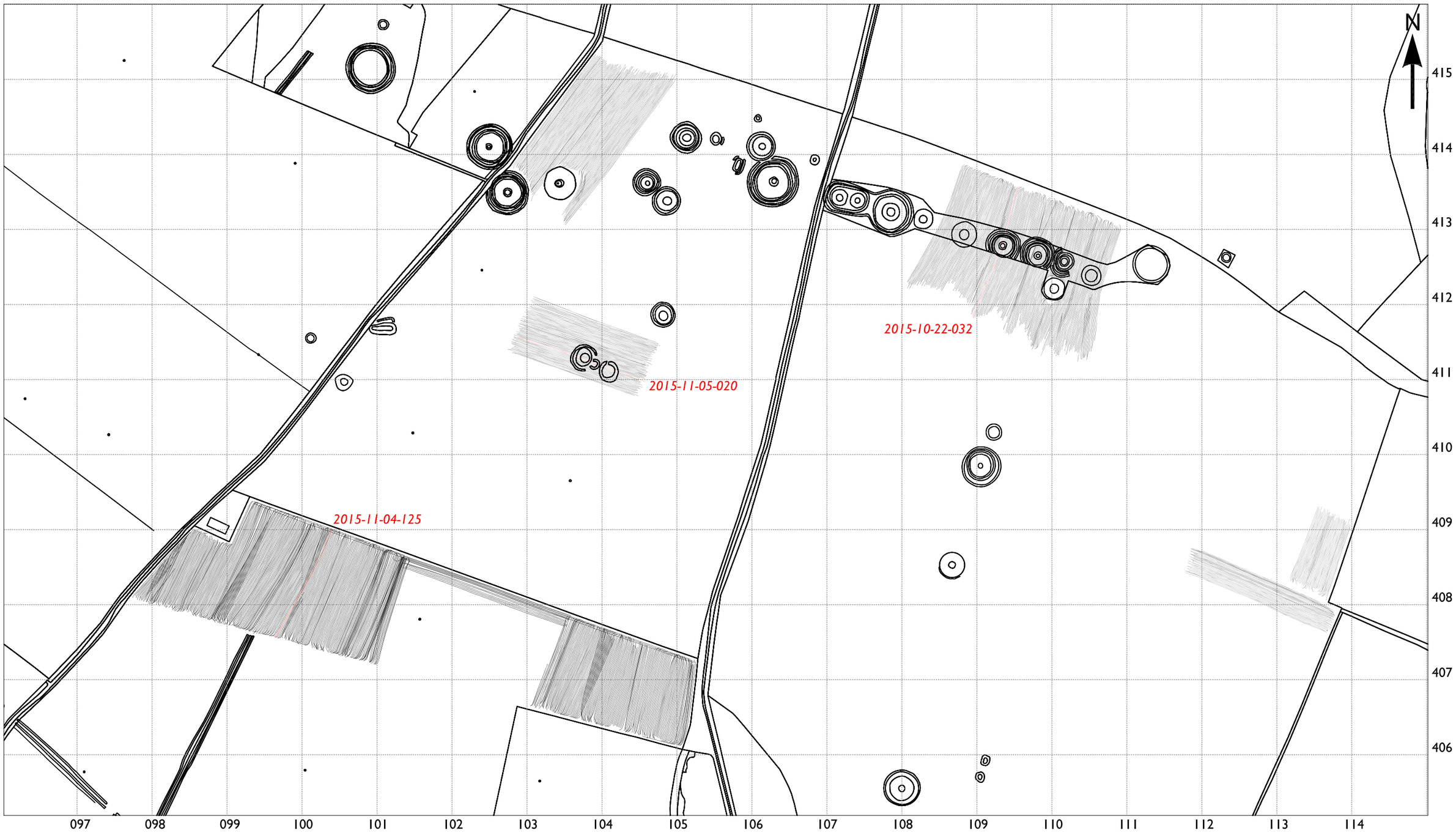
Figure 3

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Location of GPR survey swaths, October and November 2015



0 300m

1:5000

2015-11-04-125 Location of selected GPR profile shown on Figure 9

Ground Penetrating Radar survey swaths

Geophysics Team 2015

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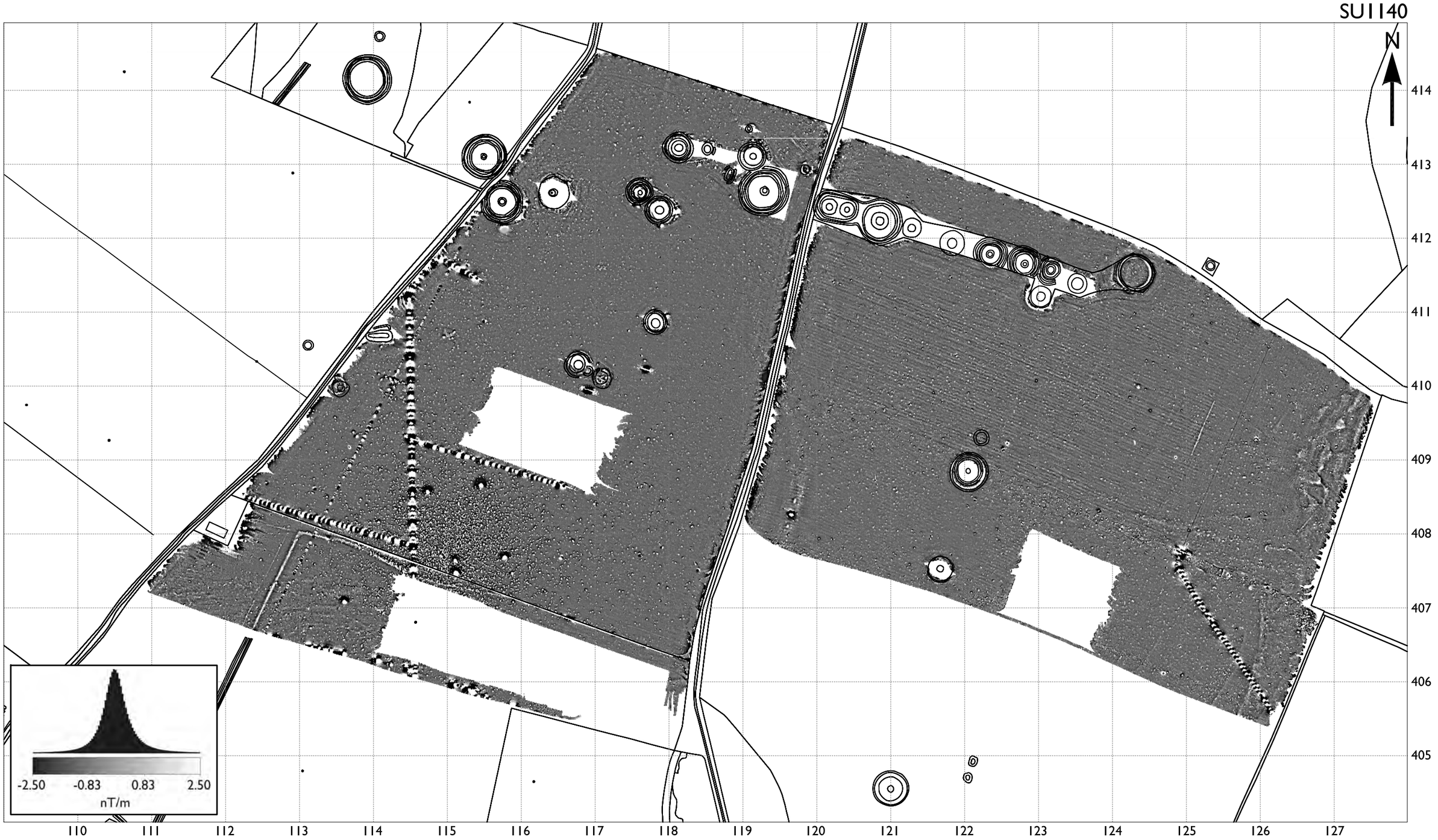
Figure 4

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Location of caesium magnetometer survey, October and November 2015



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1:5000

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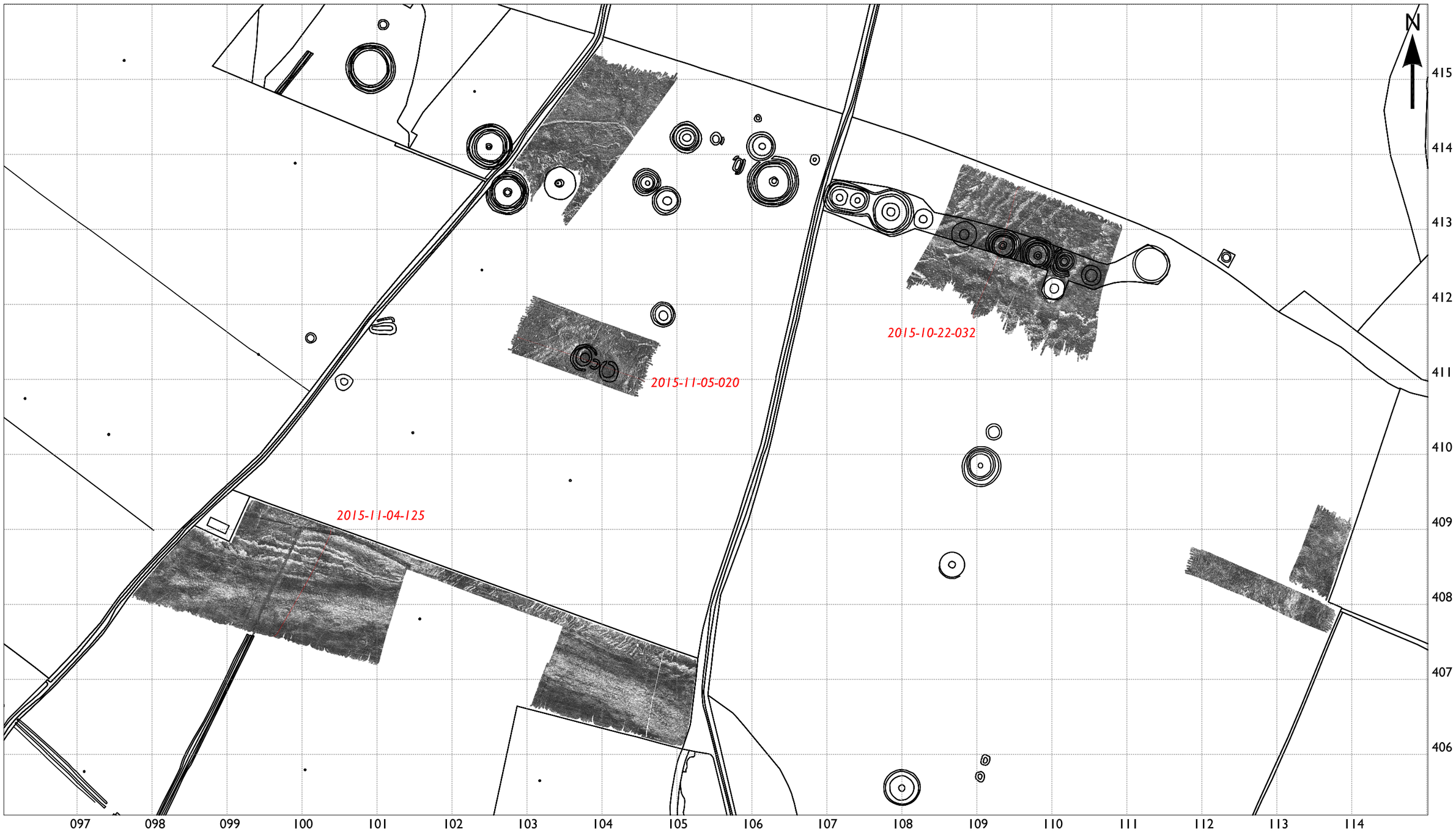
Figure 5

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

GPR amplitude time slices between 16.8 and 19.2ns (0.81 - 0.93m) October, and 22.1 and 25.4ns (1.1 - 1.26m), November 2015



0 300m

1:5000

2015-11-04-125 Location of selected GPR profile shown on Figure 9

Low High
relative reflector strength

Geophysics Team 2015

Historic England

Figure 6

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN (WEST), WILTSHIRE

Caesium magnetometer survey, November 2015

Traceplot of minimally processed caesium magnetometer data

0 150m

1:1250 @ A0

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Figure 7

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN (EAST), WILTSHIRE

Caesium magnetometer survey, October 2015

Traceplot of minimally processed caesium magnetometer data

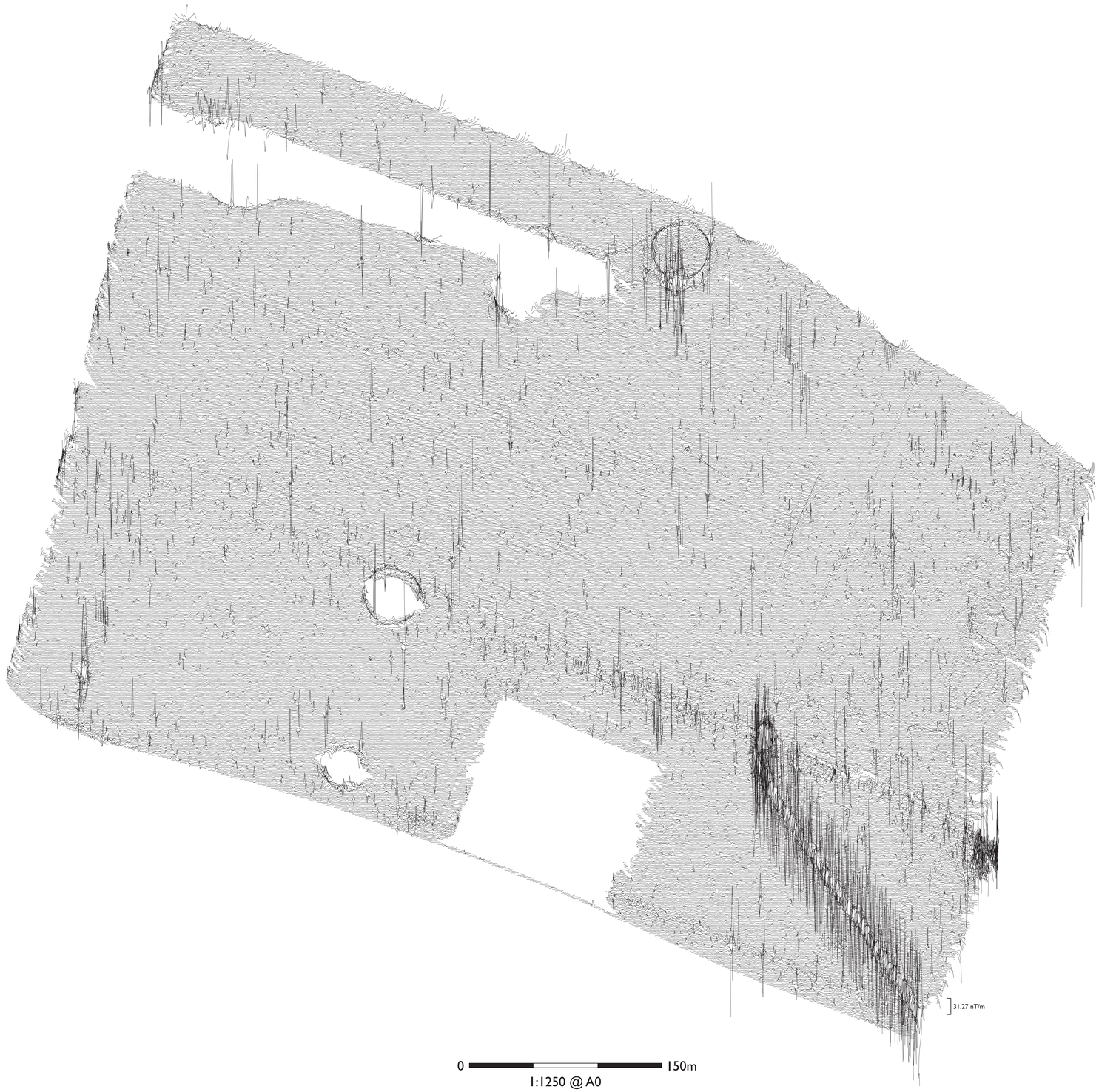

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Figure 8

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Caesium magnetometer survey, October and November 2015

Equal area greyscale image of minimally processed data

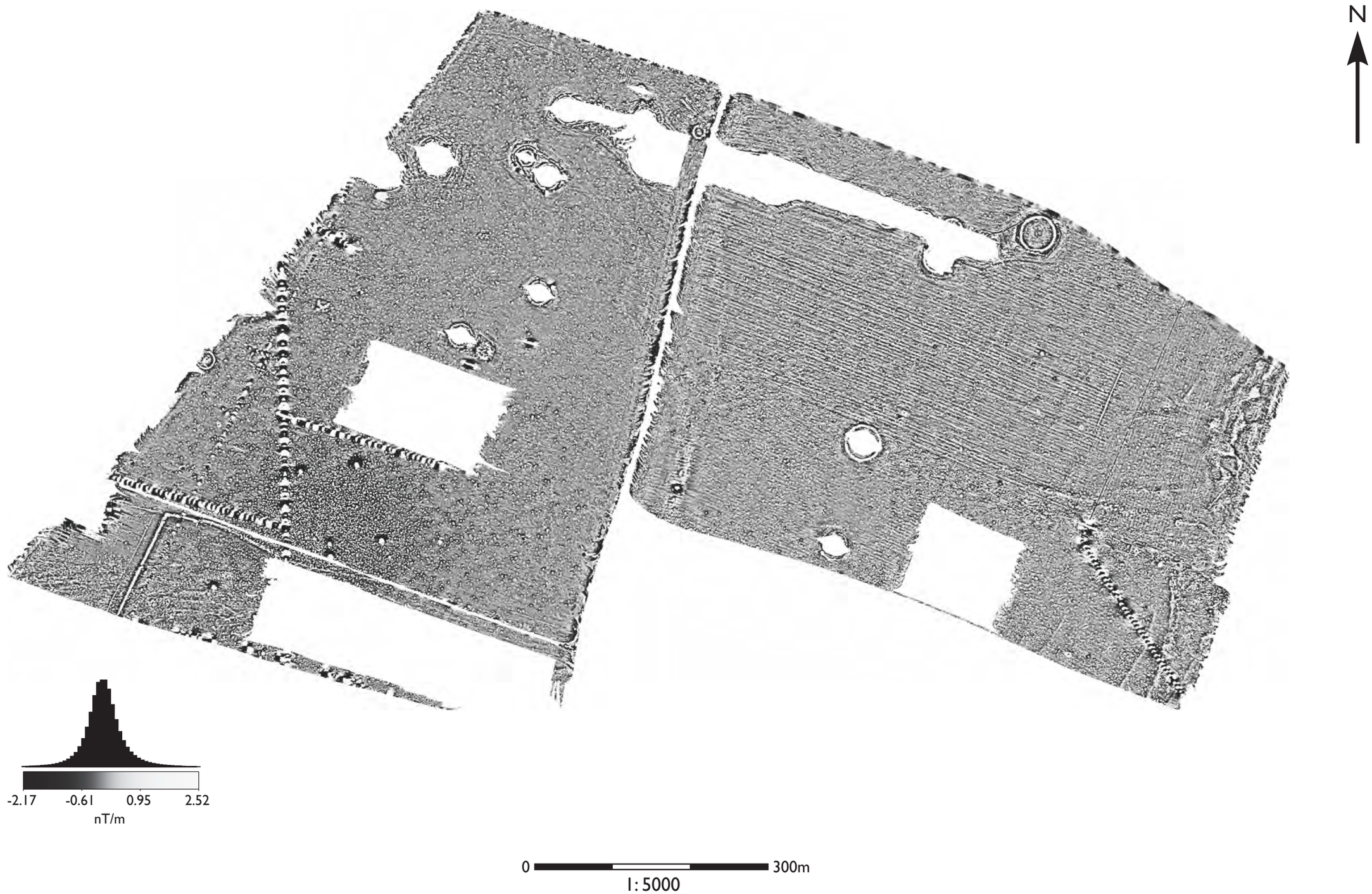

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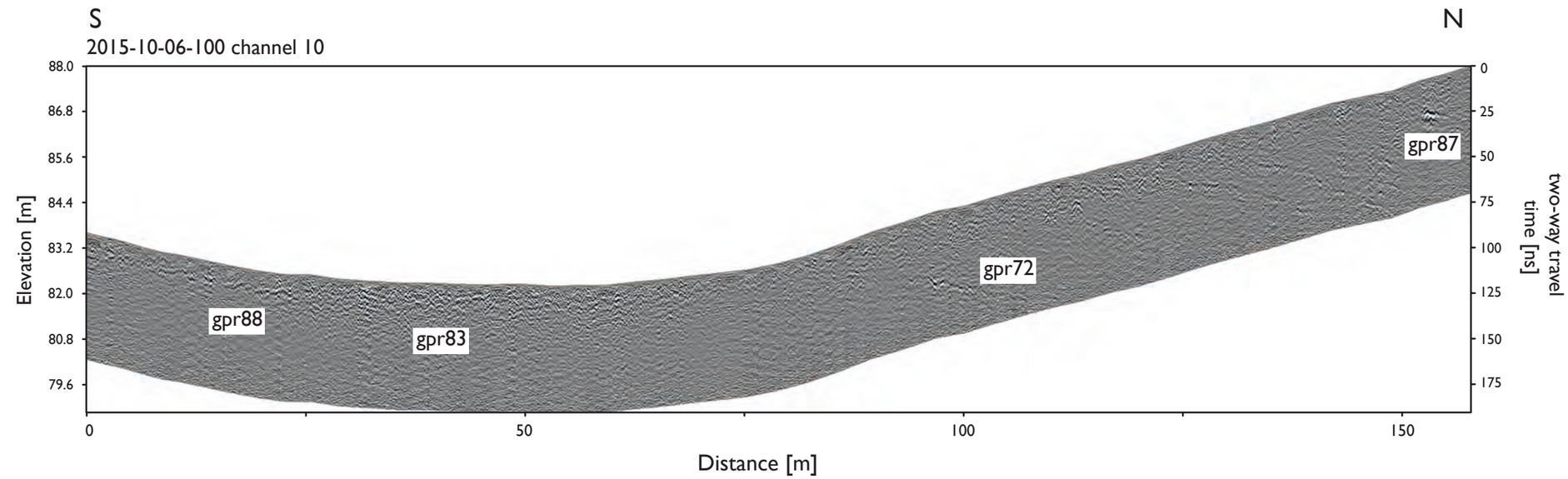
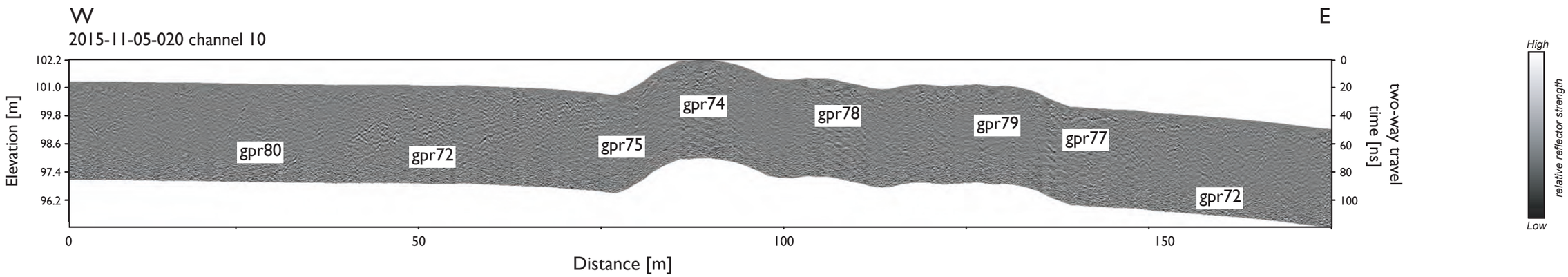
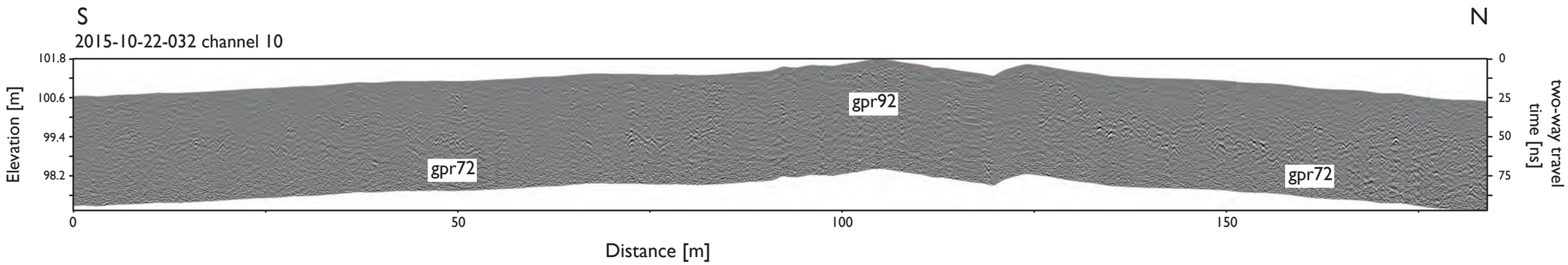
Figure 9

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Topographically corrected GPR profiles, October and November 2015







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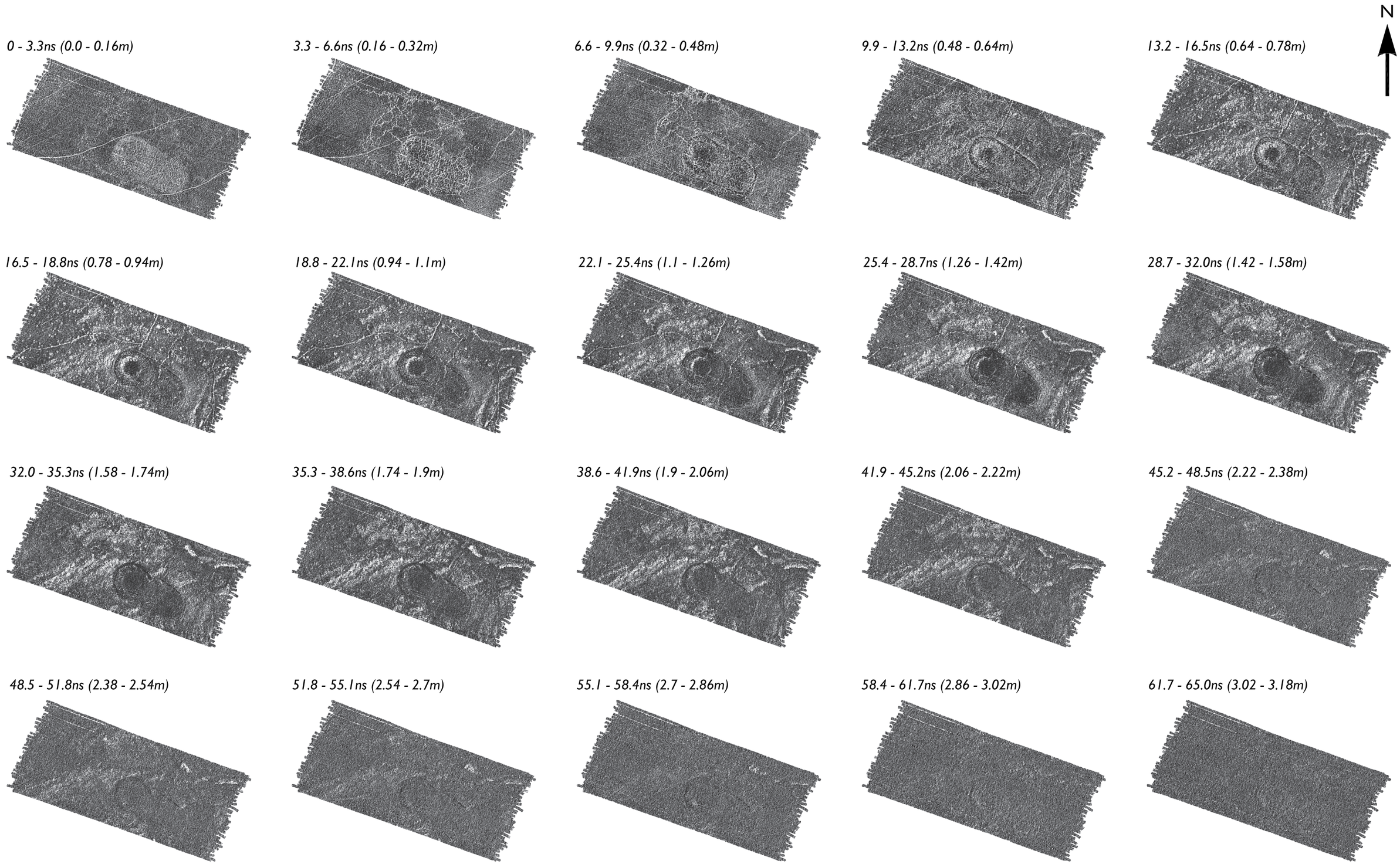
STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

GPR amplitude time slices between 0.0 and 65.0ns (0.0 - 3.18m), Wilsford 28, 28A and 29, November 2015

Figure 10



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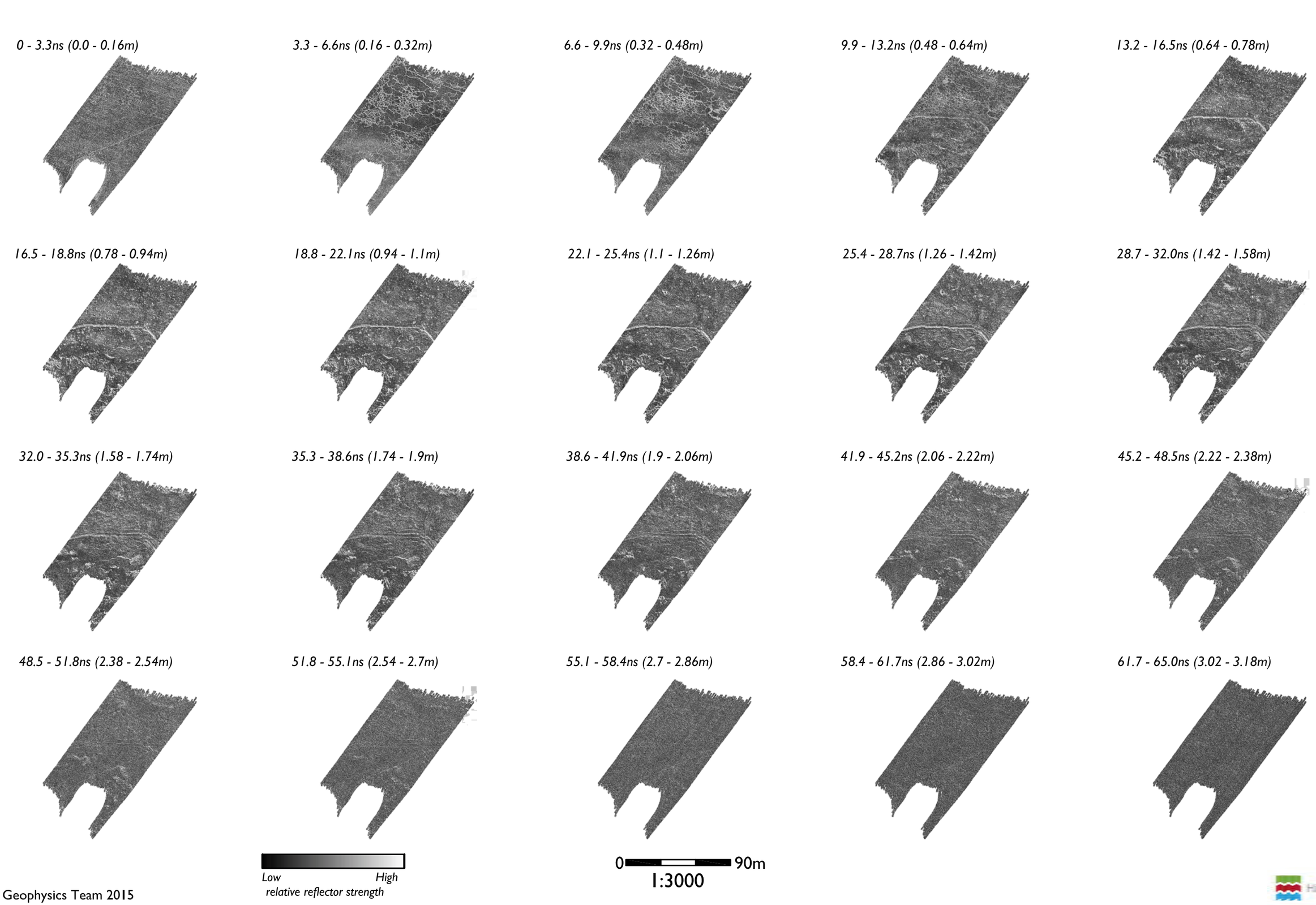
STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

GPR amplitude time slices between 0.0 and 65.0ns (0.0 - 3.18m), Bush Barrow, November 2015

Figure 11



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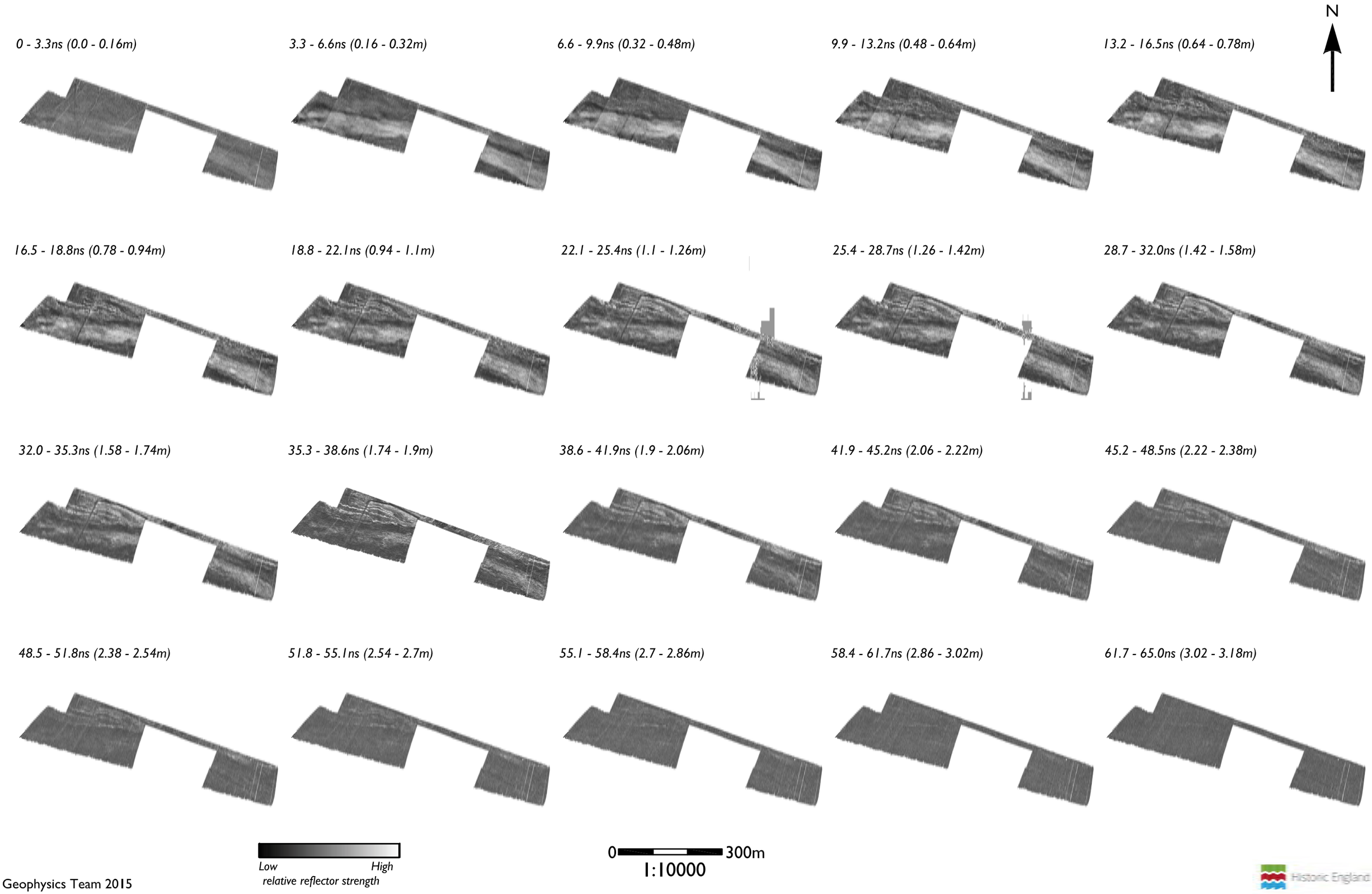
STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

GPR amplitude time slices between 0.0 and 65.0ns (0.0 - 3.18m), North Kite, November 2015

Figure 12



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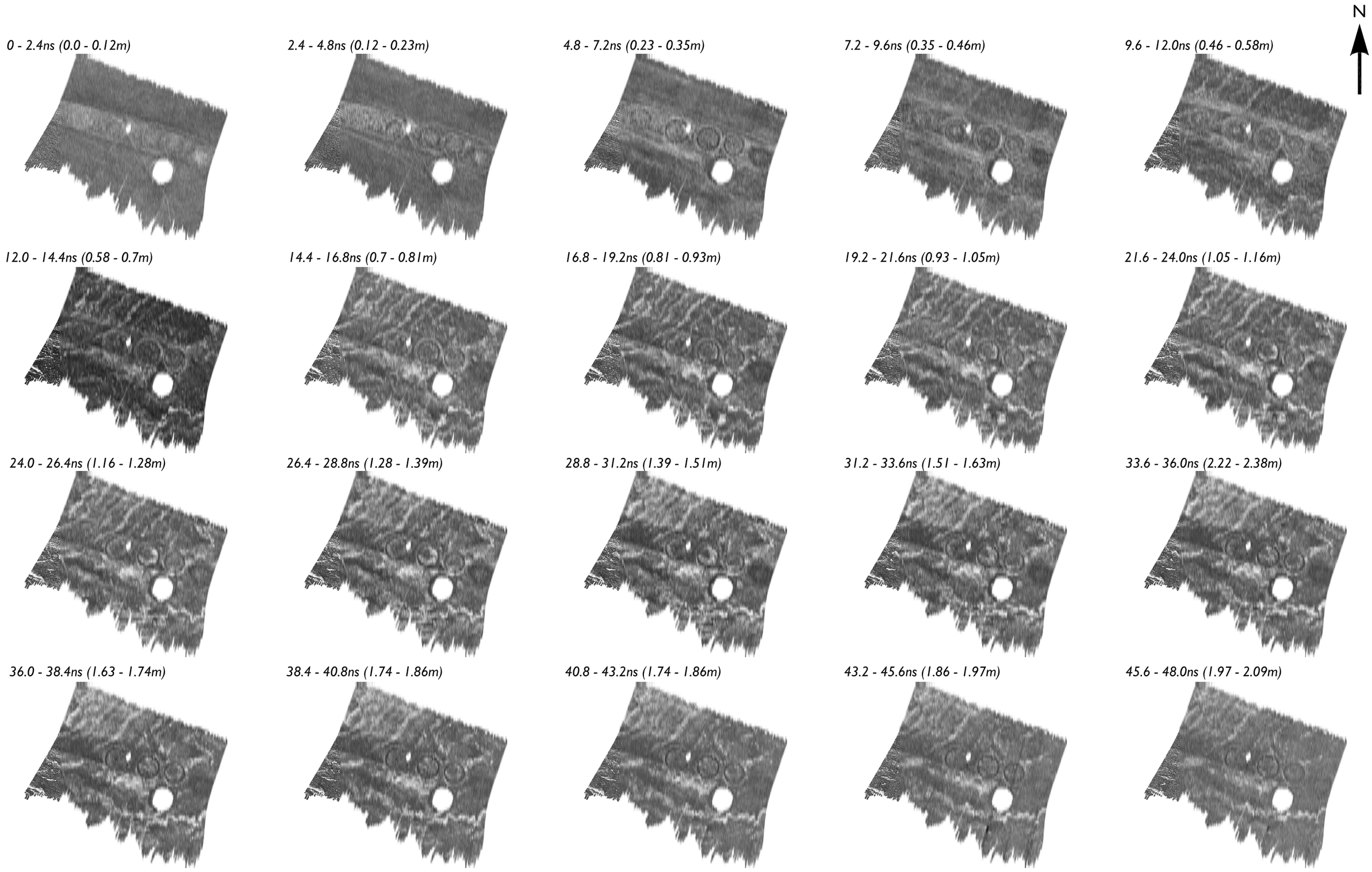
STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Figure 13

GPR amplitude time slices between 0.0 and 48.0ns (0.0 - 2.09m), Wilsford 19-22 and 24, October 2015



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STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Figure 14

GPR amplitude time slices between 0.0 and 48.0ns (0.0 - 2.09m), Normanton Down East, October 2015

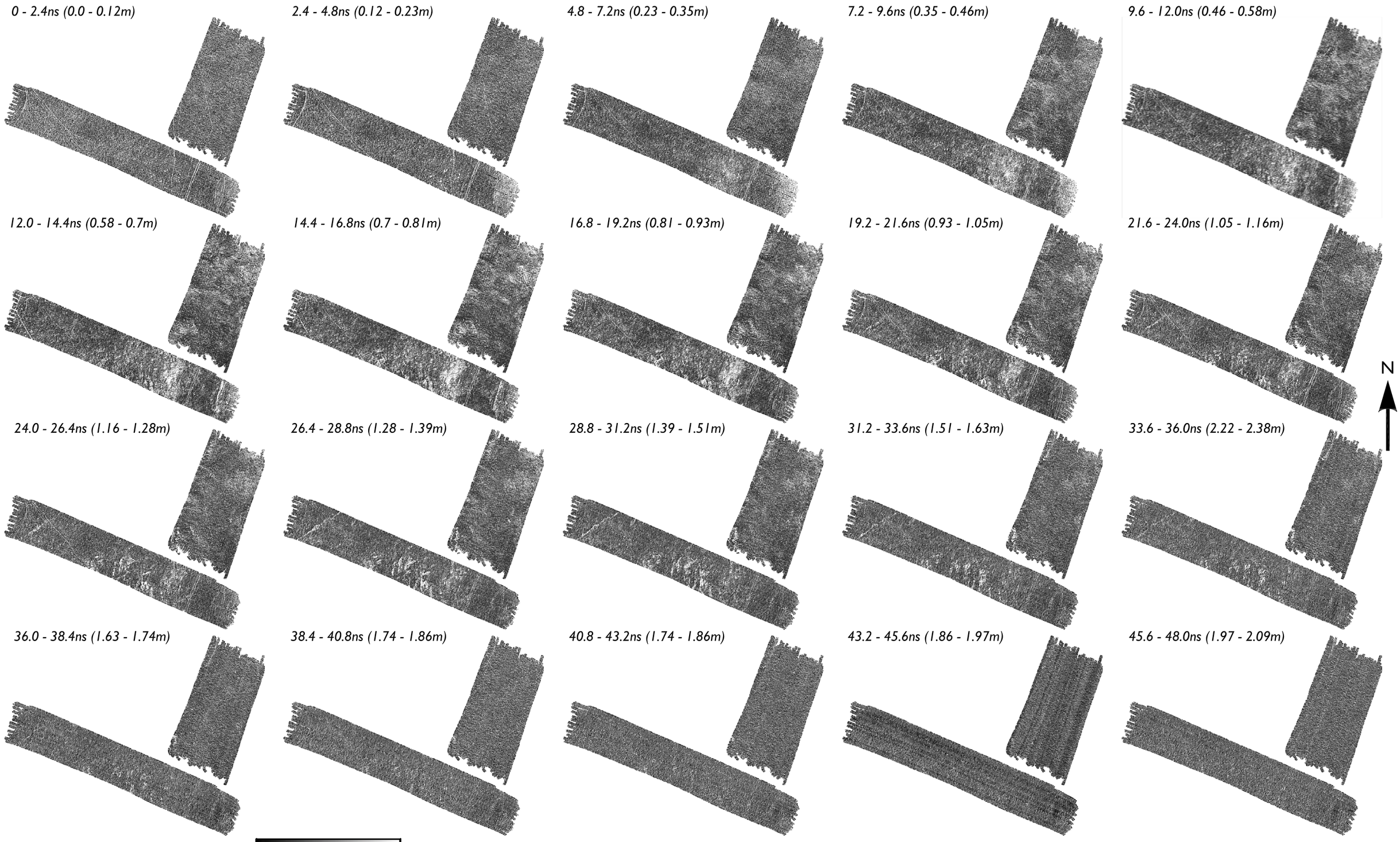

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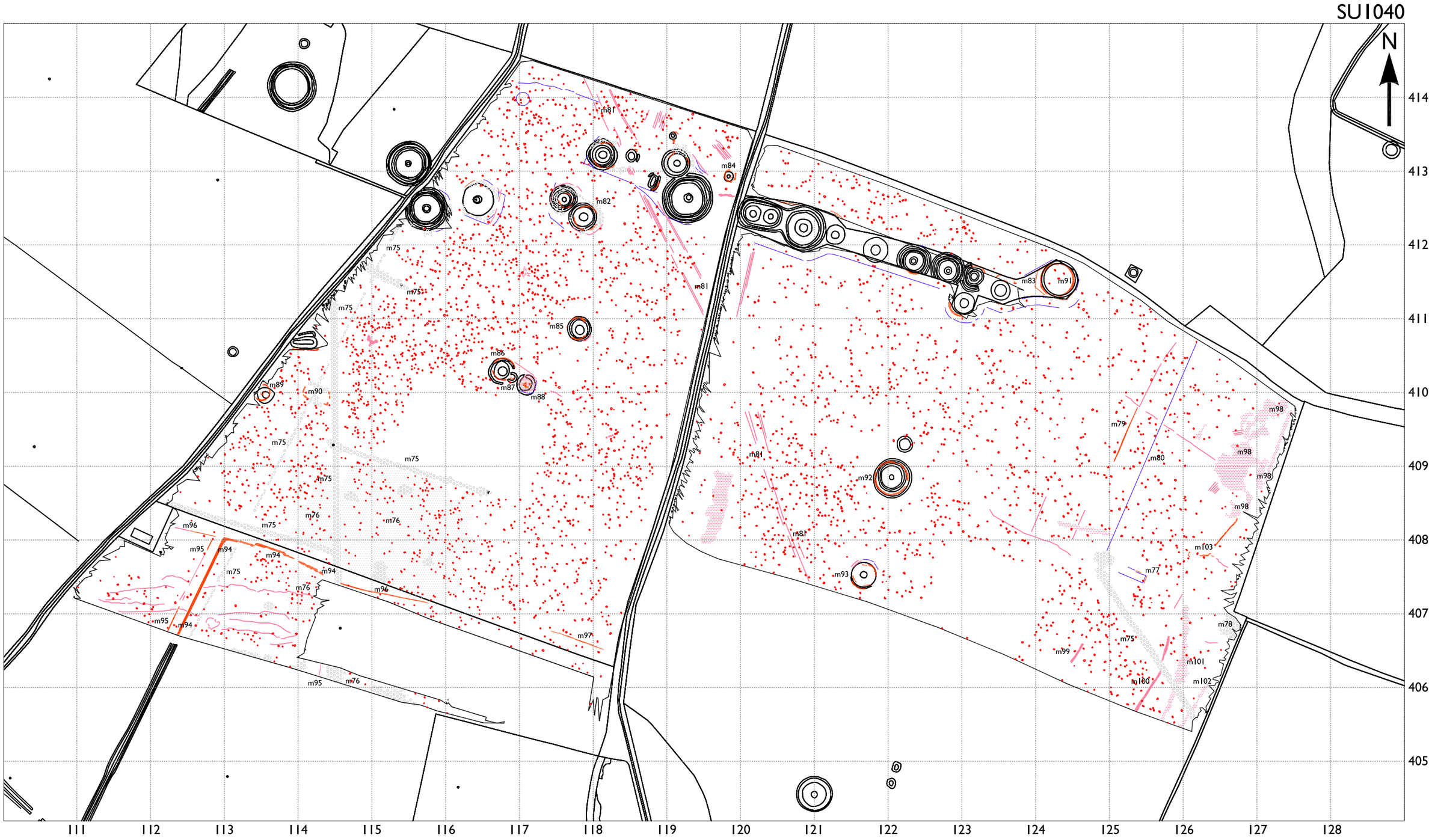
Figure 15

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Graphical summary of significant magnetic anomalies, October to November 2015



0 300m

1:5000

positive magnetic

negative magnetic

pit/tree throw hollow

raised magnetic

magnetic noise

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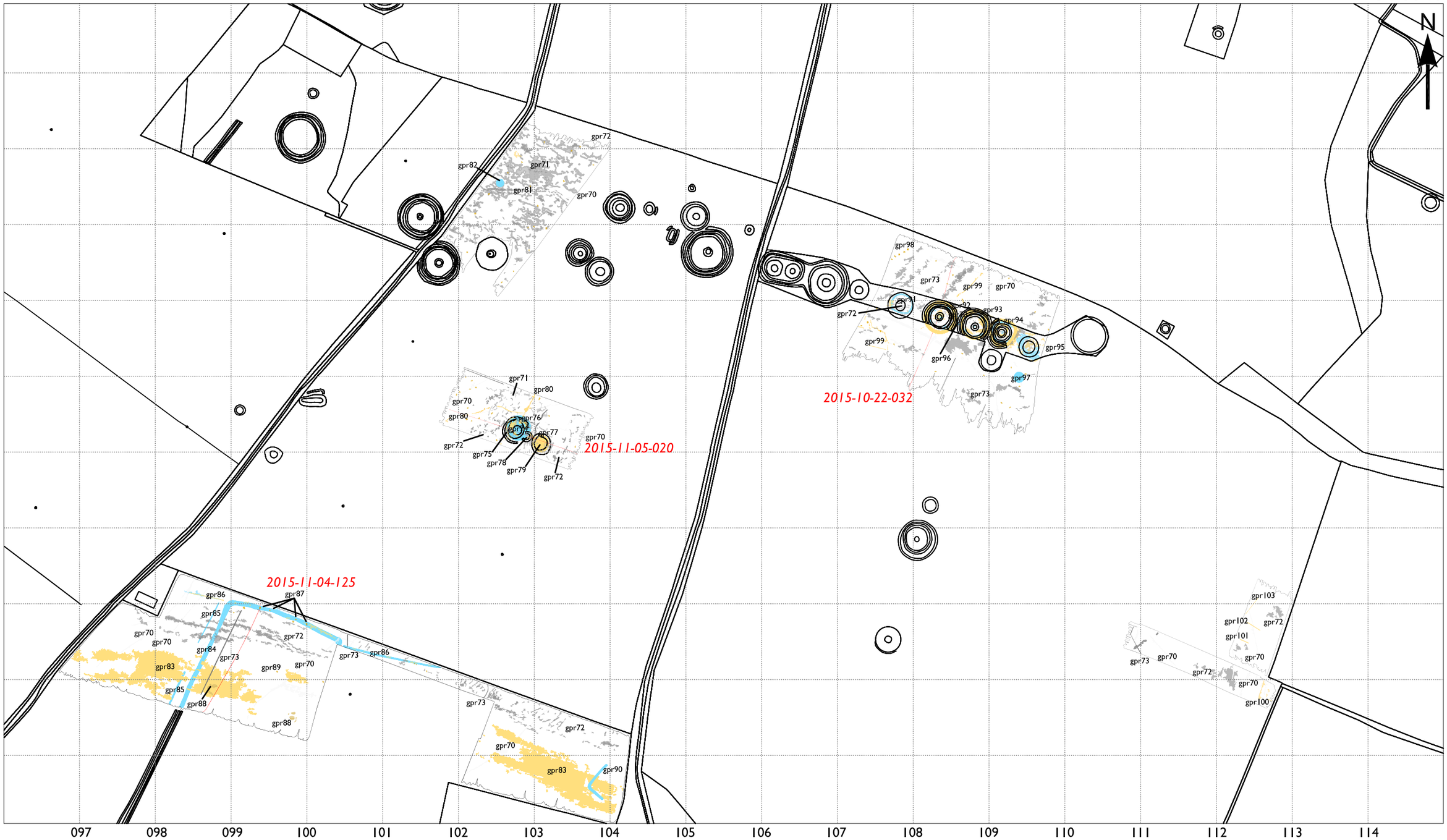
Figure 16

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Graphical summary of significant GPR anomalies, October and November 2015



0 300m

1:5000

low amplitude reflectors

high amplitude reflectors

anomalies of known or recent origin

2015-11-04-125 Location of selected GPR profile shown on Figure 9

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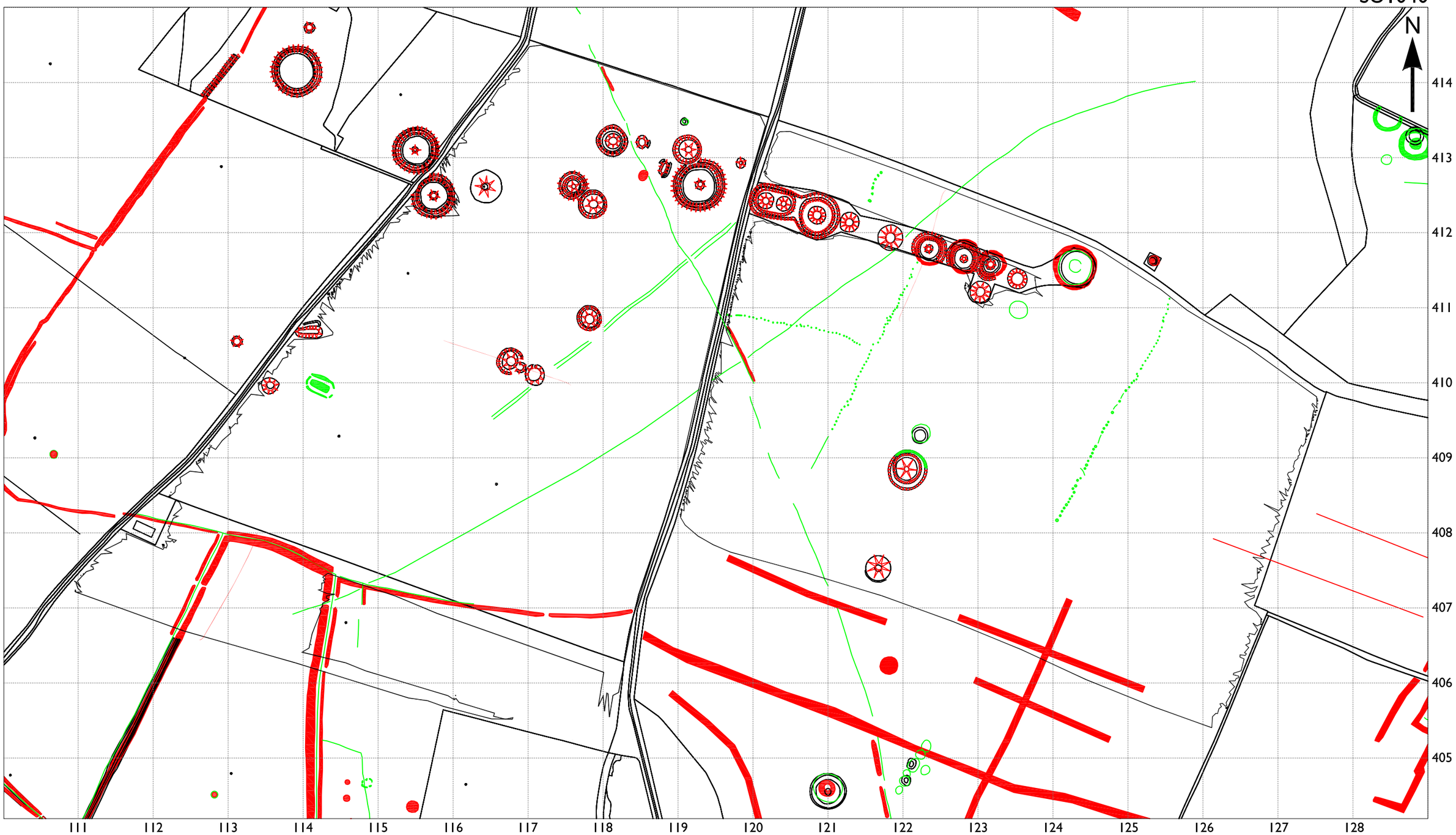
Figure 17

STONEHENGE SOUTHERN WHS SURVEY: NORMANTON DOWN, WILTSHIRE

Graphical summary of the NMP aerial survey evidence



0 300m

1:5000

NMP mapping

tramway

bank

scarp

ditch

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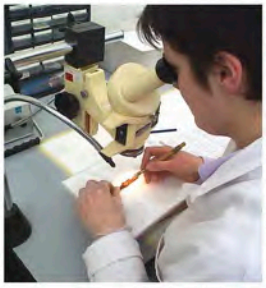



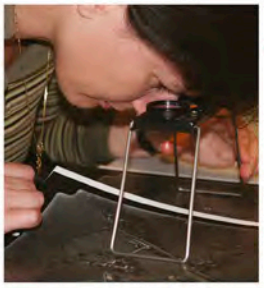


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