Archaeology South-East

ASE

Detailed Magnetometer Survey Lynholm Road Pump Station to Hailsham South WTW Rising Main Northern Section, East Sussex

Linear survey between
NGR 558983 107983 to 559164 108286
(TQ 58983 07983 to TQ 59164 08286)

ASE Project No: 5331

ASE Report No. 2012015

By John Cook BSc (Hons) AIFA

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Abstract

Archaeology South East was commissioned by Clancy Docwra on behalf of Southern Water to carry out a detailed fluxgate gradiometer survey on land designated for the Lynholm Road Pump Station to Hailsham South WTW Rising Main Northern Section, East Sussex. The survey covered approximately 1 hectare and took place on the 16th January 2012. The survey area consisted of short cropped pasture to the west of the former Tunbridge Wells to Polegate railway line, now Cuckoo Lane. The survey successfully detected limited evidence for possible archaeological activity. This evidence was largely restricted to a number of discrete positive anomalies and a single linear negative anomaly. Faint evidence for agricultural activity in the form of plough marks was also identified.

Statement of Indemnity

Geophysical survey is the collection of data that relate to subtle variations in the form and nature of soil and which relies on there being a measurable difference between buried archaeological features and the natural geology. Geophysical techniques do not specifically target archaeological features and anomalies noted in the interpretation do not necessarily relate to buried archaeological features. As a result, magnetic and earth resistance detail survey may not always detect sub-surface archaeological features. This is particularly true when considering earlier periods of human activity, for example those periods that are not characterised by sedentary social activity.

CONTENTS

1.0 INTRODUCTION

1.1 Site background

1.1.1 Archaeology South-East was commissioned by Clancy Docwra on behalf of Southern Water to conduct a magnetometer survey over two separate areas of land associated with the Lynholm Road Pumping Station to Hailsham South Water Treatment Works Rising Main Replacement Scheme (Figure 1). This report presents the results of the northern section between NGR 558983 107983 to 559164 108286 hitherto referred to as 'the survey area' (Figure 2). The survey of the southern section is to take place at a later date and will be reported on separately.

1.1.2 A desk-based assessment (DBA) has previously been undertaken by Atkins (Atkins 2011) in order to assess the potential impacts on heritage assets (see Section 2 below) and suggest appropriate mitigation. The DBA states the following:

> **North section (NGR 558983 107983 to 559164 108286)**
> In the north section, where the pipeline traverses open fields, the route of the replacement section has not been precisely defined because a recent ecology survey has identified badger sets. At this location, there may be a need to replace the rising main on land adjacent to but outside the easement of the existing rising main, in order to avoid disturbance of the badger setts.
>
> There will be no archaeological impact where the pipeline lies within the disused railway line. Where the North section runs across open fields towards New Barn, there will be no archaeological impact within the easement of the current rising main, except where a new trench may be cut. There is a possibility of encountering archaeological remains of the medieval period where there is a requirement to widen the easement and within any new pipe trench. However, the potential impact remains low, given the narrow pipeline trench and easement width.
>
> It is proposed that a geophysical survey is undertaken to assist with micro-alignment selection (outside of the raised embankment associated with a disused railway) and to help identify any need for targeted excavation in the form of localised strip, map and sample excavation in advance of trench cutting. In addition, further archaeological evaluation should be undertaken in areas of known or anticipated colluviums or alluvium to determine the possible depth of preservation. Remaining areas of the scheme would be subject to a watching brief.
>
> **South section (NGR 558503 105460 to 559768 105065)**
>
> In the South section, the easement of the existing rising main is unlikely to contain archaeological remains due to considerable ground disturbed by the construction of the existing pipeline. Therefore there will be no archaeological impact resulting from works within the

easement of the current rising main except where a new pipe trench may be required. In which case there is a possibility of encountering archaeological remains of the late prehistoric or Romano-British period where there is a requirement to widen the easement or excavate a new pipe trench (inside or outside of the former easement).

Similar to the Northern section, it is proposed that a geophysical survey is undertaken to assist with micro-alignment selection and to help identify areas likely to require targeted excavation in advance of trench cutting. In addition, further archaeological evaluation should be undertaken in areas of known or anticipated colluviums or alluvium to determine the possible depth of preservation. Remaining areas of the scheme would be subject to a watching brief.

While the geophysical survey may be affected by existing disturbance to a degree, this approach is nonetheless deemed advantageous for reasons of rapid assessment of large undisturbed areas and minimal disturbance to existing crop prior to excavation. Results can also provide a more accurate cost forecast of potential mitigation works for the client. However, the scope of the archaeological works for both sections should be agreed and approved in advance with the East Sussex County Council (ESCC) Archaeologist.

1.1.3 A Method Statement for a Targeted Magnetometer Survey was prepared by ASE (Griffin 2012) and submitted to the East Sussex County Council (ESCC) Archaeologist for approval in advance of the commencement of fieldwork.

1.1.4 In the event that the geophysical survey leads on to further archaeological fieldwork the scope of such work will be agreed in consultation with the ESCC Archaeologist in advance of development and be subject to the provision of further WSIs as appropriate.

1.2 Geology and topography

1.2.1 According to the British Geological Survey (2012) the site lies over bedrock geology of Tunbridge Wells Sand Formation – Siltstone, Mudstone and Sandstone. No overlying superficial deposits are recorded.

1.3 Aims of geophysical investigation

1.3.1 The purpose of the geophysical survey was to detect any buried archaeological anomalies that might provide a measurable magnetic response.

1.4 Scope of report

1.4.1 The scope of this report is to report on the findings of the survey. The project was conducted by John Cook and Gary Webster; project managed by Neil Griffin (fieldwork) and by Jim Stevenson (post

fieldwork).

2.0 ARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 Archaeological background information is given in the Desk Based Assessment (Atkins 2011) and is repeated below with due acknowledgement.

2.1.2 The following is a consideration of known archaeological sites and findspots within the study area, discussed by period.

2.2 Prehistoric

2.2.1 A finds scatter included Mesolithic flints west of Downash (HER MES5159). A number of flint artefacts of the Neolithic period have been found in the environs of Polegate, including at Greenleaf Garden (HER MES 15779). North of Polegate, possible Bronze Age deposits were found during excavations of the Iron Age – to Romano British site at Windfield Farm, Dittons Road (HER MES4753).

2.3 Iron-Age

2.3.1 Excavations carried out in advance of residential housing at Windfield Farm Dittons Road, Polegate uncovered a complex of ditches, gullies and post-holes were the remains of a settlement or farm dating to the late Iron Age-early Roman period.

2.4 Roman

2.4.1 The southern part of the North section (on the disused railway line) lies adjacent to the Archaeological Notification Area (215) that relates to the medieval features at Freshfield Farm. A Roman coin hoard of the 3rd century AD was found in the mid 20th century in Victoria Road, Polegate.

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2.5 Medieval

2.5.1 There is considerable evidence of Medieval activity within the environs of the North section of the proposed pipeline. There is placename evidence of a possible a settlement 10th century farmhouse at Ersham (HER MES 19187). West of Downash, medieval pottery was found in a ploughed field (HER MES5159). At Freshfields Farm, traces of ridge and furrow, the remains of a chalk possible causeway, possible wooden causeway and holloway were associated with the Medieval farmstead here (HER MES5171, MES5172, MES5173, MES5174).

2.7 Post-Medieval and Modern periods

2.7.1 There is documentary evidence of nineteenth and early twentieth century industrial complexes within the study area, including brickworks HER

MES 19194) and ropewalk (HER MES 19195) at Coldthorne Lane, Hailsham, brickworks and tramway at Station Road, Hailsham (HER MES 19191) brickworks at Oaklands, Ersham (HER MES 19193). The 19th century now demolished Ersham Lodge is recorded on 19th and early 20th maps of Hailsham.

2.7.2 A WWII air crash site and anti-tank cubes are known to have existed at Ersham, Hailsham (HER MES7927, MES 7910).

3.0 SURVEY METHODOLOGY

3.1 Geophysical survey

3.1.1 A fluxgate gradiometer (magnetometry) survey was undertaken within a 30m easement centred on the proposed route of the pipeline between NGR 558983 107983 to 559164 108286 (Figure 2).

3.1.2 The field work was undertaken on Monday 16th January 2012 when the weather was mild and sunny.

3.2 Applied geophysical instrumentation

3.2.1 The Fluxgate Gradiometer employed was the Bartington Instrumentation Grad 601-2. The Grad 601-2 has an internal memory and a data logger that store the survey data. This data is downloaded into a PC and is then processed in a suitable software package.

3.2.2 30m x 30m grids were set out using a GPS (see below). Each grid was surveyed by fluxgate gradiometer with 1m traverses; samples were taken every 0.25m.

3.2.3 Data was collected along north-south traverses in a zigzag pattern beginning in the south-west corner of each grid.

3.3 Instrumentation used for setting out the survey grid

3.3.1 The survey grid for the site was geo-referenced using a Topcon GRS-1 using Virtual Reference Stations (VRS). The GPS receiver collects satellite data to determine its position and uses the mobile phone networks to receive Corrections, transmitting them to the RTK Rover via Bluetooth to provide a sub centimetre Ordnance Survey position and height. Each surveyed grid point has an Ordnance Survey position; therefore the geophysical survey can be directly referenced to the Ordnance Survey National Grid.

3.4 Data processing

3.4.1 All of the geophysical data processing was carried out using Geoplot V3 published by Geoscan Research. Minimally processed data was produced using the following schedule of processing. Due to the very high positive readings of some of the magnetic disturbance the values

were replaced with a dummy value so as to avoid detrimentally affecting the dataset when further processed. The first process carried out upon the data was to apply a DESPIKE to the data set which removes the random 'iron spikes' that occur within fluxgate gradiometer survey data. A ZERO MEAN TRAVERSE was then applied to survey data. This removes stripe effects within grids and ensures that the survey grid edges match. Figure 5 displays the processed survey data.

3.5 Data presentation

3.5.1 Data is presented using images exported from Geoplot into Autocad software and inserted into the geo-referenced site grid. Survey data is presented as raw data and processed data greyscale plots (Figures 3-6).

4.0 GEOPHYSICAL SURVEY RESULTS (Figures 7 and 8)

4.1 Description of site

4.1.1 The survey area consisted of an approximately one hectare 30m corridor of short cropped pasture. The site lies to the west of the former Tunbridge Wells to Polegate railway line, now Cuckoo Lane and runs through several enclosures of short cropped pasture with post and wire fences and boundary ditches.

4.2 Survey limitations

4.2.1 Survey was limited at the southern end of the survey area of the site due to barbed wire fences. Where boundaries formed a physical barrier or where combined with ground conditions were considered to pose a health and safety risk these areas were omitted from the survey (Figure 2).

4.2.2 In addition to the physical limitations of the survey, the effectiveness of magnetometer surveys depends on a contrast between the absolute magnetic susceptibility of the topsoil to the underlying subsoil (Clark 1996). Features may also be difficult to detect where there has been significant primary silting.

4.3 Introduction to results

4.3.1 The results should be read in conjunction with the figures at the end of this report. The types of features likely to be identified are discussed below.

4.3.2 *Positive Magnetic Anomalies*
Positive anomalies generally represent cut features that have been in-filled with magnetically enhanced material.

4.3.3 *Negative Magnetic anomalies*
Negative anomalies generally represent buried features such as banks that have a lower magnetic signature in comparison to the background

geology

4.3.4 *Magnetic Disturbance*
Magnetic disturbance is generally associated with interference caused by modern ferrous features such as fences and service pipes or cables.

4.3.5 *Magnetic Debris*
Low amplitude magnetic debris consists of a number of dipolar responses spread over an area and is indicative of ground disturbance.

4.3.6 *Dipolar Anomalies*
Dipolar anomalies are positive anomalies with an associated negative response. These anomalies are usually associated with discreet ferrous objects or may represent buried kilns or ovens.

4.3.7 *Bipolar Anomalies*
Bipolar anomalies consist of alternating responses of positive and negative magnetic signatures. Interpretation will depend on the strength of these responses; modern pipelines and cables typically produce strong bipolar responses.

4.3.8 *Thermoremanence*
Thermoremanence is most commonly encountered through the magnetizing of clay through the firing process although stones and soils can also acquire thermoremanence.

4.4 Interpretation of fluxgate gradiometer results (Figures 7 and 8)

Magnetometry results

4.4.1 Evidence of possible archaeological activity is limited to the following described anomalies. A number of discrete positive anomalies (A1) are observed throughout the survey area, which may represent possible cut features such as pits. However, these anomalies may also relate to in filled natural features or, as in the north of the survey (figure 7), to ground disturbance related to services (A6). A single north-south trending linear moderate negative anomaly (A2) is noted running through the mid section of the survey. This anomaly may represent the remnants of a possible bank or earthwork.

4.4.2 Dipolar anomalies (A3) are also observed throughout the survey although most significantly in the south (Figure 8). These anomalies are likely to be due to discrete ferrous objects (such as modern material in the near surface). Two strong bipolar anomalies with associated magnetic disturbance (A6) are observed in the north of the survey (Figure 7) indicating existing services.

4.4.3 Several areas of magnetic debris (A4) were identified within the survey data, and are likely to relate to ground disturbance.

4.4.4 A series of ephemeral linear anomalies (A5) were identified across the survey area. These responses are likely to be the result of agricultural activity. Several of the more substantial of these anomalies, in the north

of the survey, are aligned with possible ridge and furrow activity noted during the survey.

5.0 CONCLUSION

5.1 Discussion

5.1.1 Evidence for archaeological features within the magnetic survey was, in general, difficult to interpret due to disturbance and debris related to more modern use of the land. However, the survey did successfully detect several discrete anomalies of possible archaeological origin across the site. These are mostly represented by discrete positive anomalies that may represent possible pits (Figures 7 and 8, A1). Although, these anomalies may also be caused by the infilling of natural hollows. A single linear negative anomaly (Figure 7, A2) running through the central section of the survey area may indicate the location of a former earthwork or bank. Approximately half of its length coincides with possible ridge and furrow activity. A number of ephemeral linear positive anomalies observed may be the result of more recent agricultural activity.

Bibliography

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Griffin, N. 2012 Lyndholm Road Pumping Station to Hailsham South Water Treatment Works Rising Main Replacement Scheme. Method Statement for a Targeted Magnetometer Survey

Acknowledgements

Archaeology South-East would like to thank Clancy Docwra for commissioning the survey.

SMR Summary Form

Site Code	-					
Identification Name and Address	Lynholm Road Pump Station to Hailsham South WTW Rising Main Northern Section					
County, District &/or Borough	East Sussex					
OS Grid Refs.	Linear Scheme NGR 558983 107983 to 559164 108286					
Geology	Tunbridge Wells Sand Formation – Siltstone, Mudstone and Sandstone					
Arch. South-East Project Number	5331					
Type of Fieldwork	Eval.	Excav.	Watching Brief	Standing Structure	**Survey**	Other
Type of Site	**Green Field**	Shallow Urban	Deep Urban	Other		
Dates of Fieldwork	Eval.	Excav.	WB.	**16th January 2012**		
Sponsor/Client	Clancy Docwra					
Project Manager	Neil Griffin					
Project Supervisor	John Cook					
Period Summary	Palaeo.	Meso.	Neo.	BA	IA	RB
	AS	MED	PM	Other Modern		

100 Word Summary.

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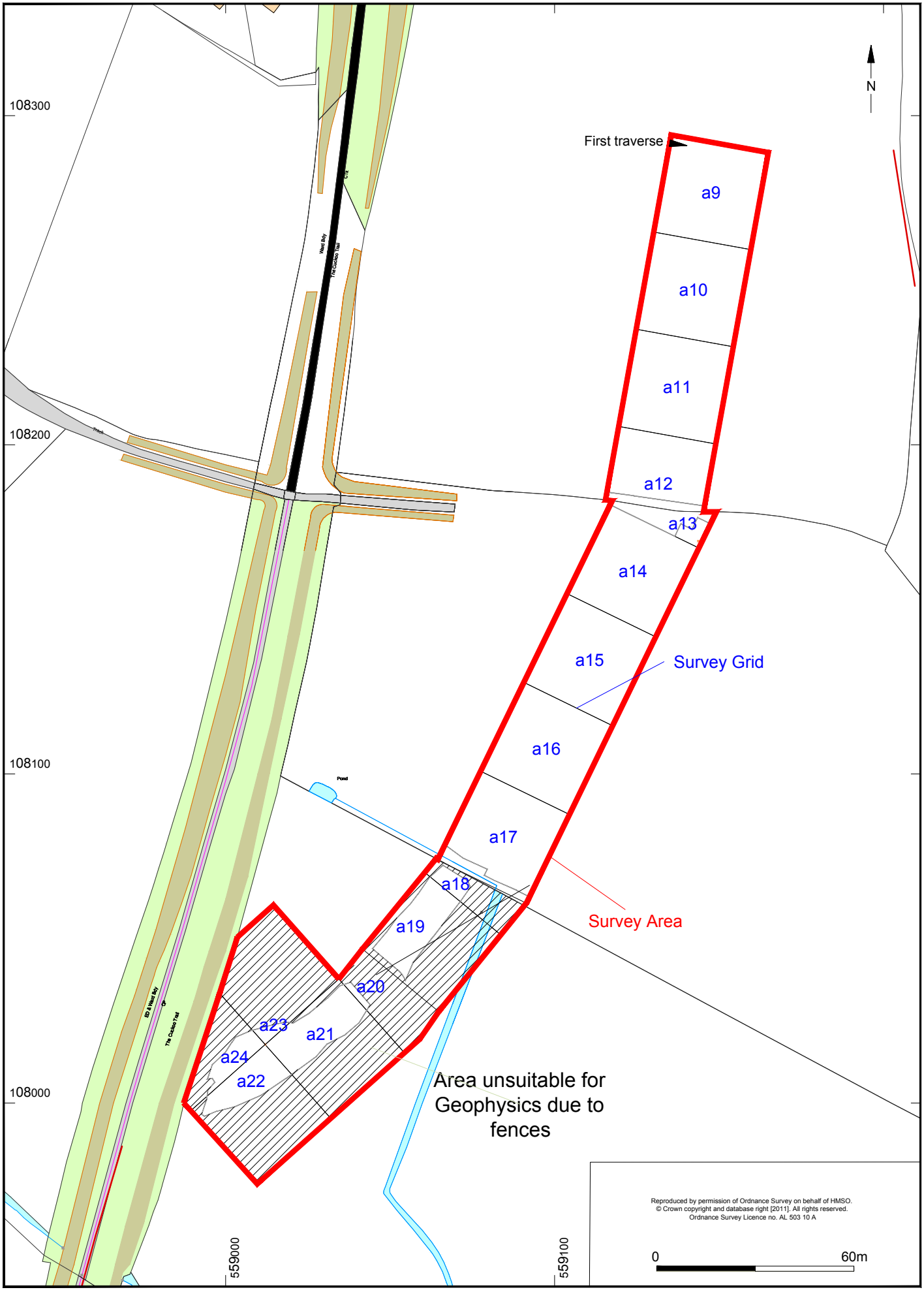
Appendix 1

Included on C.D

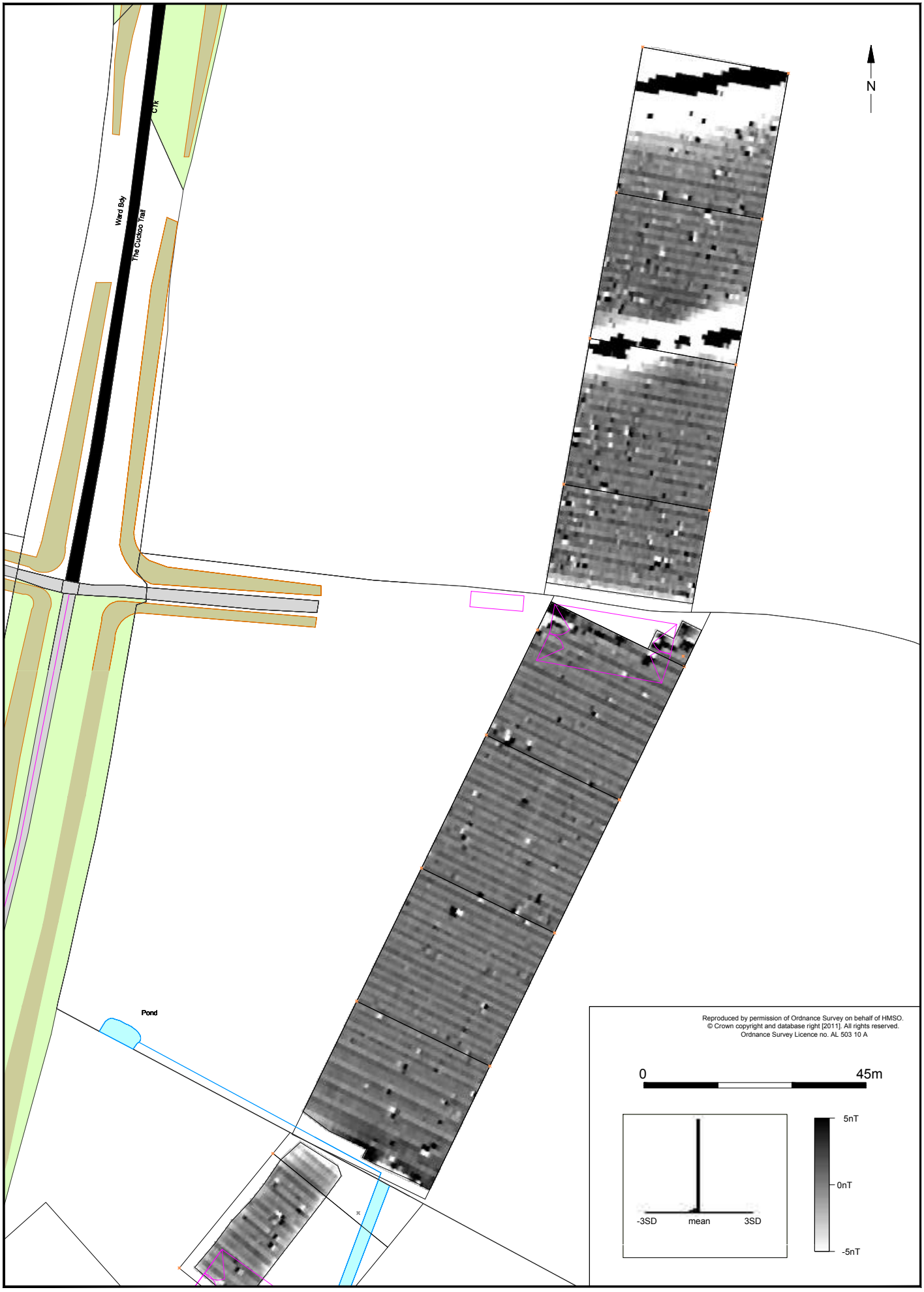
1. Raw Magnetometry Data

Reproduced from the Ordnance Survey's 1:25000 map of 1997 with permission of the Controller of Her Majesty's Stationary Office. Crown Copyright. Licence No. AL 503 10 A

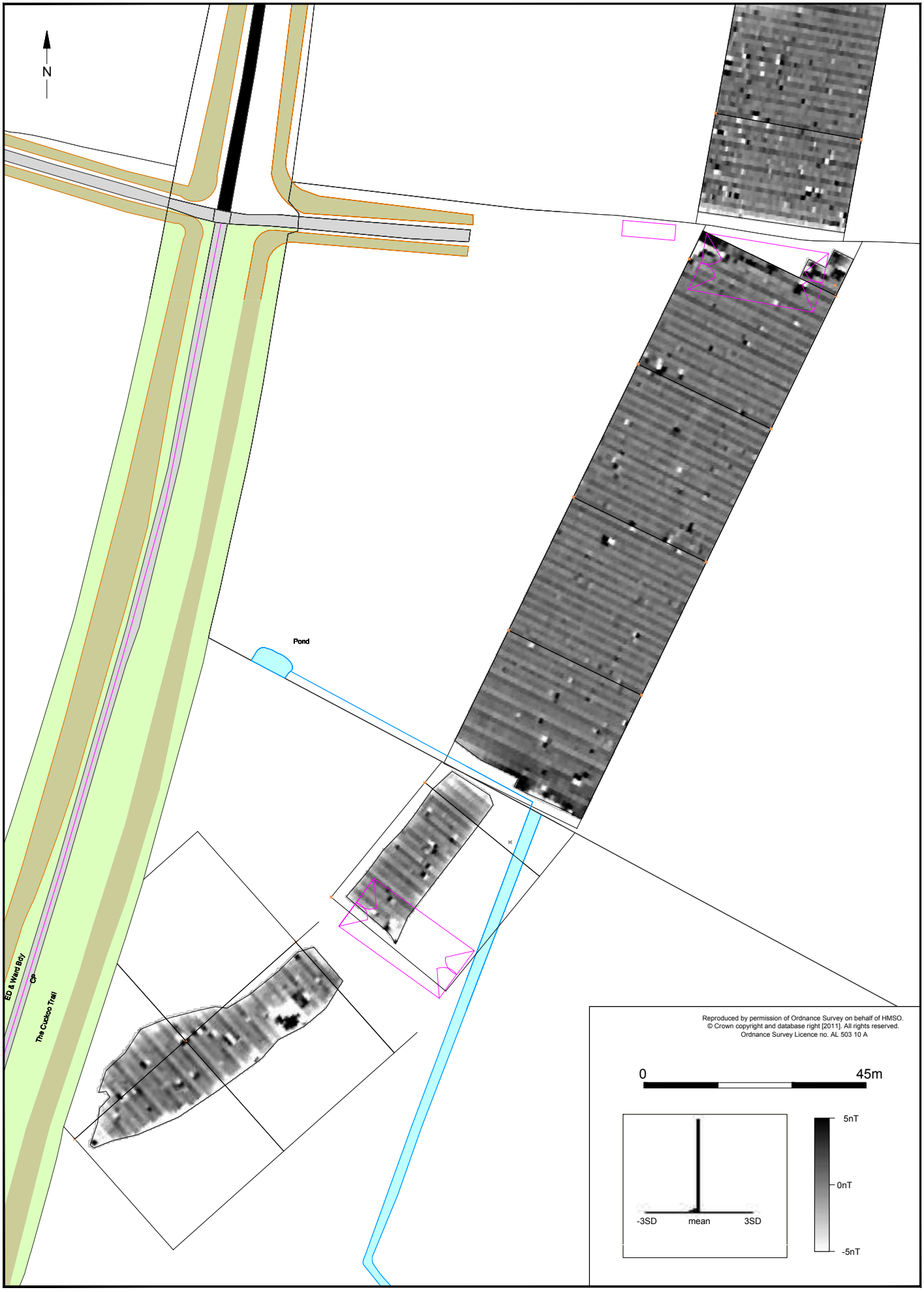
© **Archaeology South-East**		Lyndholm Road Pumping Station to Hailsham South Water Treatment Works	Fig. 1
Project Ref: 5331	Jan 2012	Site location	
Report Ref:	Drawn by: JLR		



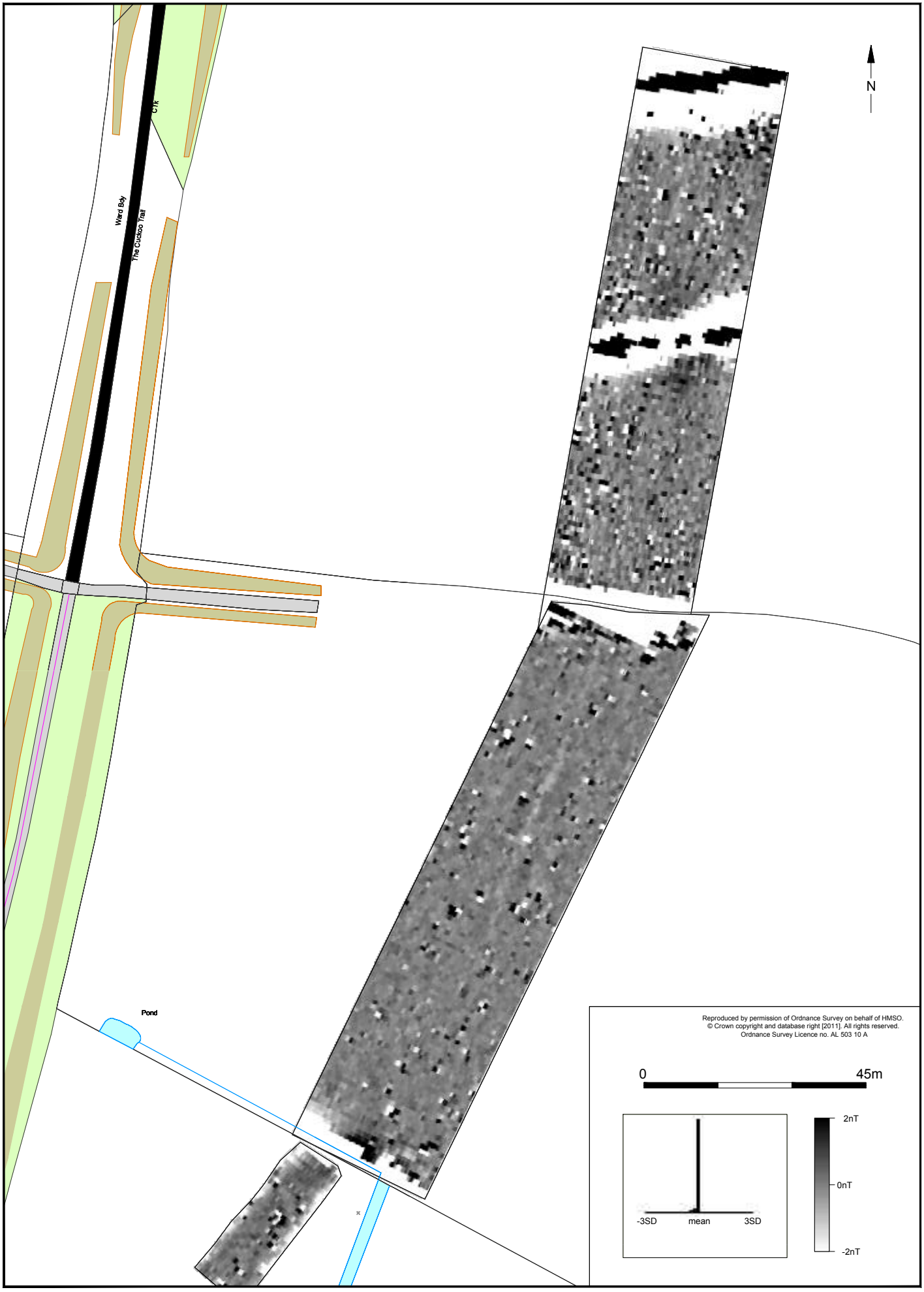
© Archaeology South-East		Lynholm Road Pump Station to Hailsham South WTW Rising Main	Fig.2
Project Ref: 5331	Jan 2012	Site plan	
Report Ref: 2012015	Drawn by: JC		



© **Archaeology South-East**		Lynholm Road Pump Station to Hailsham South WTW Rising Main	Fig.3
Project Ref: 5331	Jan 2012	Raw shade plot northern section	
Report Ref: 2012015	Drawn by: JC		



© **Archaeology South-East**		Lynholm Road Pump Station to Hailsham South WTW Rising Main	Fig.4
Project Ref: 5331	Jan 2012	Raw shade plot southern section	
Report Ref: 2012015	Drawn by: JC		



© **Archaeology South-East**		Lynholm Road Pump Station to Hailsham South WTW Rising Main	Fig.5
Project Ref: 5331	Jan 2012	Processed shade plot northern section	
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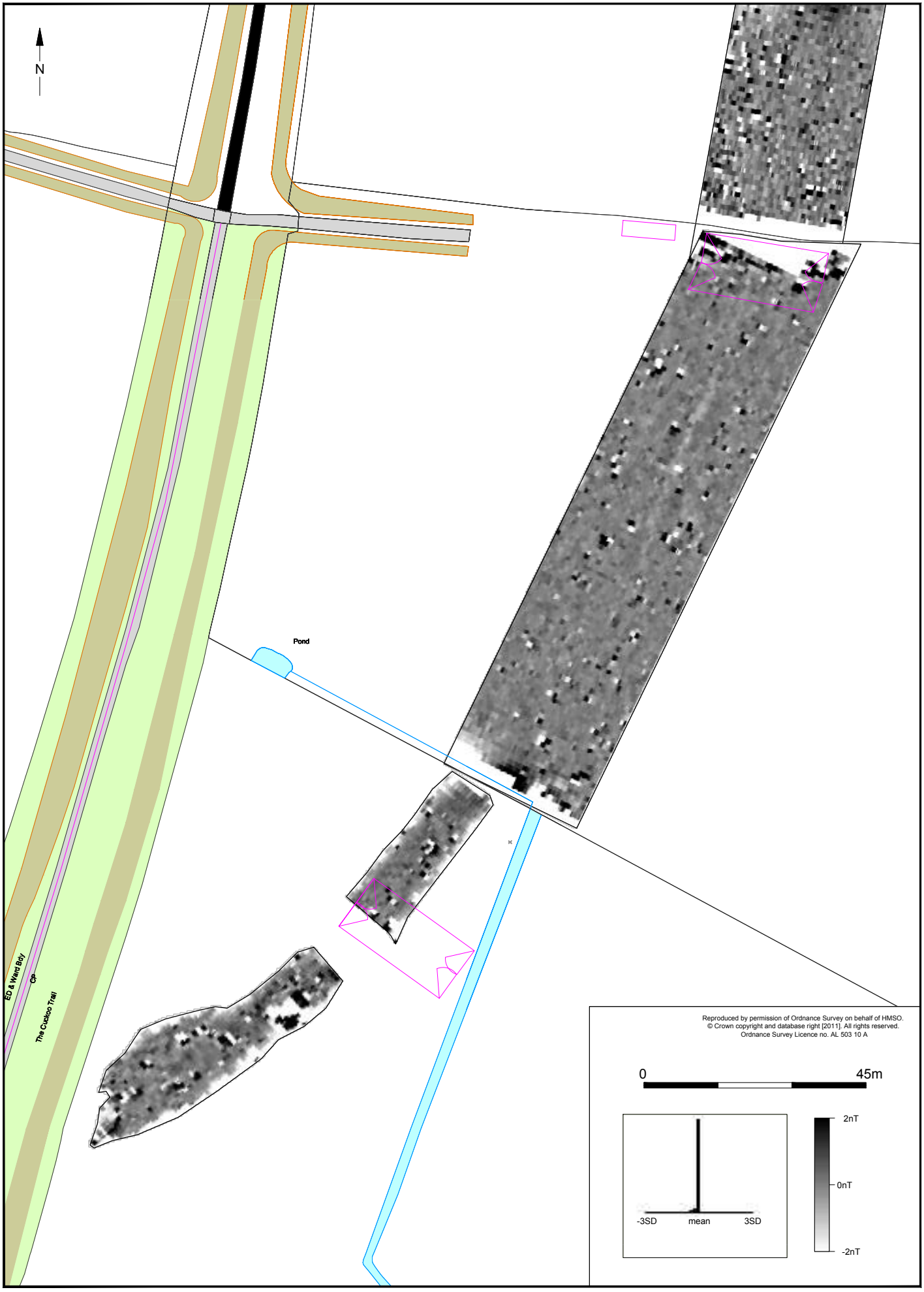

© **Archaeology South-East**		Lynholm Road Pump Station to Hailsham South WTW Rising Main	Fig.6
Project Ref: 5331	Jan 2012	Processed shade plot southern section	
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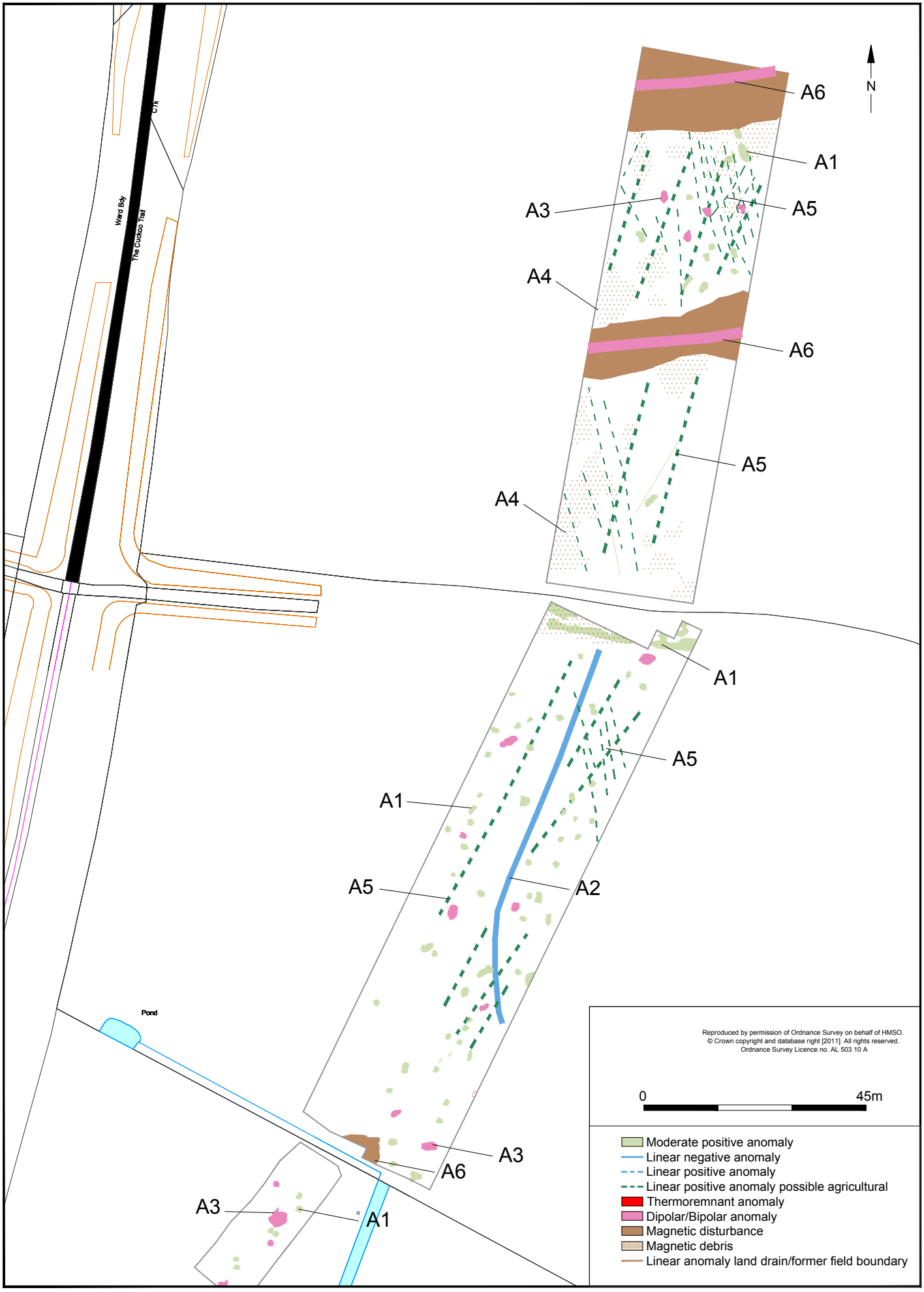

© **Archaeology South-East**		Lynholm Road Pump Station to Hailsham South WTW Rising Main	Fig.7
Project Ref: 5331	Jan 2012	Interpretation northern section	
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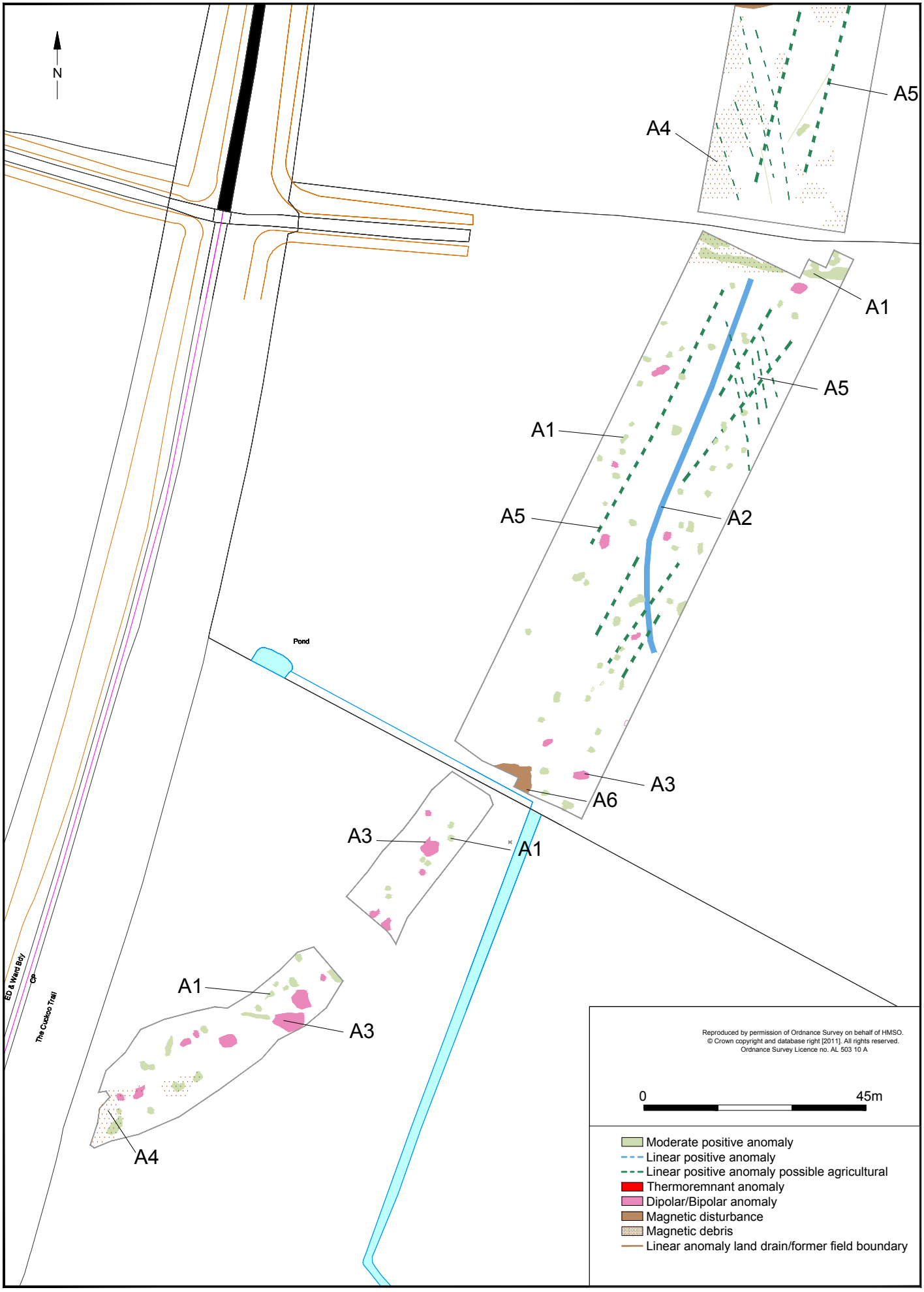

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Project Ref: 5331	Jan 2012	Interpretation southern section	
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