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Hornsea Offshore Wind Farm Project ONE

Earthwork Survey Report



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Hornsea Offshore Wind Farm Project ONE

Earthwork Survey Report

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1 INTRODUCTION

1.1 Project background

- 1.1.1 Wessex Archaeology has been commissioned by DONG Energy (hereafter 'the Client') to undertake a programme of archaeological mitigation ahead of construction of a cable route associated with an offshore windfarm. The onshore cable route runs from Horseshoe Point in the parish of North Coates (NGR TA 380 021), east of Tetney, in a broadly north-west direction towards the existing Killingholme power station (NGR TA 152 189), where a new High Voltage Alternating Current substation will be built.
- 1.1.2 The archaeological mitigation includes pre-construction topographic earthwork survey of eleven areas. Work was undertaken in line with a draft Written Scheme of Investigation (WSI) prepared by Royal HaskoningDHV (2016).
- 1.1.3 Previous archaeological investigations undertaken to inform an Environmental Statement (RPS 2013a-c) for the scheme have included desk-based assessment, aerial photographic survey, geophysical survey (Bunn 2011, in RPS 2013c, fieldwalking (Cater and Johnson 2012, in RPS 2013c) and two phases of trial trenching (RPS 2013c). In addition to this work Wessex Archaeology completed archaeological evaluation of a further 42 trial trenches along the cable route in 2015 (Wessex Archaeology 2015). Pre-construction Set Piece Excavations (SPEs) are ongoing.
- 1.1.4 This document provides a report on the topographic survey conducted over 11 extant historic landscape features initially identified in a LiDAR assessment for the scheme (Royal HaskoningDHV 2016). The topographic surveys were undertaken to Historic England Level 1 standard (English Heritage, 2007) to record the location, extent, profile and dimensions of extant earthwork features.

1.2 Location, topography and geology

1.2.1 The surveys target 11 areas distributed along the length of the scheme (**Figure 1**), their description from the LiDAR assessment and location are outlined in **Table1**.

Area No.	Plot No.	Earthwork Description	Area Covered	Height Range	Chainage (km from Substation)
1	10	Single circular mound; cable corridor crosses central portion of mound. Figures 1a & 1b.	c. 119m long by 40m wide	2.55m – 4.55m OD	35.5
2	11 & 12	3 or 4 irregular shaped mounds partially located within the cable corridor. Figures 1a & 1b.	c. 807m long (intermittent) by maximum of 40m wide	2.37m – 4.60m OD	34.5 – 35.3

Table 1: Description and location of features identified in LiDAR assessment

Area No.	Plot No.	Earthwork Description	Area Covered	Height Range	Chainage (km from Substation)
3	13	Single oblong mound oriented roughly northeast-southwest; cable corridor crosses central portion of mound. Figures 2a & 2b.	c. 111m long by 40m wide	2.56m – 3.88m OD	34.2 – 34.3
4	13	Southern section/edge of 2 mounds. Figures 2a & 2b.	c. 233m long by 40m wide	2.36m – 3.55m OD	33.8 – 34.1
5	29	Possible mound located across the cable corridor along a north-south alignment. Figures 3a & 3b.	c. 102m long by 40m wide	10.69m – 14.18m OD	28.9 – 29.0
6	71 a - d	Ridge and furrow aligned approx. northwest-southeast measuring an average of c. 4m wide by 0.05m – 0.10m from base of furrow to top of ridge. Figures 4a & 4b.	c. 540m long by <112m wide	14.32m – 14.43m OD at southern end to 8.70m – 8.82m OD at northern end	16.75 – 17.3
7	73	Ridge and furrow aligned approx. northwest-southeast measuring an average of 3.85m wide by 0.12m from base of furrow to top of ridge. Figures 4a & 4b.	c. 60m long by 54m wide	13.23m – 13.35m OD	16.6 – 16.7
8	88	Ridge and furrow aligned approx. northwest-southeast measuring an average of 4m wide by 0.18m to 0.29m from base of furrow to top of ridge. Figures 5a & 5b.	c. 120m long by 76.39m wide	13.48m – 13.75m OD	10.5 – 10.6
9	111 & 112	Series of linear mounds and ditches within Plot 111 and ridge and furrow within Plot 112 (aligned northwest- southeast to the south and east- northeast to west-southwest in the north) measuring an average of 4m wide by 0.05m to 0.11m from base of furrow to top of ridge. Figures 6a & 6b.	Plot 111 – < 144m long by <30m wide; Plot 112 – c. 75m long by c. 100m wide	Plot 111 – 16.53m – 16.93m OD Plot 112 – 17.53m – 17.64m OD	3.0 - 3.4
10	126	Ridge and furrow aligned north-south and northwest-southeast measuring an average of 4m wide by 0.1m to 0.2m from base of furrow to top of ridge. Figures 7a & 7b.	c. 117m long by 40m wide	10.71m – 10.82m OD	0.8 – 0.9
11	132 & 133	Ridge and furrow aligned northeast- southwest measuring an average of 4m wide by 0.14m to 0.2m from base of furrow to top of ridge. Figures 7a & 7b.	c. 169m long by 40m wide	10.9m – 11.11m OD	0.6 – 0.75

1.2.2 The underlying geology of the area is generally recorded as chalk of the Burnham Formation, with superficial deposits of Devensian sand and gravel till (British Geological Survey). Soil mapping records slowly permeable seasonally wet acid loamy and clayey soils across the area (Cranfield University).





2 EARTHWORK SURVEY METHODOLOGY

2.1 Overview

- 2.1.1 The recording of the location and extent of all features was conducted using a Leica Viva GNSS utilising an RTK solution. This solution provides accuracy compliant with the precision of control stated in section 2.1.1 of *Metric Survey Specifications for Cultural Heritage* (Historic England 2015a) of +/-30mm.
- 2.1.2 The location of the 11 survey areas were loaded onto the Leica GNSS system to ensure the survey locations were successfully identified in the field.
- 2.1.3 Sufficient survey points were measured to record the extent, profile and current condition of the targeted archaeological features and to adequately illustrate them in accordance with Historic England Level 1 standards.
- 2.1.4 A photographic record was made of each site using 16 megapixel Pentax K50 DSLR camera recording in DNG RAW format in accordance with Digital Image Capture and File Storage, Guidelines for Best Practice (Historic England, 2015b).
- 2.1.5 A Level 1 record was completed for each area as described in the Historic England guidance (English Heritage, 2007).

3 EARTHWORK SURVEY RESULTS

3.1 Introduction

3.1.1 Surveys were successfully completed for all 11 identified sites.

3.2 Area 1

- 3.2.1 Area 1 was identified during the LiDAR assessment as a large, circular mound probably representing a saltern mound. The field survey identified this feature as a sub-circular mound (101) with a flat top (**Figure 2** and **Plate 1**), it was also noted that other mounds were visible in the surrounding area.
- 3.2.2 This feature has been exposed to heavy ploughing which would have had an effect upon its level of preservation, though the ploughing exposes a lighter coloured and more friable topsoil than the surrounding area (RPS, 2013b). This is consistent with the remains of a medieval saltern and can be seen in the photographic record.
- 3.2.3 The interpretation of this feature as a saltern mound is further suggested by the remains within Trench 7 of the archaeological evaluation, which identifies this area as clearly representing a saltern site (RPS, 2013a).

3.3 Area 2

3.3.1 Four individual features were identified in Area 2 during the LiDAR assessment all probably associated with the medieval salt industry within the area. These consisted of 3 individual mounds, features 201, 202, and 204, and a bank, feature 203. This bank runs southwards into the survey area from its northern extent before turning west where it is truncated by feature 205, Tuttle Drain, a large post-medieval drain.



- 3.3.2 These features, 201 204 from west to east, have been heavily ploughed, with the field survey identifying them as large but subtle in form without hard edges or aspects (Figure 3 and Plate 2). The discrete mound features exhibit the same light and friable topsoil coverage as seen in Area 1 and this is visible in the photographic record.
- 3.3.3 Features 201 and 202 were both partially investigated as part of the archaeological trial trenching programme; no archaeological remains were noted (Wessex Archaeology, 2015).

3.4 Area 3

- 3.4.1 A single large mound was identified in the LiDAR data within Area 3, as with Areas 1 and 2 this was interpreted as being associated with the medieval salt industry.
- 3.4.2 The field survey observed a large subtle feature, 301, with gradual sloping sides and a flat top, which was orientated north-east to south-west across the survey area. Area 3 has been exposed to heavy ploughing, probably affecting the level of preservation of this feature, which was under crop at the time of the survey (**Figure 4** and **Plate 3**).
- 3.4.3 This feature was partially evaluated by Trench 14 during the archaeological evaluation; no archaeological remains were noted (Wessex Archaeology, 2015).

3.5 Area 4

- 3.5.1 Area 4 is located to the west of Area 3 and was also under crop at the time of the survey. A large mound was identified during the LiDAR assessment that looked characteristic of a medieval saltern mound though such a discrete and pronounced feature was not identified during the field survey. The survey recorded a subtle rise in the landform from east to west and then back to ground level over 70m suggestive of a feature but not as obvious and pronounced as features found in survey areas 1 3. It is possible that this feature is now too subtle for identification at ground level due its size, combined with its low, subtle form and the effects of heavy ploughing in the area which has made it indistinct (**Plate 4**).
- 3.5.2 A long slope with low gradient was observed in the centre of the site, feature 401, running downhill from north-east to south-west (**Figure 5**) though it's location did not correlate to any feature identified in the LiDAR assessment and it is unknown if it is archaeological in origin.
- 3.5.3 This feature was partially excavated by Trial Trench 16 during a previous phase of archaeological evaluation; this uncovered the remains of medieval salt production suggesting this feature is part of a saltern mound (RPS, 2013a).

3.6 Area 5

- 3.6.1 A single large, long bank running downhill from east to west was recorded in this area as part of the LiDAR assessment and this was successfully identified during the field survey (Figure 6). This feature, 501, is considerable in size with a rolling form that is inconspicuous within this landscape (Plate 5). Its subtle form could be attributed to consistent ploughing, causing the feature to lose definition.
- 3.6.2 The size and form of this feature suggests that it is associated with the medieval salt industry. The previously excavated Trial Trench 36 investigated part of this feature to the south of the survey area, and discovered a series of linear features running parallel or perpendicular to the slope (RPS, 2013a). Though one of these features contained 12th to 14th century pottery, the features did not have many characteristics typically associated



with salt production and environmental evidence further suggested that these features were associated with an Iron Age / early Roman settlement identified in trenching immediately to the east. As such, it is possible that this is a natural feature, which may have been archaeologically modified.

3.7 Area 6

- 3.7.1 Area 6 was identified as a region of extant ridge and furrow during LiDAR assessment and this was observed during field survey. This feature, 601, is well defined in the southern area of the site (**Plate 6**) but becomes increasingly indistinct to the north, where its preservation could have been effected by the installation of horse paddocks (**Plate 7**).
- 3.7.2 The ridge and furrow is orientated north-west to south-east (**Figure 7**) and the land is prone to holding water, which could further affect the level of preservation, especially when being impacted upon by livestock.
- 3.7.3 A slight curve is evident when looking at this feature in plan, similar to an elongated and reversed "S". There has been some debate about the origin of such aratral curves (Aston 1985); it is most commonly being attributed to being the consequence of using eight oxen plough teams, a practice attributed to the medieval period.

3.8 Area 7

- 3.8.1 During the LiDAR assessment this area was identified as an area of north-west to southeast orientated ridge and furrow; however this was not observed during the field survey. The site was dominated by a large mound feature, 701 (**Plate 8**), which is elliptical in plan and orientated north-east to south-west along its longest axis with only the north-east half of the mound in the survey area (**Figure 8**).
- 3.8.2 The mound is considerable in size being approximately 150m long and 80m wide with a long, gradual sloping side and flat top. A small bank is visible at its south-eastern edge (**Plate 9**) and the feature is covered with a rough grass surface.
- 3.8.3 Trial Trench 55 was excavated across the feature and identified a pit of unknown origin cut into glacial till at an approximate depth of approximately 0.85m beneath the ground surface. The size and form of feature 701 is consistent with features seen to the south of the scheme that are associated with the medieval salt industry but the lack of archaeological deposits characteristic of this industry and the glacial till natural suggest that this feature could be natural in origin. The existence of the bank at the southern extent of this feature and the pit discovered during the archaeological trial trenching further suggests that it, if a natural feature, it has been utilised archaeologically due to its prominent position in the landscape.

3.9 Area 8

- 3.9.1 Area 8 was identified in both the LiDAR assessment and field survey as an area of ridge and furrow orientated north-west to south-east, feature 801 (**Figure 9** and **Plate 10**).
- 3.9.2 The ridges are predominately approximately 4m wide though some narrower areas of ridge were observed with a width as low as 1m in places. The area is prone to waterlogging and has been used for grazing so it is possible that this has affected the level of preservation in areas of the site.
- 3.9.3 As with feature 601, a slight curve is visible in plan suggesting that this feature originates in the medieval period.



3.10 Area 9

- 3.10.1 This survey area (**Figure 10**) was located in the same position as Set Piece Excavation 4 and also extended into the field immediately to the north. The LiDAR assessment identified 2 areas of ridge and furrow, one in the field in the northern area of plot 112, to the north of SPE 4, which was orientated east north-east to west south-west, and one to the south of the same plot which was orientated north-west to south-east. Furthermore, it identified a series of mounds and ditches across the survey area.
- 3.10.2 The field survey successfully recorded these areas of ridge and furrow, feature 901 (Plate 11) to the north and feature 902 to the south. Both features exhibit a similar curved shape to the ridge and furrow in Areas 6 and 8 and are of a similar size suggesting they are also medieval in origin.
- 3.10.3 A series of earthwork features were identified and recorded, these were a low semicircular bank, 903, a bank forming part of an enclosure, 904, and a series of field boundaries 905.
- 3.10.4 Bank 903 is semi-circular in plan, approximately 13m across and facing north-west. It is bordered at its southern edge by a large ditched field boundary and is subtle in nature only having a maximum height of 0.15m. This feature is probably related to the series of linear features that are evident in the LiDAR data to the north-east that are likely medieval and possibly associated with a deserted village. These features will be partially investigated during the current work at Set Piece Excavation (SPE) 4.
- 3.10.5 A single instance of these linear earthworks was visible in the survey area, feature 904, which exists as a bank orientated north to south. This bank is formed by a change in ground level rather than being an up-built feature and faces to the east.
- 3.10.6 A series of field boundaries, 905, (**Plate 12**) run through the survey area and form part of the boundary to the southernmost ridge and furrow, 902. A large ditch runs north to south at the western edge of 902 splitting into two arms 65m northwards along its length from it southern extent. One arm continues northwards where it terminates at the southern boundary of 901. The other arm curves 90 degrees to run east to west and form the northern boundary of 902.

3.11 Area 10

- 3.11.1 Area 10 was initially identified as containing two regions of ridge and furrow, a relatively small portion running north to south at the western extent of the survey with the rest of the area containing a second set, orientated north-west to south-east.
- 3.11.2 Both these features were successfully recorded (**Figure 11**). The westerly area of ridge and furrow, feature 1001, is of similar size and form to the instances observed throughout the rest of the scheme and is likely of similar medieval date. Conversely, the ridge and furrow to the east of the survey area, 1002, is subtler (**Plate 13**) with the survey results indicating that the ridges are consistently straight, possibly suggesting that it is later in period than 1001.
- 3.11.3 The ground cover in both these fields was rough pasture and prone to retaining water. Both features 1001 and 1002 were partially investigated during a previous phase of trial trenching. Trench 108 (Wessex Archaeology 2015) revealed topsoil and subsoil to a depth of 0.8m in the location of feature 1001.



3.12 Area 11

- 3.12.1 This area was identified through the strong presence of ridge and furrow in the LiDAR data orientated north-east to south-west and this was observed on site as feature 1101 (**Figure 12** and **Plate 14**).
- 3.12.2 The ridge width is consistent with much of the instances identified in the other survey areas at approximately 4m. The survey area is relatively narrow but viewing the feature in its wider context from the available LiDAR data it exhibits a slight curve in plan, again associating this feature with earlier ridge and furrow from the medieval period.

4 DISCUSSION

4.1 Summary

- 4.1.1 The surveys successfully recorded topographic features at all 11 survey areas identifying likely medieval features associated with salt production in the southern part of the scheme (Areas 1 to 3) and ridge and furrow in the north (Areas 6 and 8 to 11).
- 4.1.2 The field surveys correlated with the LiDAR assessment except in survey Areas 4 and 7. At Area 4, the features that were evident in the LiDAR assessment could not be identified on the ground, possibly due to modern ploughing methods.
- 4.1.3 Area 7 showed no visible sign of the ridge and furrow identified from the LiDAR data though the survey did identify a relevant feature in the form of a large mound with an associated bank.
- 4.1.4 A long bank feature recorded at Area 5 is most likely a natural feature which may have been archaeologically modified.

5 REFERENCES

5.1 Bibliography

Aston, M., 1985, Interpreting the Landscape

English Heritage, 2007, Understanding the Archaeology of Landscapes

Historic England, 2015a, Metric Survey Specifications for Cultural Heritage

Historic England, 2015b, Digital Image Capture and File Storage

- Royal HaskoningDHV, 2016, Hornsea Project ONE; Written Scheme of Investigation (WSI) for Earthwork Survey and Subsequent Restoration of Extant Earthworks
- RPS, 2013a, Hornsea Offshore Wind Farm Project One: Environmental Statement Volume 3 – Onshore. Chapter 5 Historic Environment (PINS Document Reference: 7.3.5)
- RPS, 2013b, Hornsea Offshore Wind Farm Project One: Environmental Statement Volume 6 – Onshore. Annex 6.6.1 Soil Types and Descriptions (PINS Document Reference: 7.6.6.1)
- RPS, 2013c, Hornsea Offshore Wind Farm Project One: Environmental Statement Volume 6 – Onshore. Annex 6.5.5: Trial Trenching Report (PINS Document Reference: 7.6.5.5)
- Wessex Archaeology, 2015, Hornsea Offshore Wind Project ONE: Archaeological Trial Trenching Report. WA Report reference: 110490.06 v07

5.2 Online sources

British Geological Survey, *Geology of Britain online viewer*, http://www.bgs.ac.uk/discoveringgeology/geologyofbritain/viewer.htm

Cranfield University, Soilscapes map, http://www.landis.org.uk/soilscapes/index.cfm



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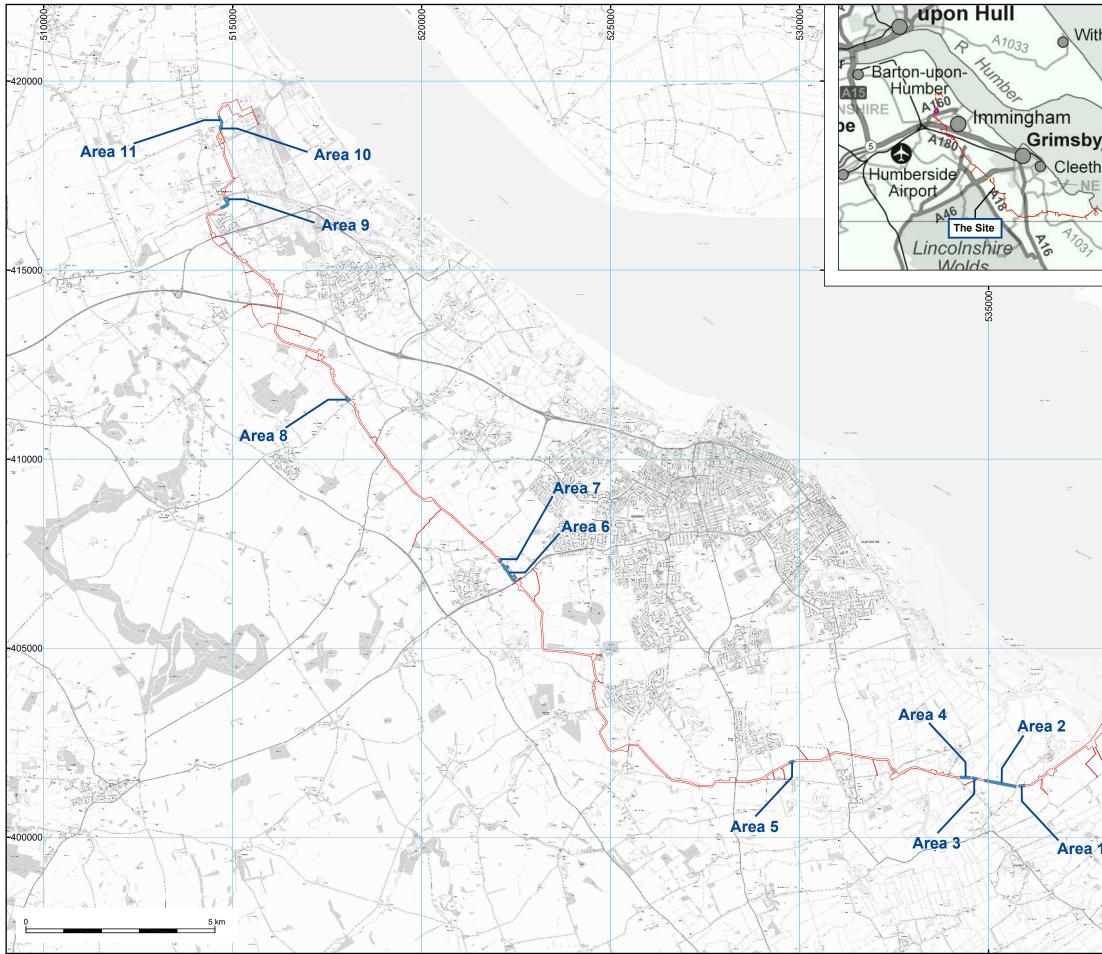
6 APPENDICES

6.1 Dimensions of topographic features

Feature	Feature type	Shape in Plan	Max width or diameter of feature	Max length	Level of max height / depth in metres above OS datum	Max change in height	Approximate distance between ridges tops	Approximate height difference between base of furrow and ride top
101	Mound	Sub-circular	123m	n/a	4.1m	1.8m	n/a	n/a
201	Mound	sub-rectangular orientated NE- SW	57m NW - SE	> 54m NE -SW continues beyond survey area to NW	3.97m	1.1m	n/a	n/a
202	Mound	Sub-circular	58m NW - SE	78m NE - SW	n/a	n/a	n/a	n/a
203	Bank	Linear with turn from N-S to E-W	17.5m	57m E-W; > 48m N-S continues beyond survey area N	4.35m	1.75m	n/a	n/a
204	Mound	Elliptical	93m	57m	4.6m	1.7m	n/a	n/a
205	Ditch	Linear orientated N-S	47.5m	>70m continues beyond survey area to N and S	Base was unsurveyable as working drain	> -1.8m	n/a	n/a
301	Mound	sub-rectangular orientated NE- SW	90m	140m	3.7m	1.2m	n/a	n/a
401	Bank	Linear running NW - SE	70m	>40m continues beyond survey area to N and S	3.4m	1.1m	n/a	n/a
501	Bank	Linear orientated N-S	82m	>60m runs beyond survey area to N and S	14.1m	3.5m	n/a	n/a
601	Ridge and furrow	Parallel bank and ditch system orientated NW-SE	160m	440m	n/a	n/a	two widths 9m & 6m	0.2m
701	Mound	Elliptical	95m	>110m, continues beyond survey area to SW	13.3m	3m	n/a	n/a
801	Ridge	Parallel bank and	75m	110m	n/a	n/a	9m	0.3m

Hornsea Offshore Wind Farm Project One Earthwork Survey Report

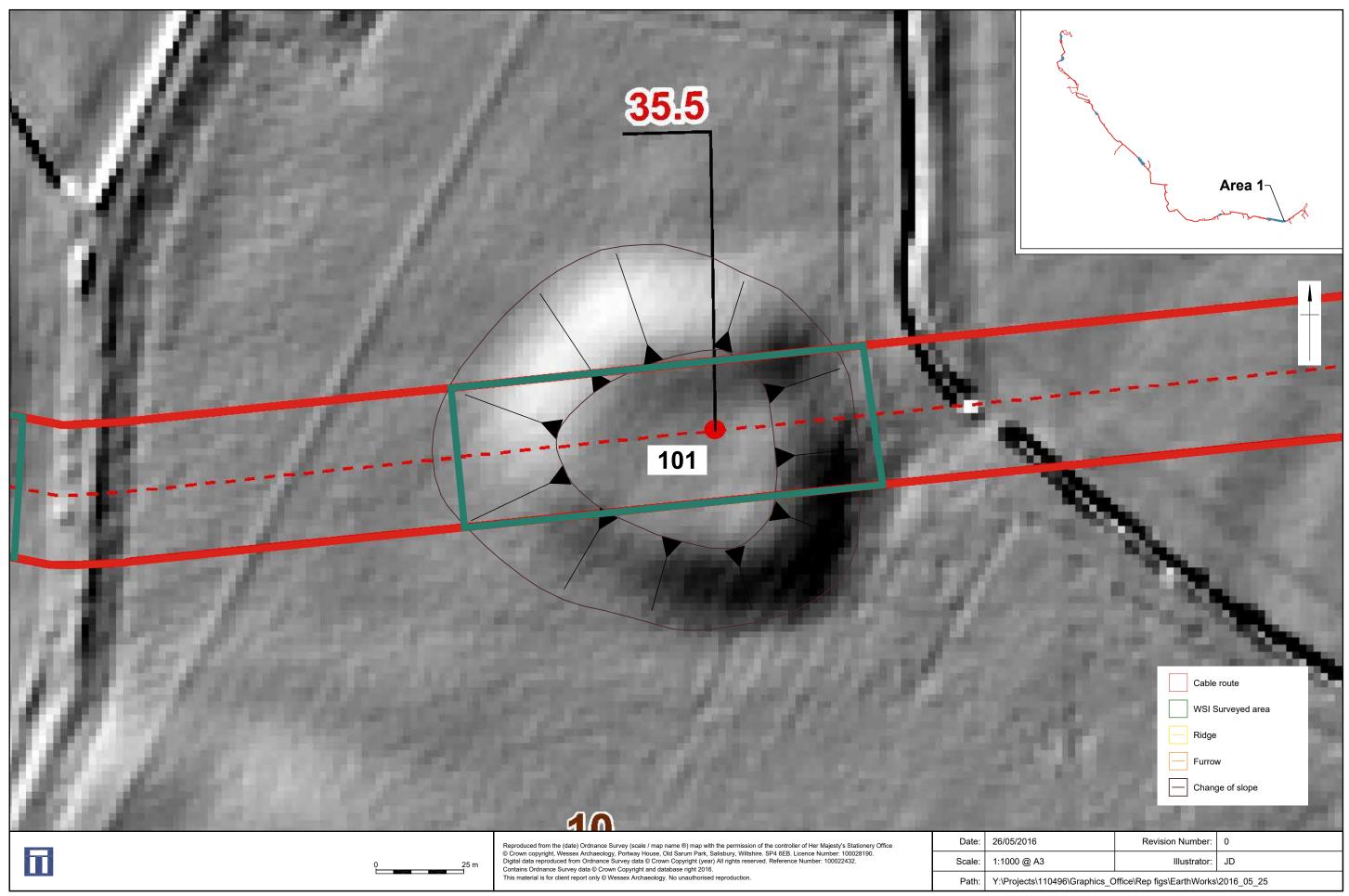
	and furrow	ditch system orientated NW-SE						
901	Ridge and furrow	Parallel bank and ditch system orientated NE-SW	85m	90m	n/a	n/a	9m	0.12m
902	Ridge and furrow	Parallel bank and ditch system orientated NW-SE	>68m continues byond survey area E	>98m, continues beyond survey area S	n/a	n/a	9m	0.2m
903	Bank	Semi-circular, facing NW	13m	10m	17.5m	0.15m	n/a	n/a
904	Ditch	Linear orientated N-S	10m	30m	16.99m - 17.4m	-0.2	n/a	n/a
905	Ditch	Linear orientated N-S	115m	5m	17.1m	-0.35	n/a	n/a
905	Bank	Linear with 90 degree turn, runs SE-NW before turning 90 W to meet N-S linear listed above	6m	15m SE-NW; 15m NE- SW	n/a		n/a	n/a
1001	Ridge and furrow	Parallel bank and ditch system orientated N-S	25m	82m	n/a	n/a	9m	0.12m
1002	Ridge and furrow	Parallel bank and ditch system orientated NW-SE	45m	145m	n/a	n/a	5m	0.1m
1101	Ridge and furrow	Parallel bank and ditch system orientated NE-SW	155m	120m	n/a	n/a	8m	0.1m



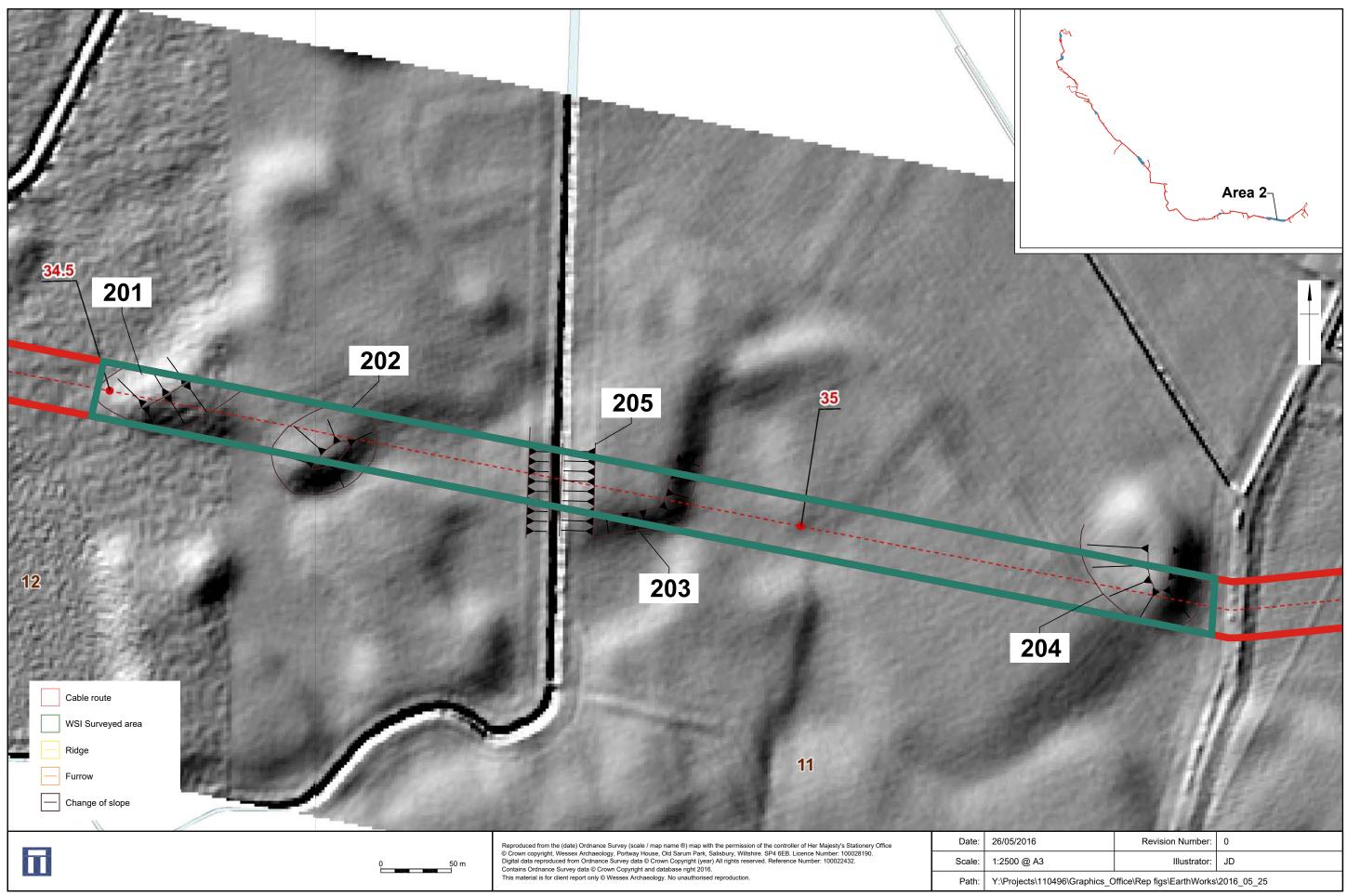
Site location

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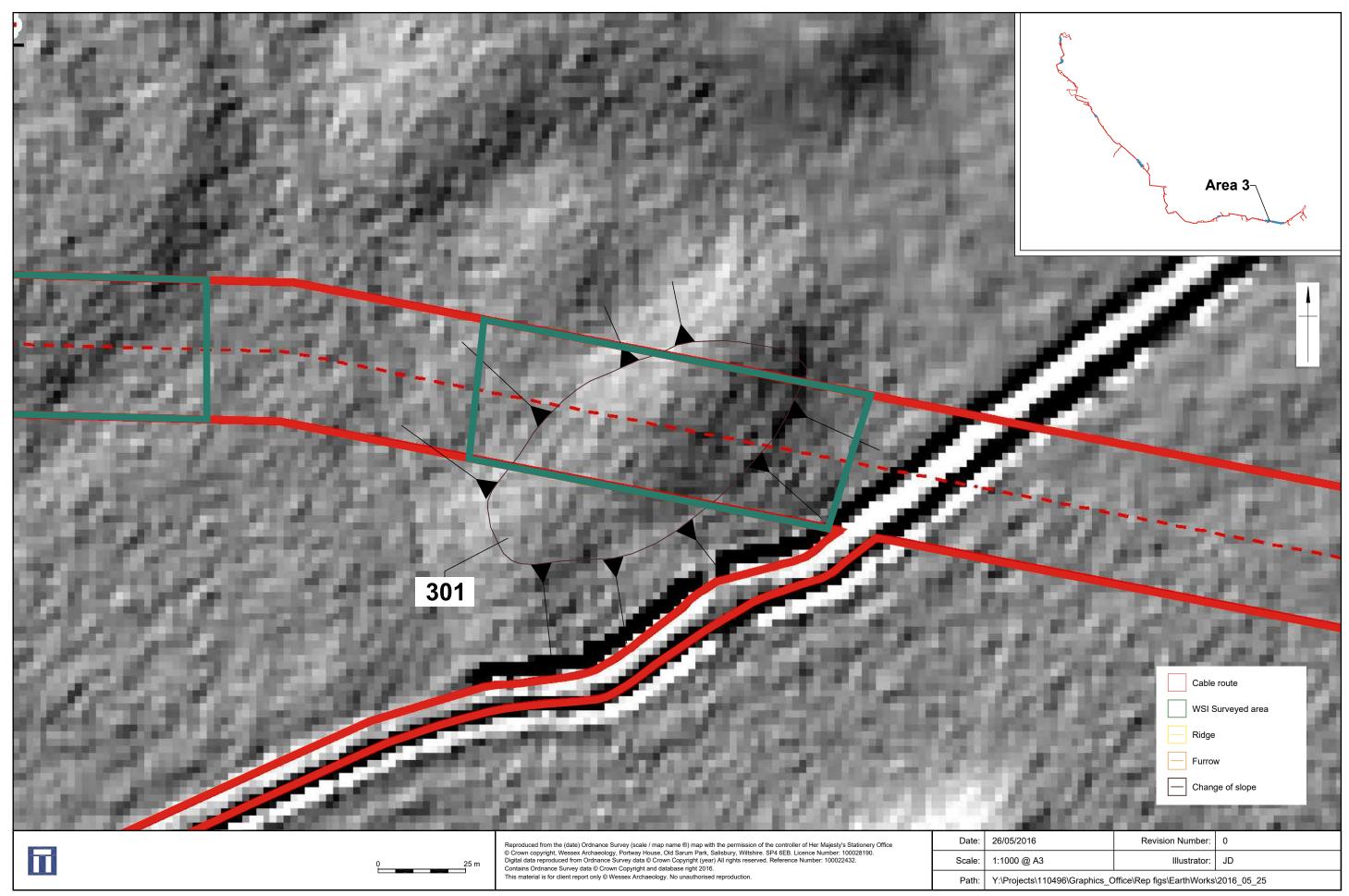
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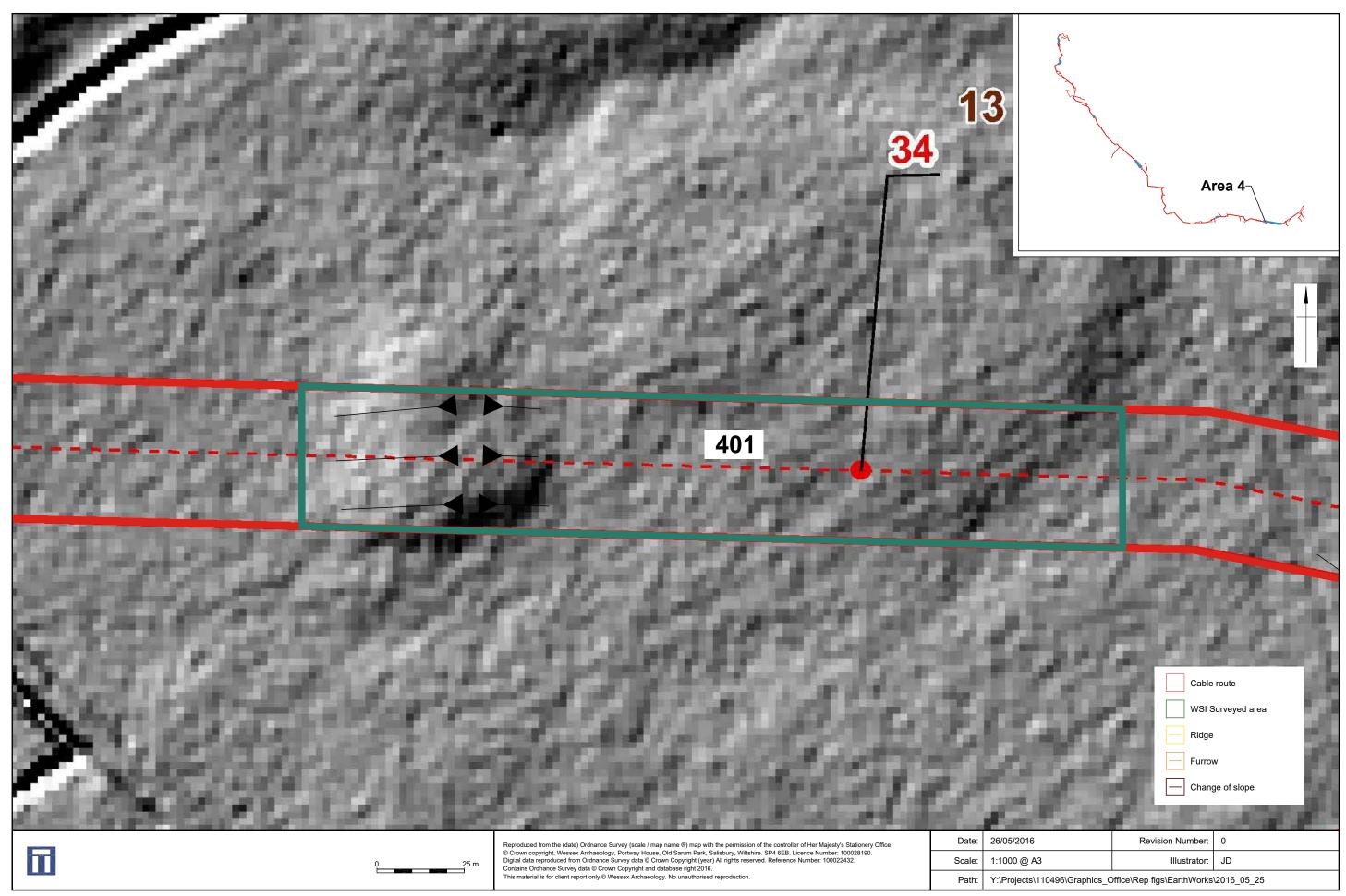
Plan of Area 1 topographic survey overlain on LiDAR hillshade



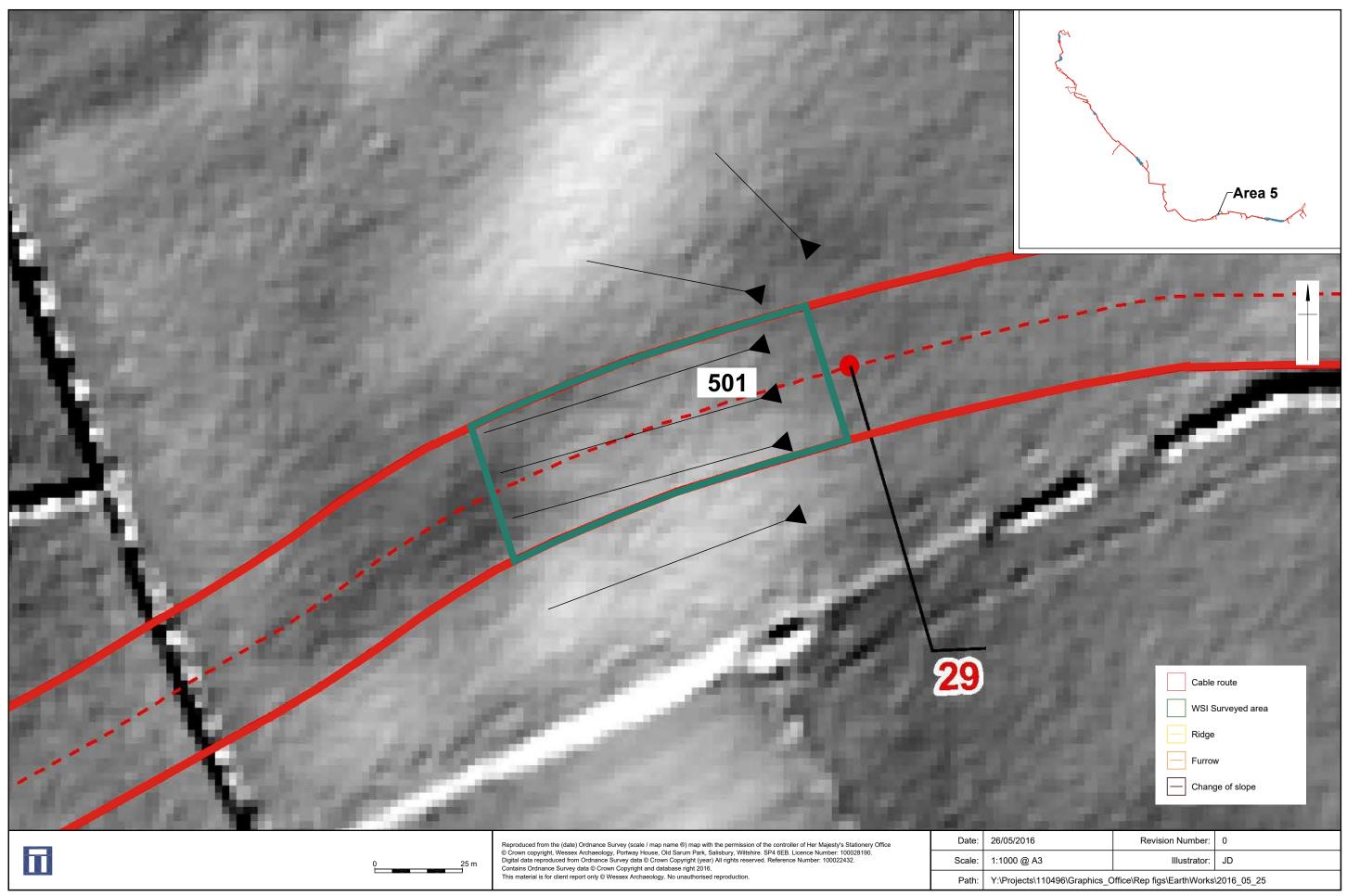
Plan of Area 2 topographic survey overlain on LiDAR hillshade



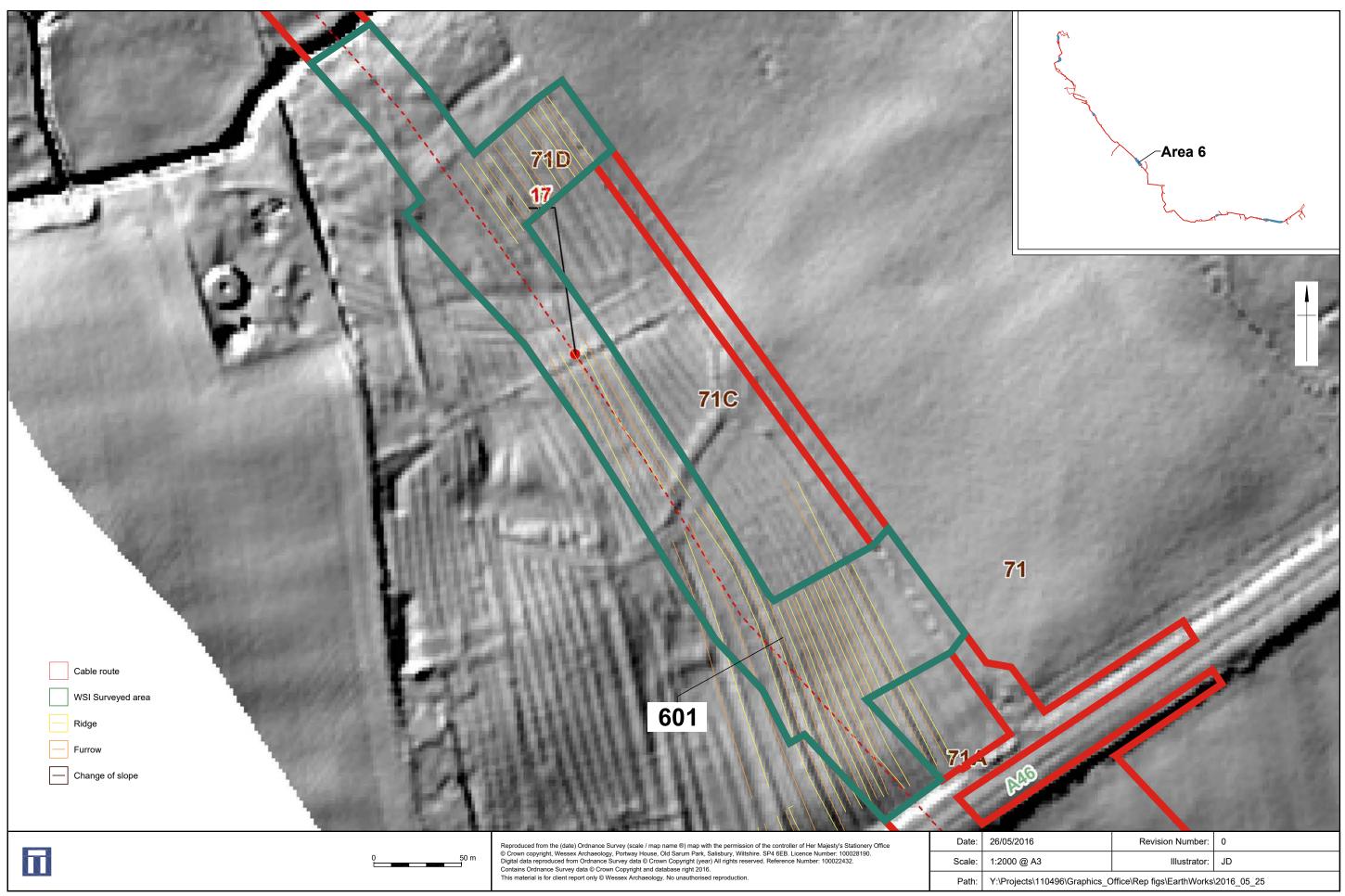
Plan of Area 3 topographic survey overlain on LiDAR hillshade



Plan of Area 4 topographic survey overlain on LiDAR hillshade

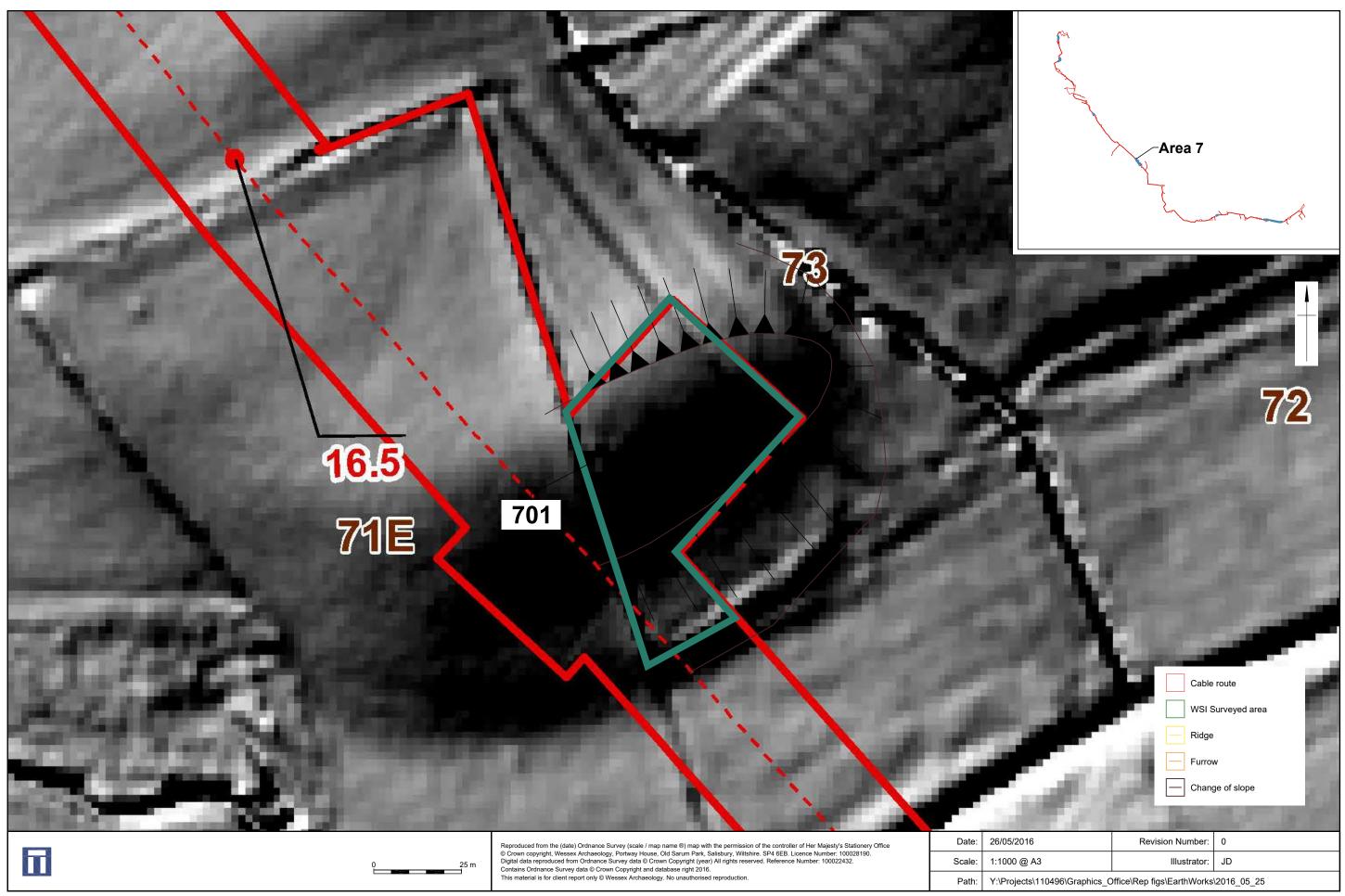


Plan of Area 5 topographic survey overlain on LiDAR hillshade

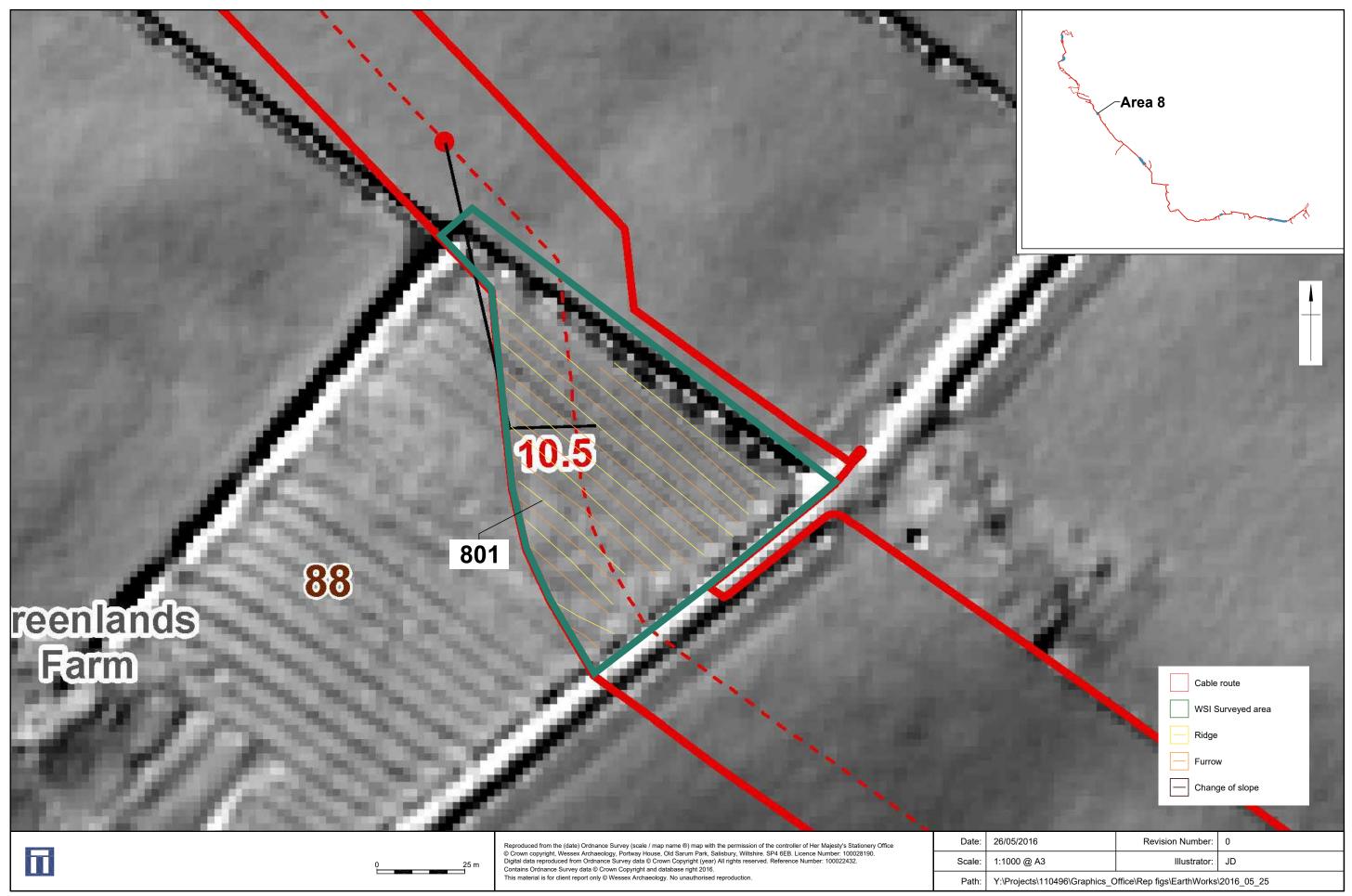


Plan of Area 6 topographic survey overlain on LiDAR hillshade

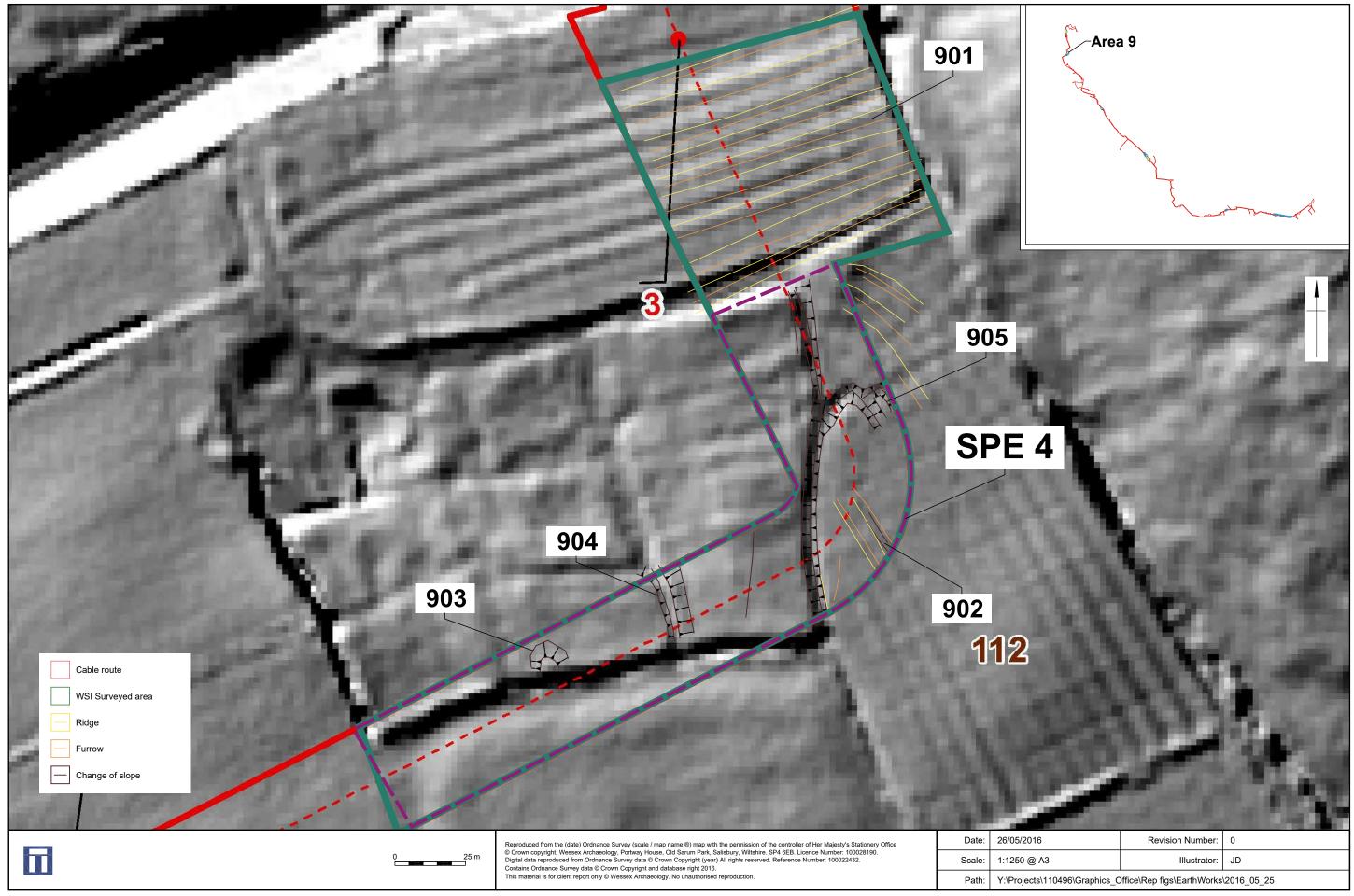




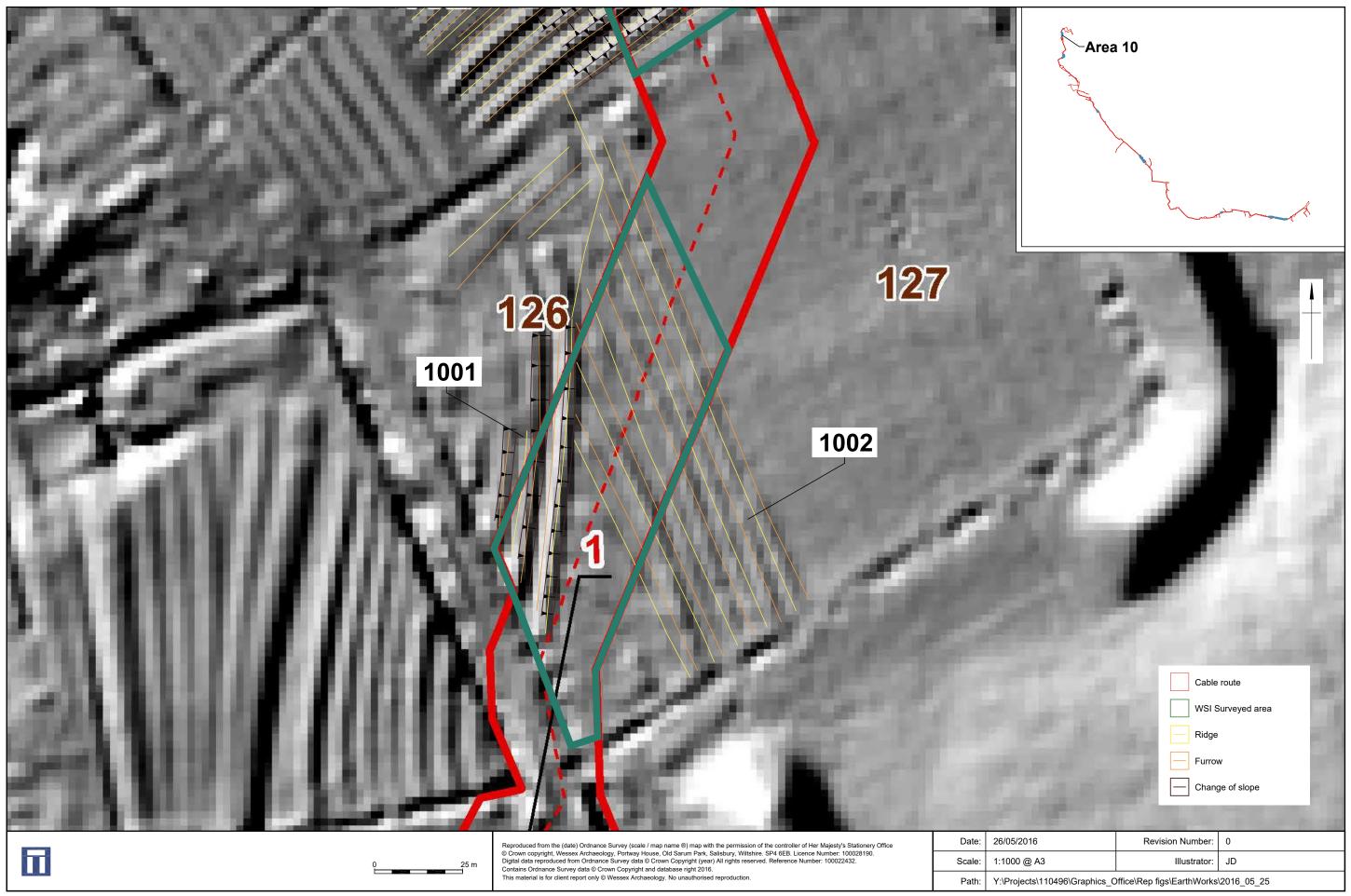
Plan of Area 7 topographic survey overlain on LiDAR hillshade



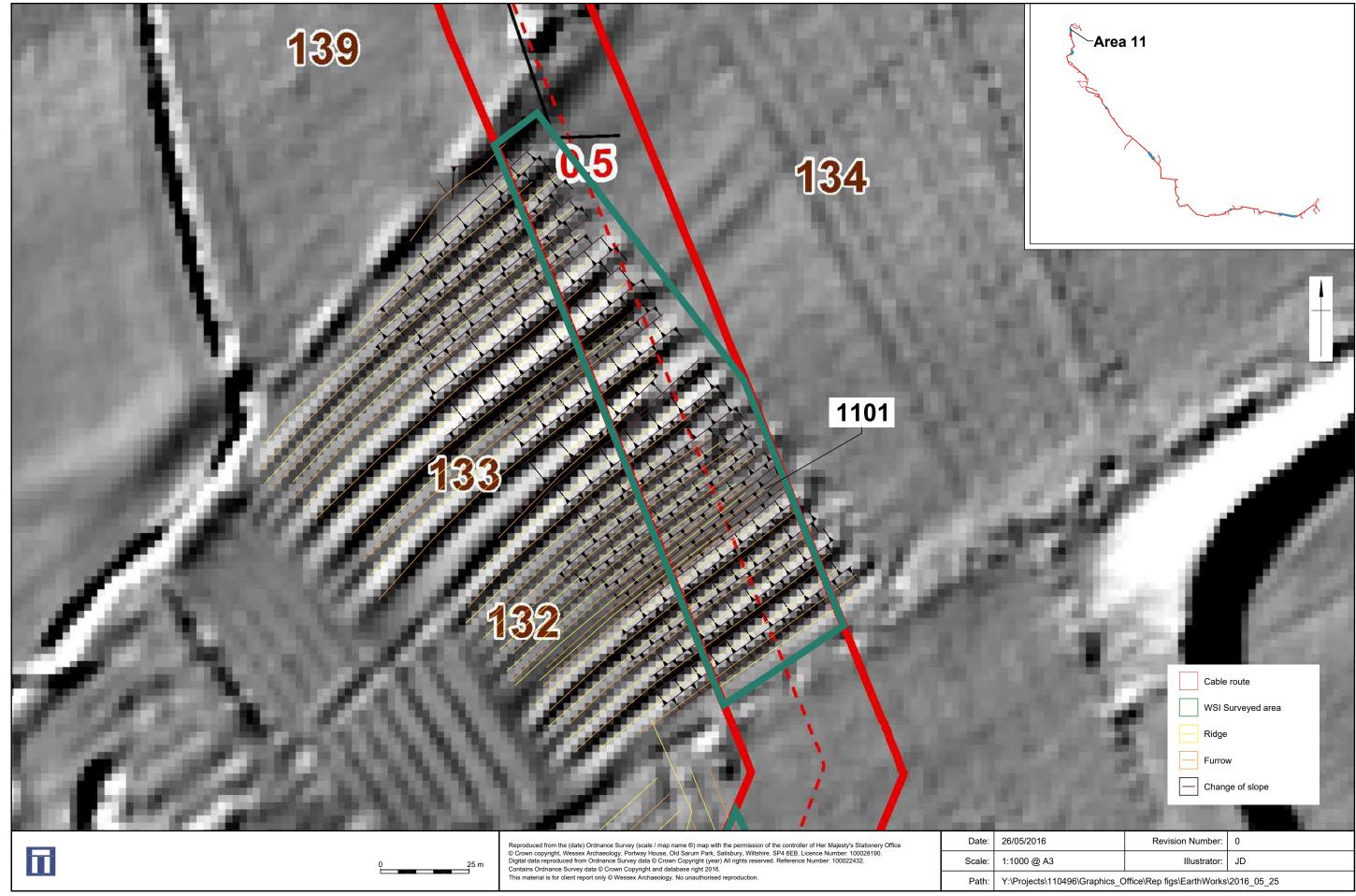
Plan of Area 8 topographic survey overlain on LiDAR hillshade



Plan of Area 9 topographic survey overlain on LiDAR hillshade



Plan of Area 10 topographic survey overlain on LiDAR hillshade



Plan of Area 11 topographic survey overlain on LiDAR hillshade



Plate 1: Circular mound 101 in Area 1, possibly a medieval saltern



Plate 2: Mound feature 201 in Area 2, possibly a medieval saltern

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Plate 3: Low mound 301 in Area 3, probably associated with medieval salt industry



Plate 4: View across Area 4, looking north-east

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Plate 5: View across bank feature 501 in Area 5, looking east



Plate 6: Area of well defined ridge and furrow, 601, in the southern part of Area 6

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Plate 7: Ridge and furrow 601 in northern part of Area 6



Plate 8: View across large mound feature 701

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Plate 9: Bank at the southernmost edge of feature 701



Plate 10: Ridge and furrow 801 in Area 8

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Plate 11: Ridge and furrow 901 in northern part of Area 9



Plate 12: Feature 905 in Area 9, looking north-east

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Plate 13: Ridge and furrow 1002 in eastern part of Area 10



Plate 14: Ridge and furrow 1101 in Area 11

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