



# Halvergate, Great Yarmouth, Norfolk

## Earthwork Survey Report

**March 2023**

**Client: Broads Internal Drainage Board\Water Management Alliance**

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## Halvergate, Great Yarmouth, Norfolk

### *Earthwork Survey Report*

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## Summary

Oxford Archaeology East were commissioned to carry out an earthwork survey at Halvergate near Great Yarmouth in Norfolk (TG 4898 0789), in advance of habitat improvement works. The site was split into 16 fields (A-P) and surveyed in two phases. The first phase took place on the 24<sup>th</sup> January 2023 and consisted of a topographic spot height survey carried out through the use of UAVs. This also included a photographic survey of Lockgate Mill. The second phase took place over two days between 31<sup>st</sup> January to 7<sup>th</sup> February 2023 and consisted of an interpretive line survey using GNSS systems.

A total of 77 earthwork features were identified with a suspected date range spanning the Late Anglo-Saxon to modern periods. The landscape is covered with natural drainage channels, some of which have been recut and repurposed into enclosures and drainage ditches. There is also evidence for frequent modifications to field boundaries and changes in the alignments of field systems.

Evidence of multiple forms of land use were identified from the earthworks characterised during the survey, including salt extraction, animal husbandry and a possible floated water-meadow.

## Acknowledgements

Oxford Archaeology East would like to thank Roy Howath and Matthew Philpot for commissioning this project. Thanks are also extended to Steve Hickling who designed the brief and monitored the works on behalf of Norfolk County Council Community and Environment Services.

The project was managed for Oxford Archaeology East by Gareth Rees. The fieldwork was directed by Thomas Houghton and Gareth Rees, who were supported by Daria Adamson, Joe Ferrier and Katharine Waring. James Fairbairn carried out the photographic survey of the windmill. Digitising was carried out by Thomas Houghton and Dave Brown, who also produced the figures.



## 1 INTRODUCTION

### 1.1 Scope of work

- 1.1.1 Oxford Archaeology East (OA East) were commissioned by the Broads Internal Drainage Board\Water Management Alliance to undertake an earthwork survey at Halvergate, to the west of Great Yarmouth, in advance of habitat improvement works (Fig. 1; TG 4898 0789).
- 1.1.2 The work was undertaken as a condition of planning permission BA/2022/0321. A brief was set by Steve Hickling (2022) of Norfolk County Council Community and Environment Services (NCCCES) outlining the local authority's requirements considered necessary to inform the planning process. A Written Scheme of Investigation (WSI) was produced which detailed the methods by which OA East proposed to meet the requirements of the brief (Rees 2022). The fieldwork took place between 24<sup>th</sup> January to 7<sup>th</sup> February 2023.
- 1.1.3 The site archive is currently held by OA East and will be deposited with Norfolk Museum Service (NMS) in due course under accession number NWHCM 2023.74.

### 1.2 Location, topography and geology

- 1.2.1 The site is located in the parish of Halvergate, c. 2.5km to the west of Great Yarmouth and is situated in the south-eastern part of the Norfolk Broads landscape (TG 4898 0789). It is bounded to the south and east by the River Yare and the North Breydon Flats. Agricultural fields bound the north and west of the site. The Wherry Railway Line which runs between Great Yarmouth and Norwich crosses through part of the investigation area.
- 1.2.2 The site mostly comprises flat, grazed marshland with drainage channels running throughout and the investigation area lies at approximately 0m OD. Breydon Water is designated as a Site of Special Scientific Interest (SSSI) and part of RSPB Berney Marshes and Breydon Water Nature Reserve.
- 1.2.3 The geology of the area comprises Breydon Clay and Silt overlying bedrock Crag Group Sand and Gravel (British Geological Society 2023).

### 1.3 Archaeological and historical background

- 1.3.1 The following archaeological and historical background is taken from a Desk-based Assessment (DBA) prepared by Heather Wallis in October 2022 (Wallis 2022). The information presented in this section is based on a c. 0.75km search of the Norfolk Historic Environment Record (NHER) and is supplemented by information from historic maps and documentary sources.
- 1.3.2 Select NHER and National Mapping Project (NMP) data is presented in Fig. 2.

#### *Late Anglo-Saxon to medieval (c. AD 850-1500)*

- 1.3.3 The earliest activity recorded in the vicinity dates from the Late Anglo-Saxon to medieval periods. Six probable saltern mounds have been identified through analysis

of aerial photographs and are likely to be of either Late Anglo-Saxon or medieval date (NHER 10412, NHER 35368 (not illustrated), NHER 42415, NHER 42416, NHER 42432 and NHER 42443).

- 1.3.4 Two further probable saltern mounds, also identified through analysis of aerial photographs, have been assigned a medieval date (NHER 42159 and NHER 42168). Evidence suggests that both these mounds had been levelled by the 1980s.

### *Post-medieval (c. AD 1500-1750)*

- 1.3.5 The majority of the post-medieval remains in the vicinity of the site comprise drainage ditches and banks, all of which have been recorded through analysis of aerial photographs. Most of the ditches and banks are sinuous and follow the line of natural streams across the marsh. A few areas have concentrations of parallel linear ditches.
- 1.3.6 Paddy's Loke (NHER 4324) is a raised track which follows a sinuous route across the northern part of the marshes, leading eastwards to Great Yarmouth and is still visible in the landscape today. It has been suggested that this is part of the earliest road/track leading from the marshes to the town of Great Yarmouth. The line of the watercourse which the track follows forms the boundary between several of the pre-modern parishes, suggesting it is of an early date. Similarly, earthworks recorded at three other locations also follow the early parish boundaries (NHER 42417, NHER 42420 and NHER 42433).
- 1.3.7 Six small enclosures have been identified in the vicinity, all of which have been interpreted as sheep cotes. Three of these lay within the survey area (NHER 42189, NHER 42116 and NHER 42167), with three more similar examples present in the surrounding landscape (NHER 42200, NHER 42201 and NHER 42164). To the west of the site, a possible stack stand (NHER 18187) has been recorded along with a pond (NHER 43487) and a clay extraction pit (NHER 42163). To the north, and now partially under the A47 Acle Straight, a possible post-medieval mound of unknown function has been recorded (NHER 43488). Several of these sites were levelled during the latter half of the 20th century.
- 1.3.8 Three areas of possible ridge and furrow have been identified in the vicinity (NHER 42160 and NHER 42202), one of which is situated within the survey area (NHER 42439). The narrow form of the ridge and furrow is indicative of a post-medieval date. Two areas of drainage ditches have also been recorded (NHER 4322 and NHER 42422) to the north and west of the site and post-medieval pottery has been found near to Lockgate Farmhouse (NHER 31878; not illustrated). At the south end of the site is Lockgate Mill, also known as Breydon North Wall Mill (NHER 10406; not illustrated). This is a Grade II listed brick tower mill built in the late 19th century which survives in a semi-derelict state.
- 1.3.9 Just beyond the northern end of the site and on the bank of Breydon Water, a hollow-post mill once stood (NHER 58851; not illustrated). Its location is known only because it was referenced by Arthur Patterson, a local writer and naturalist (1857-1935). A 19th-century steam powered drainage pump is also located near to the site, on the banks of the River Bure (NHER 42910; not illustrated).

1.3.10 All other post-medieval remains recorded in the vicinity are located on the margins of Breydon Water and this includes wooden posts which once formed revetements (NHER 42172 and NHER 42173), areas of former oyster pits (NHER 42169 and NHER 42170) and the remains of two jetties (NHER 41622 and NHER 41623; not illustrated).

***Modern (c. AD 1750-present)***

1.3.11 Evidence of both First and Second World War activity has been recorded in the vicinity of the site. First World War pillboxes are located on either side of the A47 Acle Straight (NHER 18493 and NHER 18494), with a further pillbox located on the western edge of Breydon Water (NHER 14851). The former are polygonal in shape and both extant, with the latter recorded as having been circular and no longer visible. It may have been buried within the modern flood bank or could have been removed. Second World War bomb craters have also been recorded from aerial photographs in the vicinity of the site (NHER 42165 and NHER 27615).

## 2 EXCAVATION AIMS AND METHODOLOGY

### 2.1 Aims

2.1.1 The project aims and objectives were to identify, measure, characterise and record all archaeological features that survive above ground as earthworks within the survey area.

### 2.2 Regional research aims

2.2.1 The earthwork survey took place with consideration of, and aims to contribute to, the goals of the updated *East of England Regional Research Framework* (ALGAO East of England 2021).

2.2.2 The following former Regional Research Frameworks were also considered:

- *Research and Archaeology: A Framework for the Eastern counties: 2. Research Agenda and Strategy* (Brown and Glazebrook 2000)
- *Research and Archaeology Revisited: A Revised Framework for the East of England* (Medlycott 2011)

### 2.3 Fieldwork Methodology

2.3.1 The methodology followed that outlined in the brief (Hickling 2022) and detailed in the WSI (Rees 2022). All stages of the project adhered to the *Standards for development-led archaeological projects in Norfolk* produced by NCCCES (Robertson *et al.* 2018)

2.3.2 The survey consisted of two elements:

- i. A topographic spot height survey
- ii. An interpretive line survey

2.3.3 The topographic survey was carried out by an Unmanned Aerial Vehicle (UAV) to cover the entire area, giving spot heights at least every 100mm. A high-resolution digital elevation model (DEM) was then created from this data in order to identify and target earthwork sites. These sites were then subject to traditional survey grade GNSS interpretive survey.

2.3.4 The topographic survey was carried out photogrammetrically using a DJI Phantom 4 Pro V2 UAV and a DJI Mavic 3E, with an integrated 20MP\1-inch CMOS sensor camera, under the control of a qualified CAA approved pilot. A check for overhead services, no-fly zones and ground-based hazards, such as pedestrians and livestock, was conducted prior to the flight.

2.3.5 The UAV flew no more than 50m above ground level, lower if ground hazards permitted. The flight path did not overfly the railway or land outside of the site.

2.3.6 Multiple flights were needed to cover the entirety of the site, so each flight consisted of transects flown across a block of the survey area. Each block overlapped to form a single photogrammetric data set. Photographs were taken at intervals along these transects at a distance and overlap (c. 75%) appropriate to produce the required

resolution (>10cm per pixel). Additional oblique photos were also taken in areas where features were not visible from directly above.

- 2.3.7 Ground control points (GCPs) were established throughout the survey area using a Leica survey grade differential GNSS unit (using GS16 sensor), tied into the OS grid using a dGPS with SMARTNET correctional data.
- 2.3.8 The interpretive survey consisted of taking measurements of the breaks of slope for all earthworks as well as any other prominent features on the site – including obstructions.
- 2.3.9 Cross-sections were recorded across significant earthwork features.
- 2.3.10 Photogrammetric surveys were processed using Agisoft Metashape Pro software to create DEMs and top-down orthophotos.
- 2.3.11 The photographic survey was undertaken at Lockgate Mill using a Nikon D90 digital camera fitted with a Nikon DX AF-S Nikkor 18-105 zoom lens. Photographs were taken of external features from the north, south-east and west as well as close-up shots of any architectural features noted. Two metre and one metre scales were used for external reference. Photographs of the mill in its surroundings were also taken to show its geographical context. Internal photographs were also taken from the doorway. Photographs were supplemented from the drone survey carried out at the same time.

## 3 RESULTS

### 3.1 Introduction and presentation of results

- 3.1.1 The results of the earthwork survey are presented below, primarily as a description of the interpretive survey. The results of the topographic survey are presented as a digital elevation model (DEM) in Figs 3-5, 7-9, 11, 12 and 14, with key features detailed with hachure plans and profiles in Figs 6, 7, 10 and 13, to illustrate the objective basis for the interpretative descriptions.
- 3.1.2 The earthwork survey area was split into 16 fields (annotated A-P), across which the survey identified 77 features. These consisted of multiple linear features and possible enclosures, three building platforms, two possible sheep cotes, one area of water-meadow irrigation, one possible saltern and several modern features.
- 3.1.3 For the purpose of this report, the 77 features identified have been numbered (1-77), as annotated on the DEM (Fig. 3) and hachured plans, and are presented below by field.

### 3.2 Results

#### *Field A*

- 3.2.1 The scope of the earthwork survey was restricted to the south-east corner of this field (Figs 5 and 6). The main feature within the site boundary in Field A is a possible Late Anglo-Saxon to medieval saltern mound (Feature 1) which is cut by a modern drainage ditch on its north-west edge. The saltern measures c. 45m by 25m, has a height of around 0.65m and is identified in the NHER as one of three similar earthworks in this field (NHER 42443, MNF48095).
- 3.2.2 Directly to the south there is evidence of a possible c. 8.5m wide ditch earthwork, with a depth of 0.4m, that follows the extent of the current south-east field boundary ditch (Feature 2). This runs for a visible stretch of 50m before terminating directly south of Feature 1.
- 3.2.3 To the north of the possible saltern runs a heavily eroded north-east to south-west aligned drainage ditch with a current depth of c. 0.2m. Its size (up to c. 20m wide in places) and irregular form suggests it is likely a repurposed natural drainage channel that continues to the north-west, outside of the surveyed area (Feature 3). There is also possible evidence for a raised bank (c. 0.2m height) on the south-west edge of this feature.
- 3.2.4 Both linear features have been disturbed by modern drainage works and diversions at the eastern extent of Field A (visible on Google Earth imagery).

#### *Field B*

- 3.2.5 This field contains a series of modern drainage works, as well as a large modern lake developed for bird habitation (Fig. 5). Nothing of archaeological significance was identified within the surveyed part of this field.

### ***Field C***

- 3.2.6 The south-west corner of Field C (Figs 7 and 8) contains a c. 2m wide circular pit with a depth of around 0.45m (Feature 4).
- 3.2.7 Two irregular linear features were also identified running parallel with one another, about 25m apart (Features 5 and 6). Both features consist of shallow, north to south aligned ditches and banks, measuring c. 12m wide. Feature 5 has a depth of around 0.2m, while Feature 6 is shallower with a depth of c. 0.1m.
- 3.2.8 A c. 2m wide drainage ditch, with a depth of c. 0.2m, is present in the north-east corner of the surveyed area (Feature 7). This spans the c. 25m distance between the current northern boundary ditch and the terminus of an irregular natural channel, likely repurposed for drainage.
- 3.2.9 Feature 8 represents a ditch and bank, which is obscured by a modern track just inside the surveyed area, but where visible, measures c. 10m wide by 0.3m deep. The northern bank is better preserved and continues eastwards, outside of the surveyed area. No remains of a bank are visible for Feature 9, which measures c. 45m long, c. 3m wide and c. 0.1m deep.

### ***Field D***

- 3.2.10 Feature 10 represents a bank (c. 30m wide by 0.4m high) that runs north-east to south-west across the centre of Field D (Figs 5 and 6) and continues eastwards beyond the surveyed area. It is possible that it re-emerges in Field H as Feature 36.
- 3.2.11 Feature 11 is a significant ditch and bank, c. 45m wide, that runs north-east to south-west across Field D and continues eastward beyond the surveyed area. The banks measure c. 0.3m high from the base of the ditch. It is possible that it re-emerges in Field G as Feature 26.
- 3.2.12 Ditches present in this field on the NHER (e.g., NHER 42446) were not identified either on the DEM or during the interpretative survey.

### ***Field E***

- 3.2.13 Field E (Fig. 5) contains three small possible drainage ditches that span the distance between the track and modern enclosure ditch. Feature 12 is a narrow linear feature that measures c. 1m wide by 0.2m deep, Feature 13 has a regular 'zigzag' shape and measures c. 2.5m wide by 0.15m deep and Feature 14 is curvilinear and likely represents a repurposed natural channel, and measures c. 2m wide by 0.2m deep.
- 3.2.14 Field E also contains a platform upon which Lockgate Mill was constructed (Feature 15). The platform measures c. 25m by 45m and has a maximum height of c. 0.7m. The south-west edge of the platform is currently used by cattle to access water in the disused by-pass channel.

### ***Field F***

- 3.2.15 Field F (Fig. 8) contains a platform (Feature 16) within which sits the demolition rubble of a former concrete building. The platform itself measures c. 50m long by 25m wide,

with a height of around 0.4m and abuts the north-west extant modern field boundary ditch. There is a slight depression that runs from the south-east of the building to the north-east side of the platform, which may represent a path or track once used to access the building from the north-east.

- 3.2.16 Also within Field F is a small, irregular enclosure that measures c. 16m long by 10m wide, with the surrounding ditch measuring c. 0.2m deep (Feature 17). This appears to form the south-west corner of a north-west to south-east aligned field system.
- 3.2.17 At the centre of field F, Features 18 and 21 form the extent of a north-west to south-east aligned field system (c. 190m in length) which runs into the current boundary ditch to the north. Features 19 and 20 are curvilinear drainage ditches that split this field system into three separate enclosures.
- 3.2.18 The eastern extent of the field contains a series of narrow, sharply cut drainage ditches, possibly representing repurposed natural channels, that may form small enclosures (Features 22-24). All these ditches are about 2m wide and about 0.2m deep.
- 3.2.19 Feature 25 consists of ten raised earthworks of unknown purpose, present in the eastern corner of the field. These appear as two single and four pairs of parallel banks around c. 10-12m long, 1.5m apart and 0.1m high.

### ***Field G***

- 3.2.20 Field G (Figs 8 and 9) contains a ditch and bank earthwork (Feature 26) orientated north-east to south-west, which may be a continuation of Feature 11. The feature measures c. 14m wide by 0.25m deep and continues north-east into field H as Feature 37.
- 3.2.21 The field also contains a series of repurposed natural drainage channels (Feature 27), that have been recut as possible small circular enclosures (Features 28-29). Feature 28 measures around 12m across while Feature 29 is larger at c. 18m across. Google Earth imagery shows that these features have undergone modern recutting.
- 3.2.22 Connected to this system is a possible square sheep cote enclosure previously identified as NHER 42189 (Feature 30). This enclosure measures c. 20m by 20m, with the surrounding ditch measuring c. 0.25m deep and the associated banks c. 0.15m high. Gaps in the bank suggest possible entrances on the north-west and south-east corners.
- 3.2.23 Raised earthworks (Feature 31 and 32) are also present and may represent elements of an earlier north-west to south-east aligned field system. These have an irregular size with a width of between c. 6-10m and height of between c. 0.1-0.15m.
- 3.2.24 The south-east corner of Field G contains two ditches (Feature 33 and 34) that form a north-east to south-west aligned drainage system, which run into the modern field boundaries.



### ***Field H***

- 3.2.25 Field H (Figs 9 and 10) contains a small bank earthwork, c. 6m wide by 0.15m high, that runs c. 60m east before terminating at the modern field boundary ditch (Feature 35).
- 3.2.26 Directly to the south of this feature is a second, larger bank earthwork with the same alignment that spans the width of the field (Feature 36). At c. 18m wide and c. 0.35m high, this bank may be the continuation of Feature 10 identified in Field D. The bank appears to turn to the south-east before it reaches the current boundary ditch, ending c. 20m after crossing Feature 37.
- 3.2.27 Feature 37 is the continuation of bank and ditch Feature 26. The feature measures c. 14m wide by 0.4m deep and continues north-east before it terminates, where it meets bank earthwork Feature 36. It then appears to restart after the bank and continues into Field I as Feature 40.
- 3.2.28 Raised earthworks (Features 38 and 39) are also present and may represent parts of an earlier north-west to south-east aligned field system. These are an irregular size with a width of between c. 6-8m and a height of between c. 0.1-0.15m.

### ***Field I***

- 3.2.29 Field I (Figs 9 and 10) contains Feature 40, a continuation of bank and ditch Feature 37, which appears to turn to the south. This north to south aligned stretch of the earthwork is c. 9m wide by 0.3m deep, with a c. 0.2m high bank on its eastern edge. It appears to be on a similar alignment to Feature 44.
- 3.2.30 Feature 41 is another bank and ditch earthwork that runs on an east-north-east to west-south-west alignment, before turning and terminating to the north. It measures c. 8m wide by 0.2m deep and connects to the square enclosure ditch of a possible building platform (Feature 43).
- 3.2.31 Feature 42 is a bank measuring c. 12m wide by 0.2m high which follows the extent of the current enclosure ditch.
- 3.2.32 Field I also contains a possible rectangular building platform and enclosing ditch which measures c. 45m by 20m (Feature 43). The associated ditch measures c. 0.45m deep and appears to have a bank on its western and southern edges (c. 0.3m high). A gap in the bank of the south-west corner of the enclosure may represent an entrance to the adjoining south-west enclosure. The northern edge of the platform is bounded by a shallow ditch and bank, c. 4m wide by 0.15m deep.
- 3.2.33 A sharply cut drainage ditch (Feature 45) runs north-east/south-west from the western end of Feature 46 and measure c. 2.1m wide and c.0.1m deep.
- 3.2.34 The irrigation channels of a floated water-meadow are bounded by an east to west drainage ditch to the north, which has a uniform width of c. 5m (Feature 46). The south-east extensions extend into the area of the water-meadow and north into an area of natural drainage. This ditch appears to be a modern recut for the purposes of drainage along the line of an older boundary.

3.2.35 The possible floated water-meadow is present in the south-east corner of Field I and is situated on a north-west to south-east alignment (Feature 47). Four ridges and two channels are visible. The channels measure from c. 8-10m wide over an area of c. 75m and the ridges are c. 0.25m high.

### *Field J*

3.2.36 Field J (Fig. 11) contains the remains of a shallow ditch and bank running north-east to south-west alongside the current northern boundary ditch of the field (Feature 48). This measures c. 13m across with a depth of c. 0.15m.

3.2.37 Field J also contains a large modern lake developed for bird habitation (Feature 52) as well as a series of related drainage ditches around c. 5-7m wide (Features 49-51).

### *Field K*

3.2.38 The southern section of Field K (Figs 12 and 13) contains a c. 2m wide east to west drainage ditch (c. 33m long by 1.8m deep), which runs into the current western field boundary ditch (Feature 53).

3.2.39 To the north-west of feature 53 is a small, oval pit measuring c. 2m by 1.5m, with a depth of c. 0.1m (Feature 54).

3.2.40 To the north of this small pit is a north-east to south-west aligned enclosure (c. 55m by 38m) which runs into the modern eastern boundary ditch (Features 55 and 56). The ditch ranges from c. 1.45m wide in the south to c. 3m wide in the north, with a consistent depth of around 0.15m.

3.2.41 The south-west corner of this enclosure is cut by a large pit (Feature 57). This measures c. 25m long, c. 8m wide and c. 0.3m deep.

3.2.42 Field K also contains a series of repurposed natural channels for drainage (Features 58 and 59). Feature 58 measures c. 5.5m wide by 0.3m deep and runs into an east-south-east to west-north-west aligned enclosure ditch (Feature 60). Feature 59 is a curvilinear diversion from Feature 60 and measures up to c. 5.5m wide by 0.5m deep.

3.2.43 A regular linear enclosure ditch was identified in Field K, measuring c. 0.15m deep and c. 2.5m wide (Feature 60). This ditch runs on a north-north-east to south-south-west alignment, before turning east-south-east to west-north-west and running into the modern field boundary ditch. This continues in Field L as Feature 64.

3.2.44 A rectangular sheep cote (Feature 61) was identified within this enclosure (NHER 42116). It measures c. 25m wide by 13m long. The surrounding enclosure ditch measures c. 0.2m deep and has a width of between c. 2.5-3.5m. The platform inside the enclosure is slightly raised from the surrounding area, with a height of c. 0.1m.

### *Field L*

3.2.45 Field L (Figs 12 and 13) contains a long boundary ditch (Feature 67) that runs the entire length of the field on a north-east to south-west alignment. The ditch measures c. 4.5m wide by 0.3m deep.

- 3.2.46 There is also an irregular enclosure (Feature 62) that respects Feature 67 and may relate to the repurposing of natural drainage channels. This varies between c. 4m-6m wide and is around c. 0.35m deep.
- 3.2.47 To the north of this enclosure is a small, irregular shaped pit (Feature 63) which measures c. 6m long by 4m wide, with a depth of c. 0.2m.
- 3.2.48 To the north of this pit runs the continuation of the east-south-east to west-north-west enclosure ditch in Field K (Feature 64). This runs between the western current field boundary ditch and Feature 67, and has a width of c. 6m and depth of c. 0.35m.
- 3.2.49 Feature 66 is the possible northern extent of the enclosure consisting of Features 60 and 64, and runs between the western current field boundary ditch and Feature 67. This ditch measures c. 2m wide and c. 0.2m deep.
- 3.2.50 Feature 65 is a north/south running drainage/enclosure ditch which measures c. 2.5m wide and c. 0.2m in depth.
- 3.2.51 The northern part of this field also contains a series of small recut ditches that may be repurposed as enclosures or drainage ditches formed from natural channels (Features 66 and 68).

#### ***Field M***

- 3.2.52 Field M (Figs 12 and 14) contains no features of archaeological significance, but does contain a large modern lake developed for bird habitation (Feature 69).

#### ***Field N***

- 3.2.53 Field N (Fig. 14) contains a north-east to south-west aligned enclosure ditch measuring between 2.5-3m wide and 0.25m deep (Feature 70). It possibly represents an earlier version of the currently used field boundary ditch to the north.

#### ***Field O***

- 3.2.54 Field O (Fig. 14) contains a series of possible medieval to post-medieval drainage ditches that align with NHER 42417 (Features 71-73).

#### ***Field P***

- 3.2.55 Field P (Fig. 14) contains a possible small enclosure ditch and bank (Feature 74) as well as a series of possible medieval to post-medieval drainage ditches (NHER 42417), most likely repurposed from natural drainage channels (Features 75-77).

## 4 DISCUSSION

### 4.1 Saltern

- 4.1.1 The possible saltern present in Field A is one of three previously identified in this field by the NMP (NHER 42443), as well as one of a series of examples identified in the surrounding landscape (NHER 10412, NHER 42174, NHER 42197, NHER 42198, NHER 42415, NHER 42416 and NHER 42432). Salterns are mounds of piled up waste sand from salt filtration – deriving from the significant salt-making industry present from the the Late Anglo-Saxon to post-medieval periods along the Norfolk coast (Clarke 2018). Feature 1 appears to be of a more floriform shape than that of adjacent examples recorded by the NHER. The north-west extent of the earthwork has been interrupted by a modern north-east to south-west aligned drainage ditch, but otherwise appears to be in good condition (Plate 1).
- 4.1.2 A raised earthwork outside of the survey area was also partly captured by the DEM, to the west of Feature 1. The function of this feature is unclear, but given its proximity to Feature 1, it is probably associated with the activity responsible for creating the aforementioned saltern.
- 4.1.3 The other possible saltern earthworks included in listing NHER 42443 were situated beyond the confines of the surveyed area; however, from the data collected during this study, it appears that the smallest of the three may have been cut by a modern north-west to south-east aligned boundary ditch.

### 4.2 Linear features and enclosures: Fields A-F

- 4.2.1 Features 8 and 9 in Field C represent the remains of probable medieval to post-medieval curvilinear ditches (NHER 42433). These follow the line of the current field system, although very little remains of the central section due to the presence of a modern trackway along the southern extent of the field. However, where the earthworks turn away from the track to the north, there are remains of a ditch and bank, which are clearly visible on the northern side (Plate 2).
- 4.2.2 Feature 9 most likely survives due to its position at the southern extent of Field C, although there are no surviving banks present, other than the made ground for the trackway (Plate 3).
- 4.2.3 Feature 10 is a shallow bank that has been weathered by modern drainage works and agricultural use but remains visible in the DEM imagery. Feature 11 is a more significant earthwork and appears to run north-west to south-east from Field D, is then cut by the railway embankment and reappears in Field G as Feature 26. The similar alignments and dimensions of these earthworks, in contrast to most of the other features recorded during the survey, may suggest a use relationship and contemporaneity. The depression between these features may represent a trackway along the northern edge of a significant field boundary (Feature 11). While Feature 11 continues and can be further identified in Fields G and H, the continuation of Feature 10 is unclear, perhaps appearing as Feature 35 in Field H.
- 4.2.4 Field F contains a north-west to south-east aligned enclosure comprising Features 18-21, with a possible sheep cote (Feature 17) at its south-west corner (Plate 4).

### 4.3 Linear features and enclosures: Fields G-I

- 4.3.1 Fields G and H contain banked earthworks of similar dimensions (Features 31 and 32 in Field G and Features 38 and 39 in Field H) that form the north-east to south-west and north-west to south-east aligned corners of their respective fields. These possibly form part of the same field system that follows a similar alignment to the current ditches that enclose these fields. Additionally, in Field H, it is possible that the gap between the south-east running bank of Feature 36 and the north-west running earthwork of Feature 38 formed an entrance.
- 4.3.2 The ditch and bank earthwork (Features 26, 37 and 40) runs from Fields G to I where it appears to turn and run south as Feature 44. The relationship between this feature and adjacent possible field boundaries is unclear but it appears to belong to a different phase to the banked earthworks discussed above (Features 31 and 36). It is possible that it is contemporary with the building platform in Field I (Feature 43) and acted as the southern field boundary of a field system further to the north, outside of the study area. Feature 35 is a shallow bank that seems to run parallel to Feature 37, and is possibly the surviving continuation of Feature 10 in Field D.
- 4.3.3 Google Earth imagery of cropmarks appear to show the east to west aligned drainage ditch that bounds an area possibly flooded water-meadow in Field I, as turning north and running into Feature 44. It is possible that Feature 46 is an older phase of field system that has been continually reused and recut for drainage, but the south-west corner of which has been obscured by upcast from the current western drainage ditch.

### 4.4 Linear features and enclosures: Fields K-L

- 4.4.1 Fields K-L appears to show at least two phases of enclosure as well as the repurposing of drainage channels.
- 4.4.2 The 1888-1913 Ordnance Survey (OS) Six Inch map shows that the north-east to south-west aligned ditch, Feature 67, was the original north-east to south-west aligned boundary ditch between fields K and L (Plate 5). This is still the case on the OS 1:10,000 map dated 1949-1972, making the current boundary ditch part of a modern phase of modification and separate to many of the other earthwork features in this area.
- 4.4.3 Activity from a previous phase is present to the west of Feature 67. The northern extent of Fields K and L contains a large, north-west to south-east aligned enclosure (Features 60, 64 and 66) which is not present on the available historic maps of the area (Plate 6). This system has a few related, repurposed drainage channels of unknown age (Features 58 and 59), as well as enclosing one of the two sheep cotes recorded by the NHER.
- 4.4.4 To the south of this enclosure is a second, smaller enclosure on the same alignment (Features 55 and 56; Plate 7). The eastern extent of this enclosure has been lost due to the cutting of the modern boundary ditch. It appears there may have been an entrance on the western edge and the south-west corner is cut by a large, oval pit.

4.4.5 Directly east of this smaller enclosure, is a third possible enclosure (Feature 62) which joins directly with Feature 67. No entrance is visible however and its irregular shape suggests this may instead be a recut of a drainage channel (Plate 8).

## 4.5 Linear features and enclosures: Fields M-P

4.5.1 Feature 75 in Field P appears to align with a field system recorded on the NHER (NHER 42417) that pre-dates the railway line. This could form an older phase of a north-west to south-east aligned ditch that divided Field P (Plate 9).

4.5.2 Most of the other linear features in this area show little relation to the surrounding landscape features, other than the repurposing of natural channels for drainage. However, Feature 74 has the potential to be the corner of a small, rectangular north-east to south-west aligned enclosure (Plate 10).

## 4.6 Platforms: Features 15, 16 and 43

4.6.1 The earthwork survey identified three possible building platforms within the study area.

4.6.2 Field E contains Feature 15, a platform upon which the now disused Lockgate Mill was constructed (Plate 11). As mentioned within the heritage statement (Wallis 2022), the original bypass channels have been filled in, although the north-west to south-east aligned ditch that extends from the north-west corner of the platform into the current boundary ditch to the north, could be a surviving portion of the southern channel. Further discussion of the mill itself can be found in Appendix A.

4.6.3 Just to the north-east of Lockgate Mill, Field F contains a platform (Feature 16) within which sits the demolition rubble of a concrete building (Plate 12). The platform itself measures c. 50m long by 25m wide and abuts the north-west current boundary ditch. There is a slight depression that runs from the south-east of the building to the north-east side of the platform, which may represent a former path or track used to access the building from the north-east. This is identified further in the heritage statement previously produced (Wallis 2022) and is summarised as modern with no archaeological or historical significance.

4.6.4 Field I contains another possible building platform (Feature 43) which measures c. 45m long by 20m wide. It is enclosed by a deep enclosure ditch (Feature 41) to the east, south and west, and is adjacent to a possible trackway depression to the north. The possible opening in the banks on the south-west corner could suggest that this platform is related to the same field system phase as Features 31-32 and 38-39, with Feature 36 bounding to the north.

## 4.7 Floated Water-Meadow

4.7.1 One area of a possible post-medieval water-meadow was identified within the surveyed area, in the south-east corner of Field I and running on a north-west to south-east alignment (Feature 47). Four ridges and two irrigation channels were visible (Plate 13). The channels measure between c. 8-10m wide and the ridges measure c. 0.25m high. The area is bounded by an east to west aligned drainage ditch (Feature 46) to the north, the south-east extensions of which extend into the water-

meadow. While the headland likely extended to the south-western extent of Field I, no evidence of was identifiable from the DEM. This area has been previously noted within the NHER as a possible post-medieval water-meadow (NHER 42439). However, the heritage statement (Wallis 2022) notes that it aligns more closely with the modern field boundaries than the earlier, medieval features.

## 4.8 Sheep cotes

- 4.8.1 The landscape surrounding the development area features numerous possible sheep cote enclosures. Sheep cotes are discussed in Section 1.3, two of which were identified from the DEM and interpretative survey (Feature 30 – NHER 42189 and Feature 61 – NHER 42166), along with a third possible sheep cote in Field F (Feature 17).
- 4.8.2 Field G contains Feature 30 (Plate 14) – a square enclosure with two possible entrances in the north-west and south-east corners, which bears a close resemblance to two similar square examples found further west (see NHER 42200 and NHER 42201). This possible sheep cote is connected to the remains of two other possible small circular enclosures via a ditch (Features 28 and 29). Google Earth imagery shows these have been widened to serve as drainage features in recent years, so their original shape and function is unclear. Due to the large number of natural drainage channels in this field, it is possible that these were originally natural channels which were recut and used as small enclosures.
- 4.8.3 Field K contains Feature 61, a regular, rectangular enclosure which has no visible entrance (Plate 15). This is similar to a sheep cote situated c. 350m to the north-west (NHER 42164). This is contained within a field boundary (Feature 60) related to an older field layout, as shown on the 1st edition OS map.
- 4.8.4 Field F contains a large north-west to south-east aligned enclosure. Within its south-west corner is a small, rounded enclosure (Feature 17). It is possible that this is a sheep cote or some other small animal enclosure contemporary with the rest of the surrounding field system (Plate 16).

## **5 ARCHIVING**

### **5.1 Archiving, retention and dispersal**

- 5.1.1 The physical archive is currently held by OA East and will be deposited with Norfolk Museum Service under accession code NWHCM 2023.74 in due course.
- 5.1.2 This report will be uploaded to the Archaeological Data Service (ADS) in due course.



## APPENDIX A LOCKGATE MILL

By James Fairbairn

### History

- 5.1.3 Lockgate Mill, which is also referred to locally and historically as 'Freethorpe Mill', 'Banham's Black Mill' and 'Duffel's Mill' is a windpump located on the Halvergate Marshes in the detached parish of Freethorpe and within The Norfolk Broads. It is located approximately 3.2km west of Great Yarmouth and 4.8km north-east of Berney Arms on the northern edge of Breydon Water. The structure is a Grade II listed building.
- 5.1.4 The current mill was built somewhere between 1800 and 1825 under the name 'Freethorpe Mill'. When operational, the mill was driven by four patent sails that turned in a clockwise direction. These drove a 19ft diameter external scoopwheel with 7-inch paddles. Unusually for a mill on the Halvergate marshes it did not drain into the Halvergate Fleet, even though it is only c. 730m from the connection of the fleet with Breydon Water. Instead, it drained into Acle Marshes which lie to the north of the mill. A farm once stood next to the mill – it was known as Lockgate Farm and was demolished in 1981.
- 5.1.5 The earliest recorded marshman of the mill was a Mr Dan Banham, followed subsequently by Mr Bob Banham. The Banham family ceased working the mill in the early 1920s and it was taken over for a short period of time by Mr Gordon Addison, who lived at the nearby Lockgate Farm. The final marshman that worked the mill was Mr Leonard Carter, who left the mill in the mid-1940s.
- 5.1.6 After Leonard Carter left the mill, it began to fall into disrepair. In 1953 the sails were blown off the mill in a gale and it was left to deteriorate until a temporary aluminium cap was fitted in 1988 to protect the existing remains.

### External description

- 5.1.7 The mill is four stories high and built of red brick tarred black. The structure stands at 10.6m to the curb and the diameter of the base is 7.31m (Plates 17 and 18). The mill has two doors, one on the north and one on the south. These doors measure 206mm tall by 106mm wide and have double brick arches (Plates 19 and 20). The inner arches to both doorways have been repaired. The mill has four windows, two to the second floor and two to the third floor (Plate 21). The original roof structure has been replaced by an aluminium cap (Plate 22).
- 5.1.8 Some of the original external pumping machinery is still *in situ*. This consists of iron linking gear and wheels. The western side of the mill shows signs of where the scoopwheel housing once stood (Plate 23). Other parts of the pumping gear are spread around the mill. To the north of the mill are the remnants of a brick structure (Plate 24).

### ***Internal description***

- 5.1.9 Internally, most of the structure has either fallen into disrepair or has been vandalised and at the time of the photographic survey seemed unsafe. The walls to the ground floor showed some signs of whitewashing (Plate 25). Some of the timber floor structures to the first and second floors remained (Plate 26) and some of the internal workings of the mill were still *in situ* (Plate 26). A maker's name of 'T. Smithdale of Norwich', who were millwrights and engineers, could be seen on the pump rod. The firm first worked in Norwich and then nearby Acle from 1890, closing in 1974.

## APPENDIX B      BIBLIOGRAPHY

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## APPENDIX C

## SITE SUMMARY DETAILS / OASIS REPORT FORM

**Site name:** Halvergate, Great Yarmouth, Norfolk  
**Site code:** ENF153212  
**Grid Reference** TG 4898 0789  
**Type:** Earthwork Survey  
**Date and duration:** 24<sup>th</sup> January 2023 to 7<sup>th</sup> February 2023  
**Area of site:** c. 54.13ha  
**Location of archive:** The archive is currently held by Oxford Archaeology East (15 Trafalgar Way, Bar Hill, Cambridge, CB23 8SQ) and will be deposited with Norfolk Museum Services in due course under accession number NWHCM 2023.74.

### Project Details

OASIS Number	oxfordar3-513859		
Project Name	Halvergate, Great Yarmouth, Norfolk – Earthwork Survey		
Start of Fieldwork	24 <sup>th</sup> January 2023	End of Fieldwork	7 <sup>th</sup> February 2023
Previous Work	No	Future Work	Unknown

### Project Reference Codes

Site Code	ENF153212	Planning App. No.	BA/2022/0321
HER Number	ENF153212	Related Numbers	NCCCES Ref. CNF 49356

Prompt	NPPF
Development Type	Habitat improvement works
Place in Planning Process	Post planning

### Techniques used (tick all that apply)

- |   |   |  |
|---|---|--|
| <input checked="" type="checkbox"/> Aerial Photography – interpretation | <input type="checkbox"/> Grab-sampling                    | <input checked="" type="checkbox"/> Remote Operated Vehicle Survey       |
| <input checked="" type="checkbox"/> Aerial Photography - new            | <input type="checkbox"/> Gravity-core                     | <input type="checkbox"/> Sample Trenches                                 |
| <input type="checkbox"/> Annotated Sketch                               | <input type="checkbox"/> Laser Scanning                   | <input checked="" type="checkbox"/> Survey/Recording of Fabric/Structure |
| <input type="checkbox"/> Augering                                       | <input checked="" type="checkbox"/> Measured Survey       | <input type="checkbox"/> Targeted Trenches                               |
| <input type="checkbox"/> Dendrochronological Survey                     | <input type="checkbox"/> Metal Detectors                  | <input type="checkbox"/> Test Pits                                       |
| <input type="checkbox"/> Documentary Search                             | <input type="checkbox"/> Phosphate Survey                 | <input checked="" type="checkbox"/> Topographic Survey                   |
| <input type="checkbox"/> Environmental Sampling                         | <input type="checkbox"/> Photogrammetric Survey           | <input type="checkbox"/> Vibro-core                                      |
| <input type="checkbox"/> Fieldwalking                                   | <input checked="" type="checkbox"/> Photographic Survey   | <input type="checkbox"/> Visual Inspection (Initial Site Visit)          |
| <input checked="" type="checkbox"/> Geophysical Survey                  | <input checked="" type="checkbox"/> Rectified Photography |  |

Monument	Period	Object	Period
Earthwork	Anglo-Saxon	None	
Earthwork	Medieval		
Earthwork	Post-Medieval		
Structure	Modern		

### Project Location

County	Norfolk	Address Weavers Way, Great Yarmouth, Norfolk, England, NR31 9QH
District	East Norfolk	
Parish	Halvergate	
HER office	Norfolk	
Size of Study Area	54.13ha	
National Grid Ref	TG 4898 0789	

### Project Originators

Organisation	Oxford Archaeology East
Project Brief Originator	Steve Hickling
Project Design Originator	Gareth Rees
Project Manager	Gareth Rees
Project Supervisor	Thomas Houghton

### Project Archives

	Location	ID
Physical Archive (Finds)	N/A	N/A
Digital Archive	Norfolk Museum Services	NWHCM 2023.74
Paper Archive	Norfolk Museum Services	NWHCM 2023.74

Physical Contents	Present?	Digital files associated with Finds	Paperwork associated with Finds
Animal Bones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ceramics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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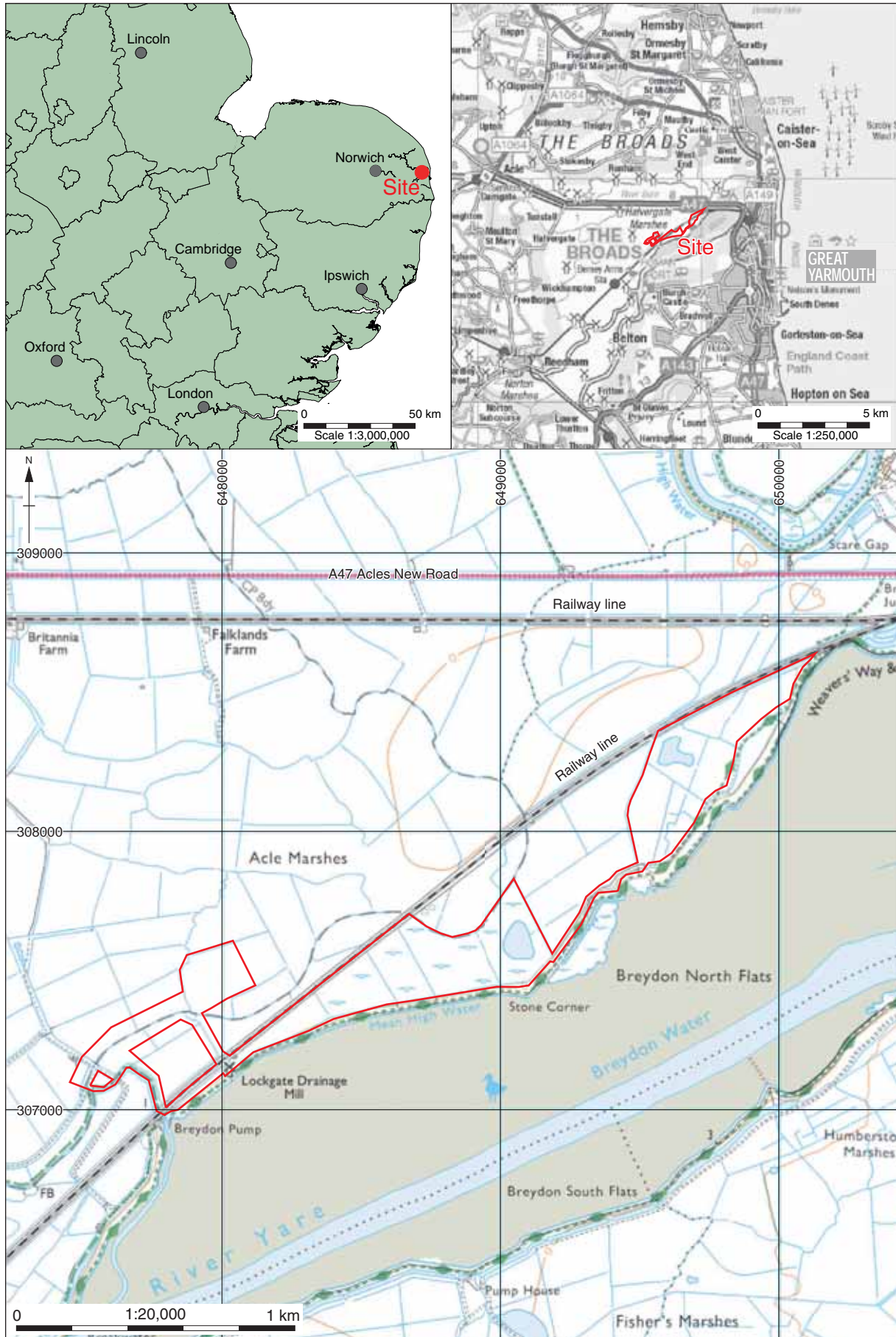
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Diary	<input type="checkbox"/>
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Virtual Reality	<input type="checkbox"/>	Miscellaneous	<input type="checkbox"/>
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		Photos (negatives/prints/slides)	<input type="checkbox"/>
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		Sections	<input type="checkbox"/>
		Survey	<input type="checkbox"/>



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Figure 1: Site location showing area of earthwork survey (red)

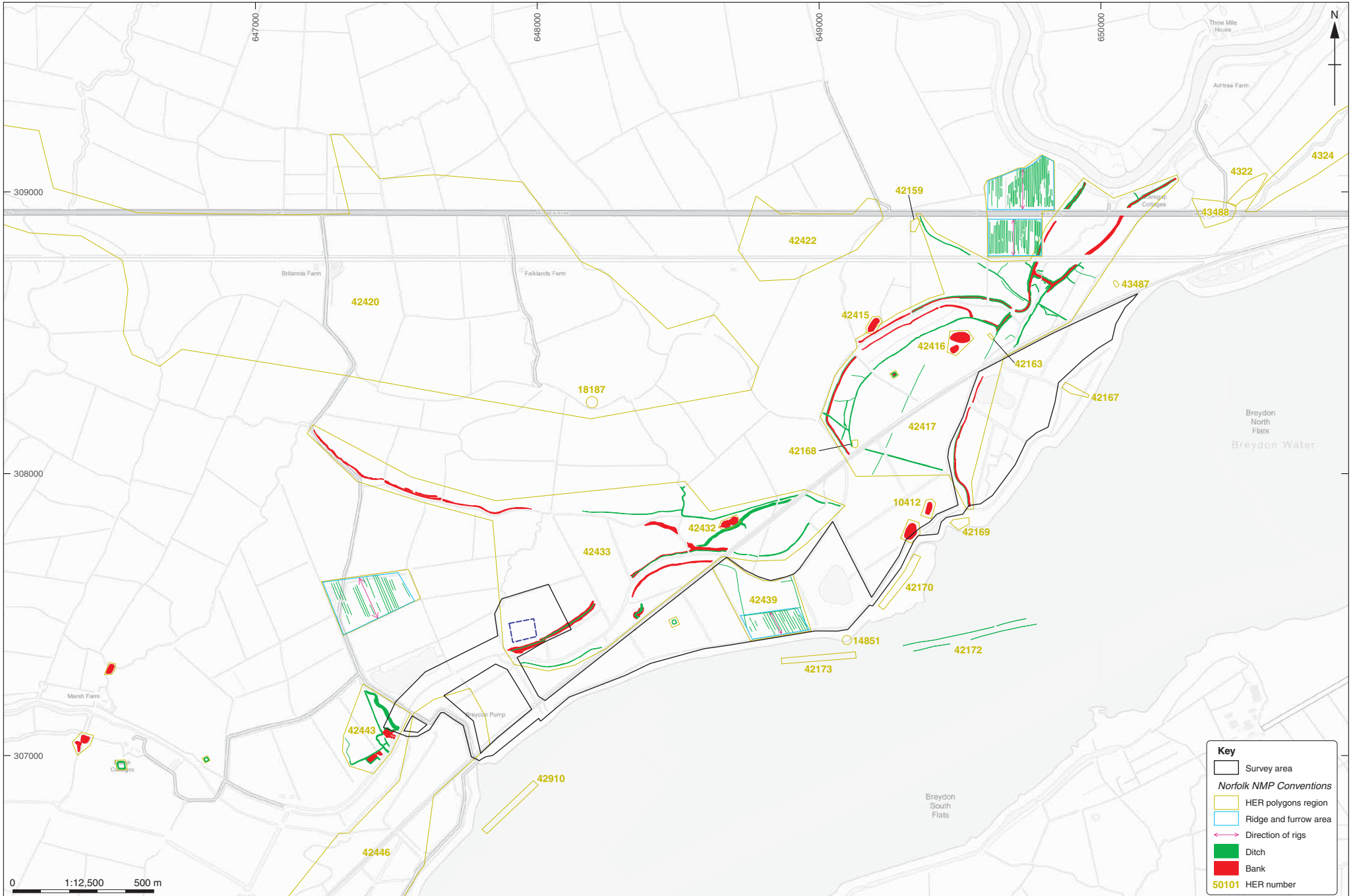


Figure 2: Selected NHER data, including Norfolk National Mapping Programme (NMP) data (copyright Historic England National Mapping Programme, licensed to Norfolk County Council)

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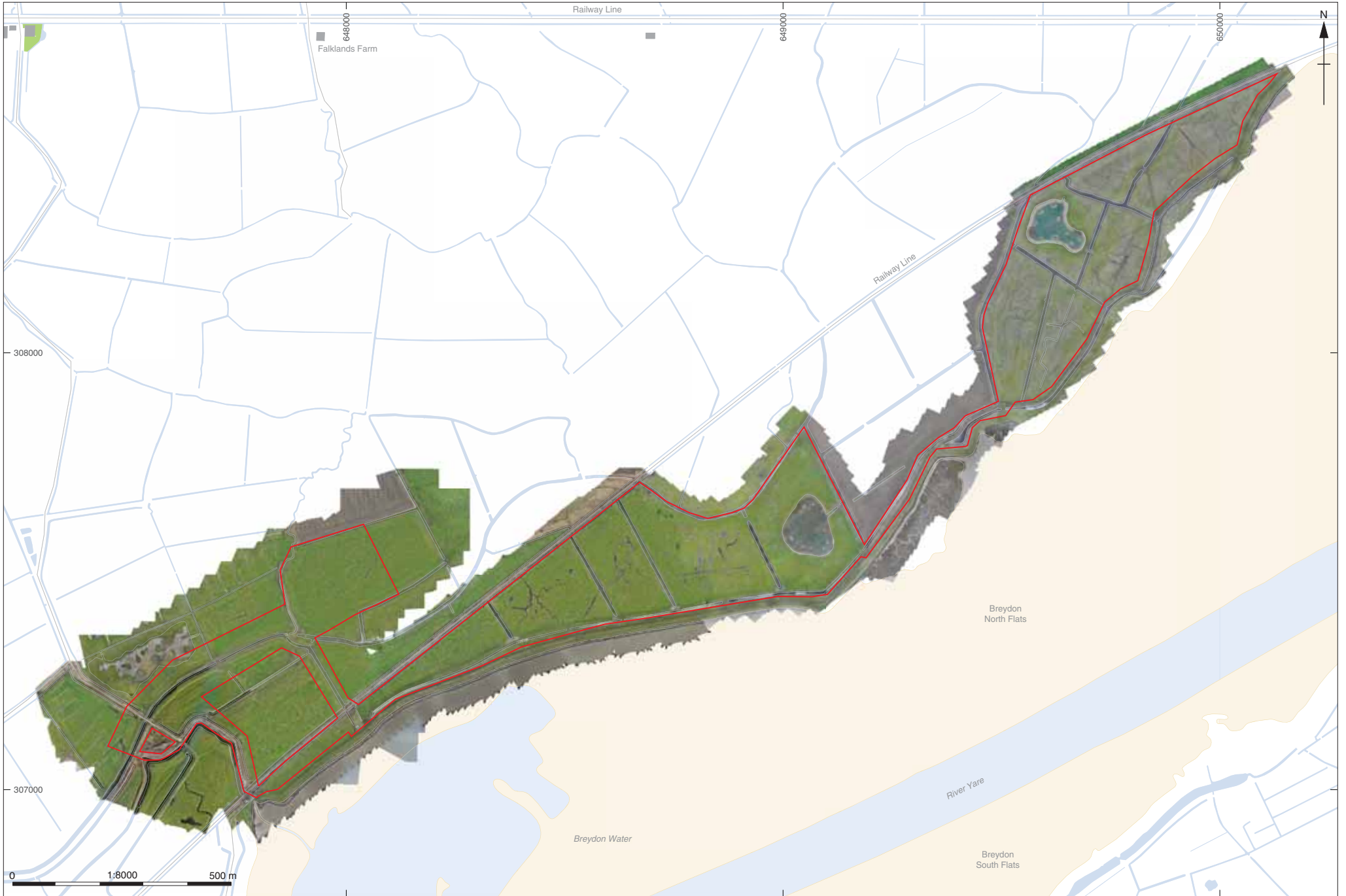


Figure 3: Site orthophoto showing area of earthwork survey (red)

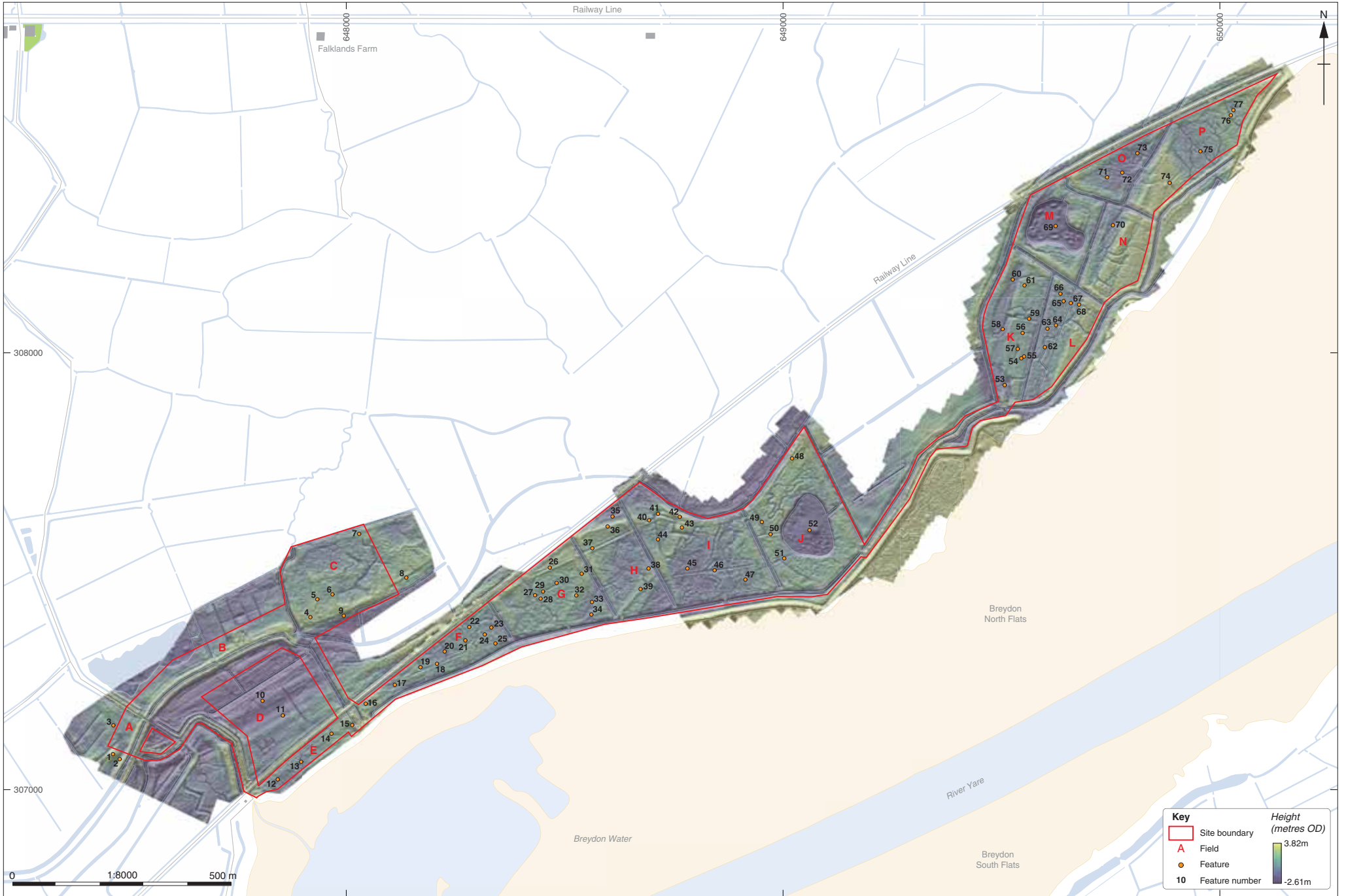


Figure 4: Digital elevation model

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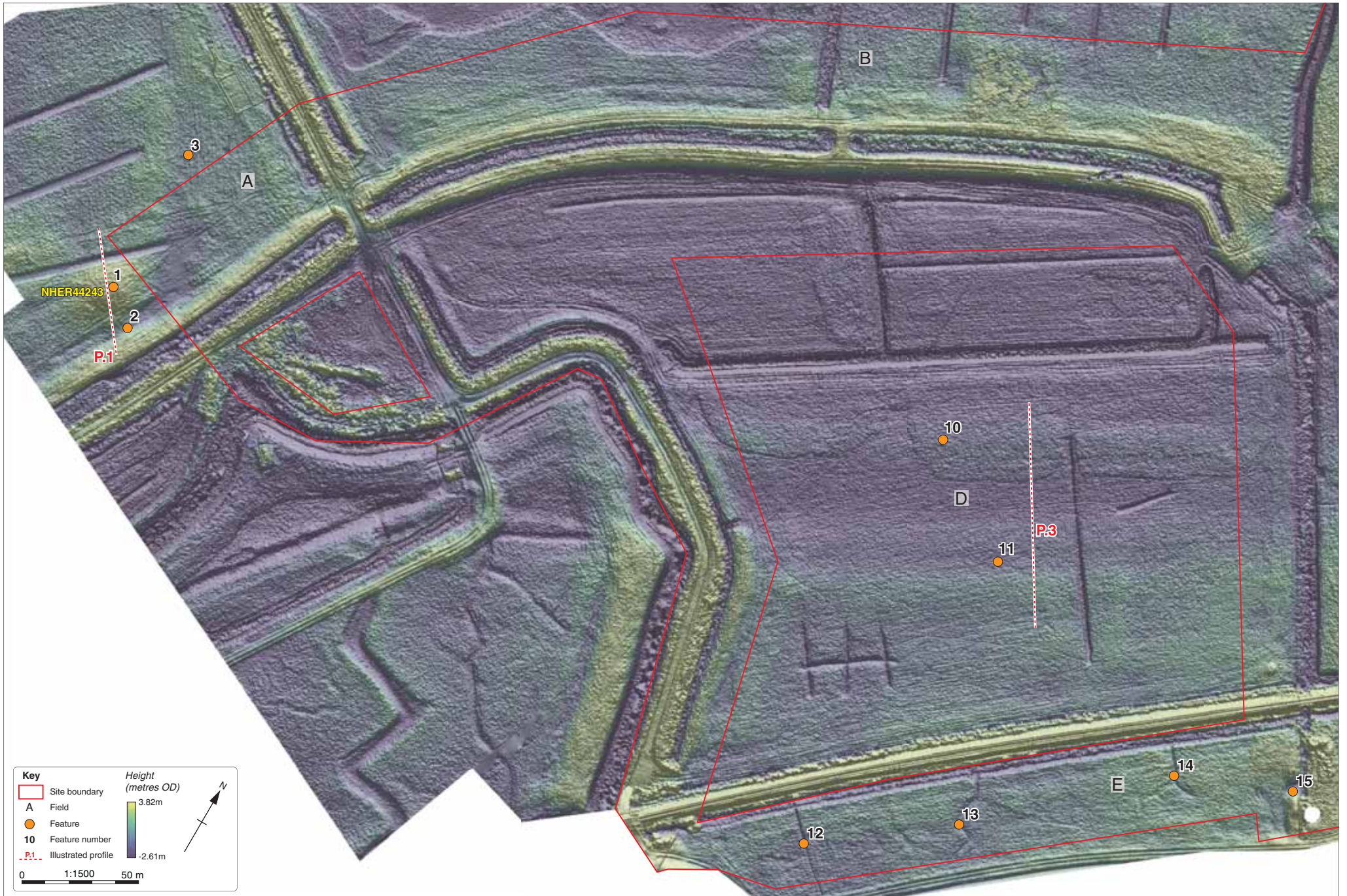


Figure 5: Fields A, B, D and E digital elevation model

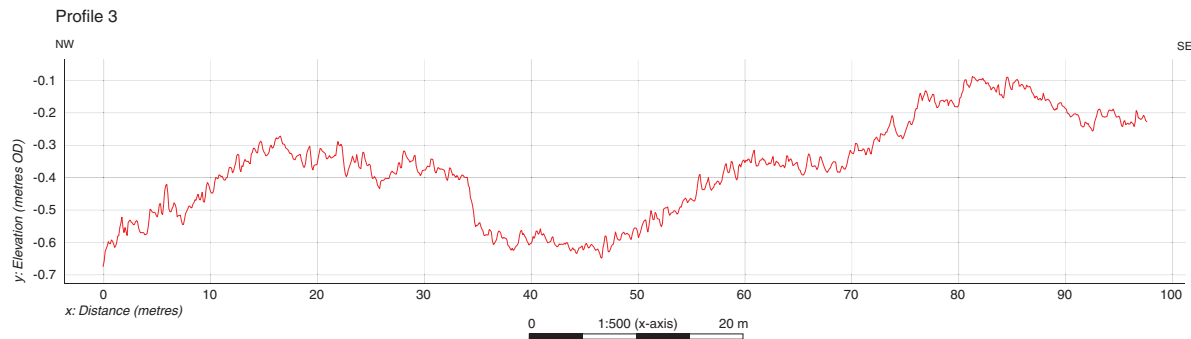
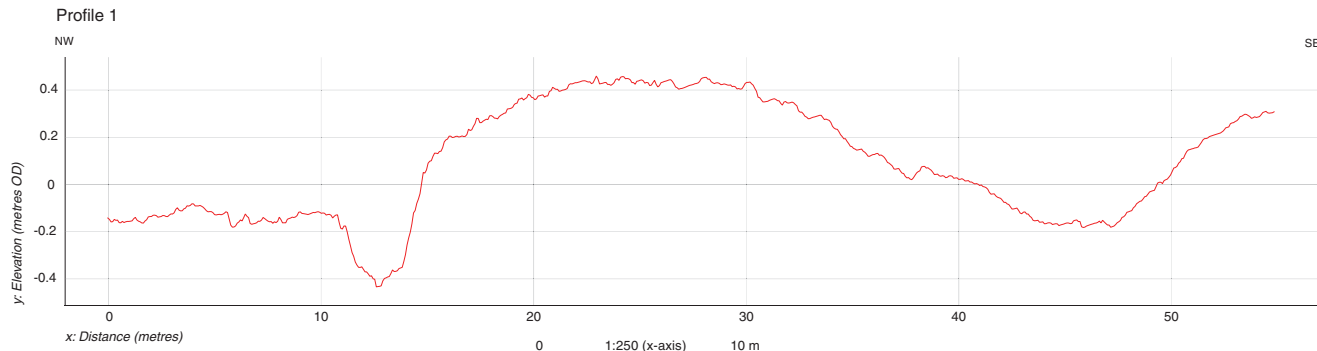
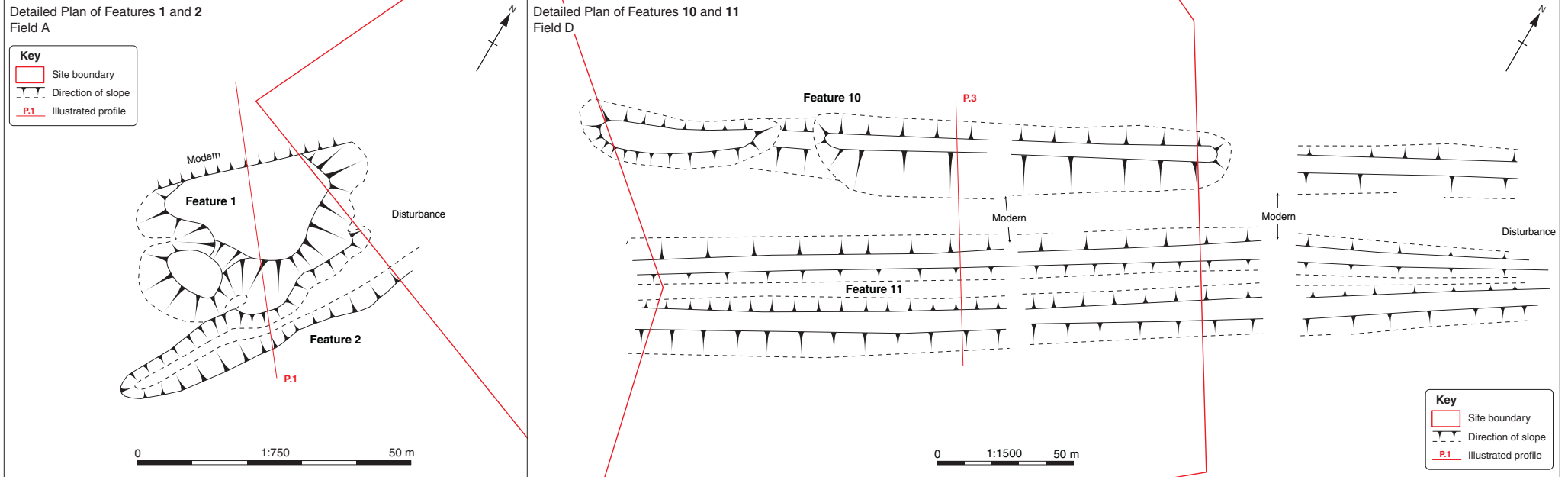


Figure 6: Hachure plans and profiles of Features 1 and 2 (Field A) and Features 10 and 11 (Field D)

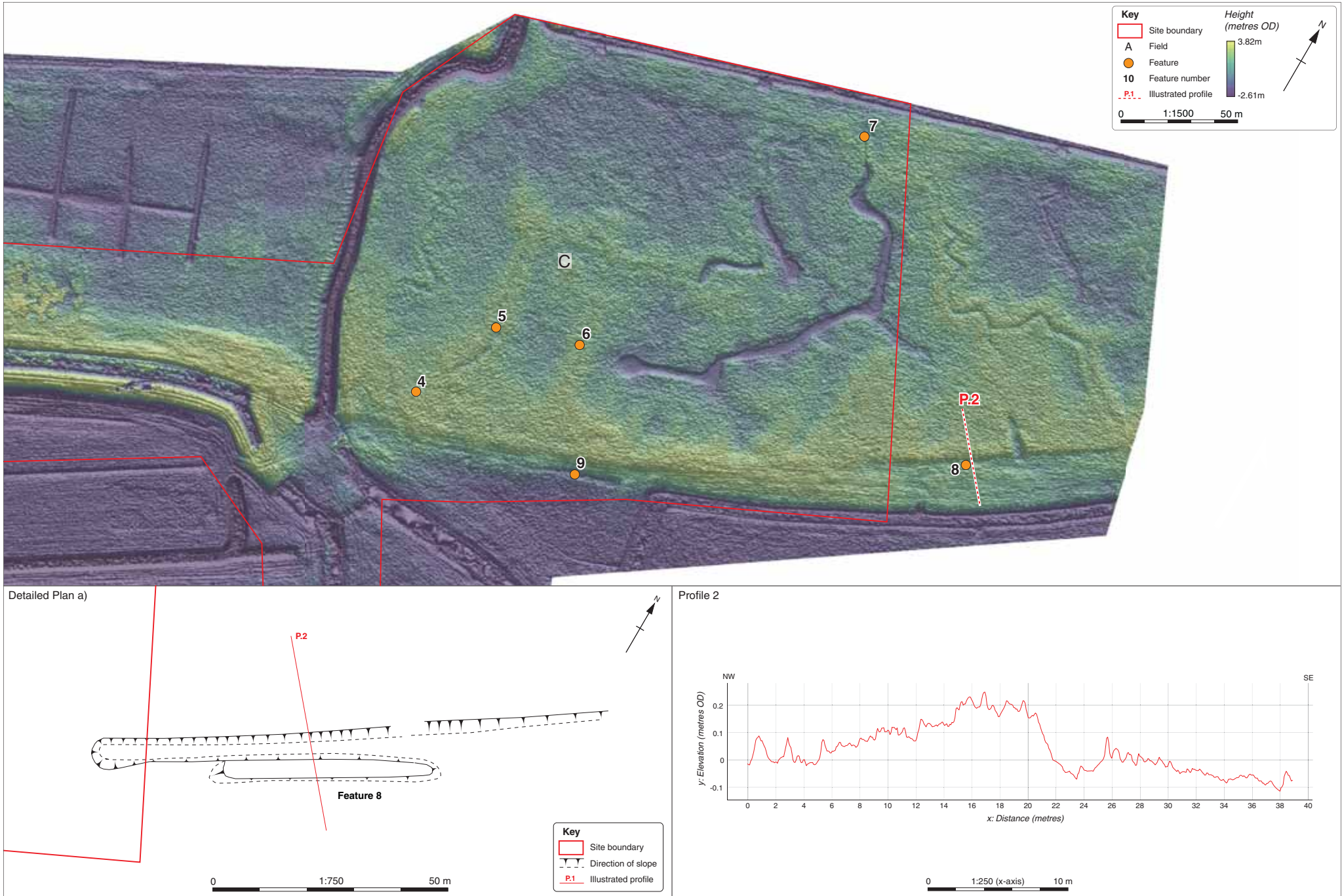


Figure 7: Field C digital elevation model, with hachure plan and profile of Feature 8

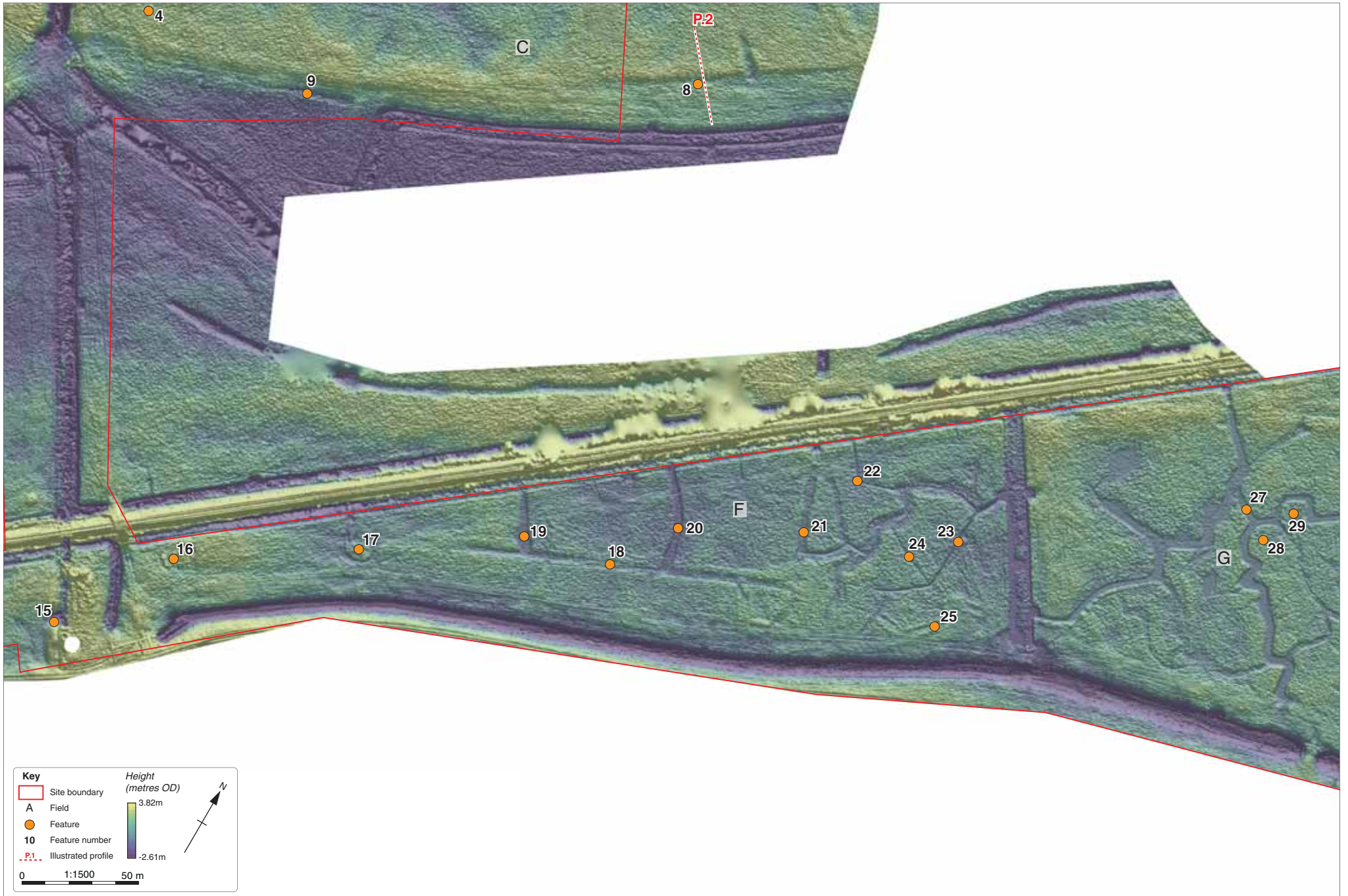


Figure 8: Fields C, F and G (west) digital elevation model

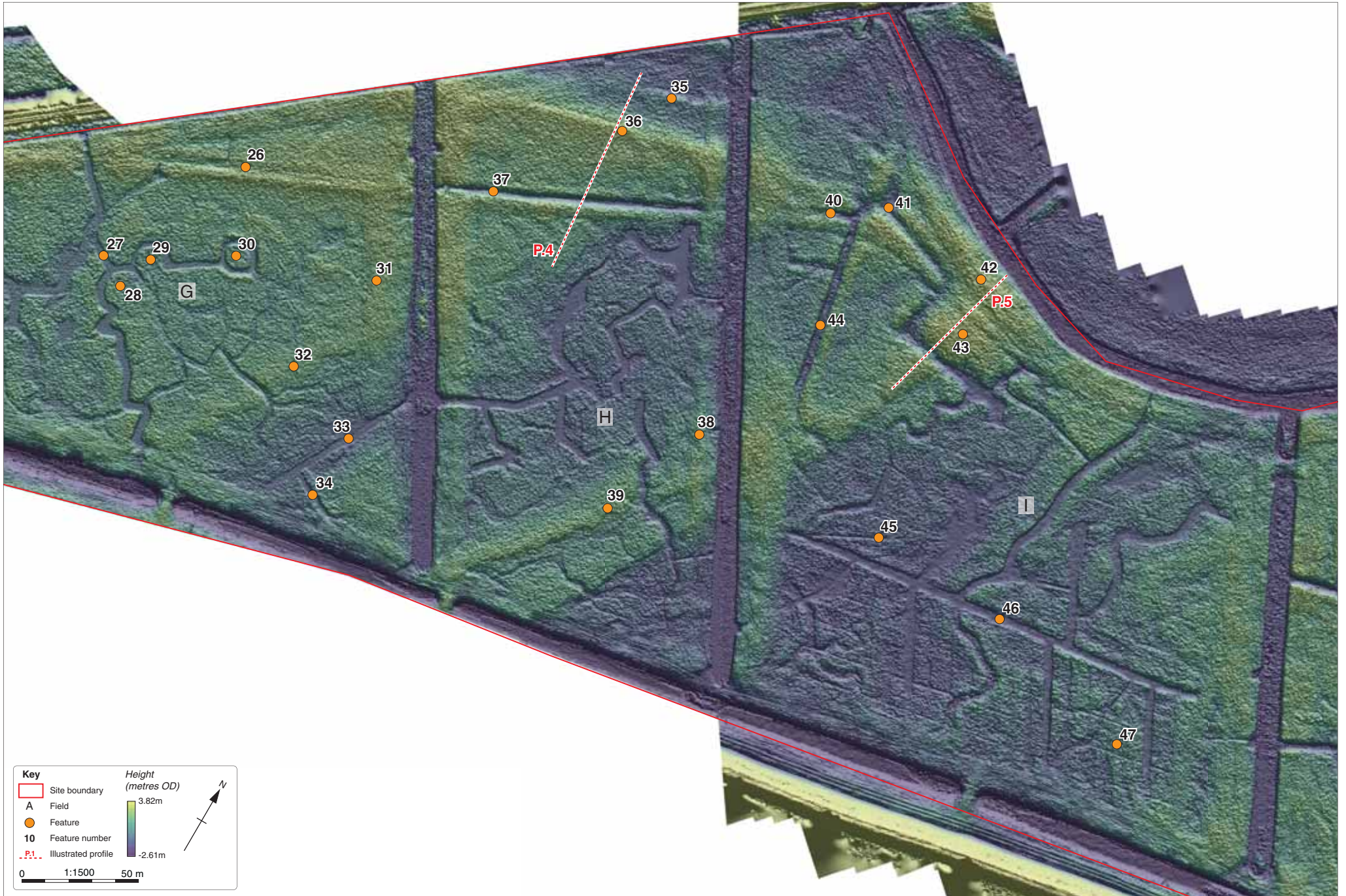


Figure 9: Fields G (east), H and I digital elevation model

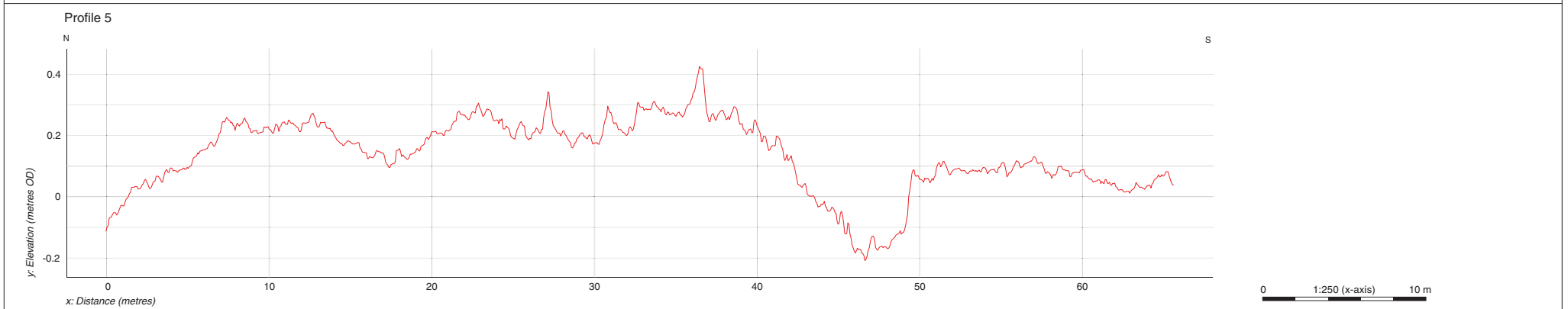
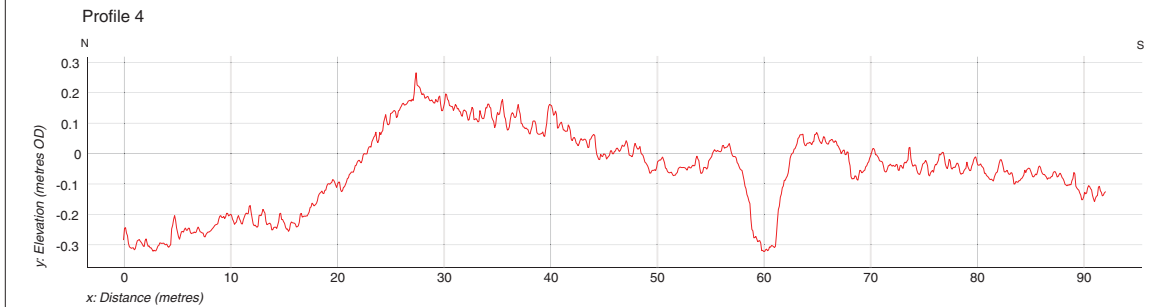
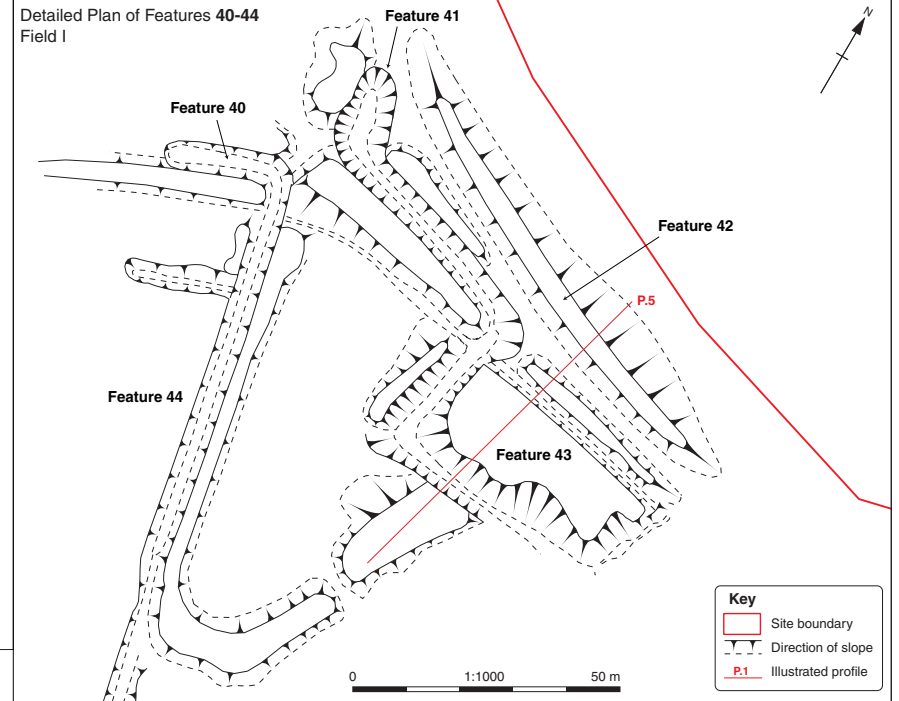
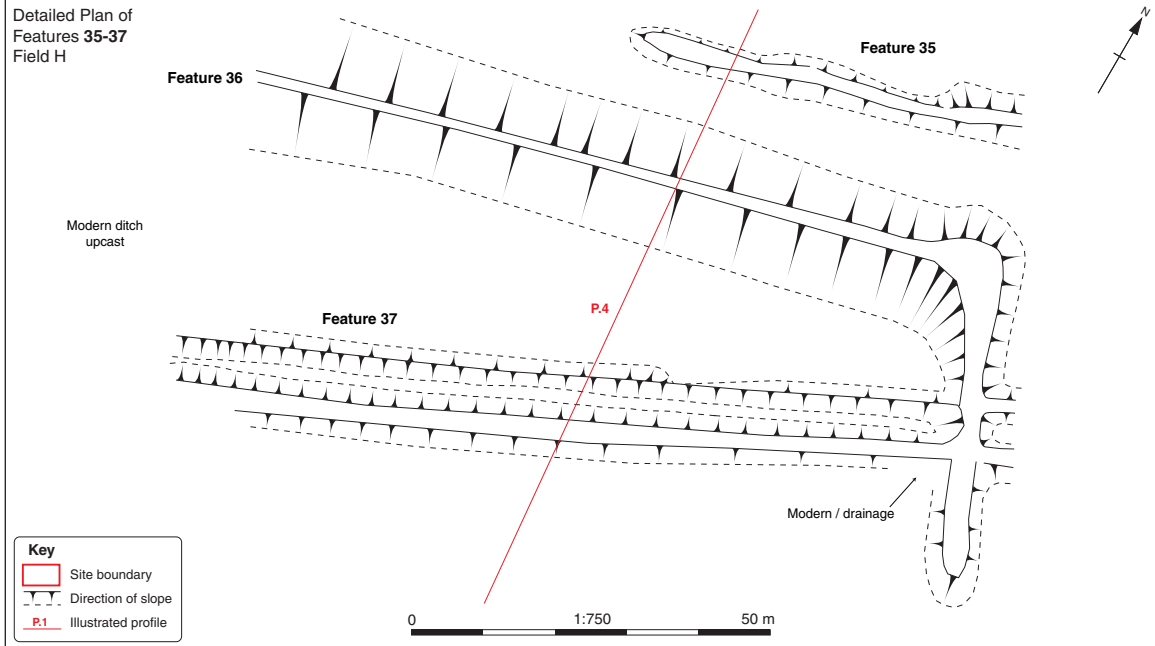


Figure 10: Hachure plans and profiles of Features 35-37 (Field H) and Features 40-44 (Field I)



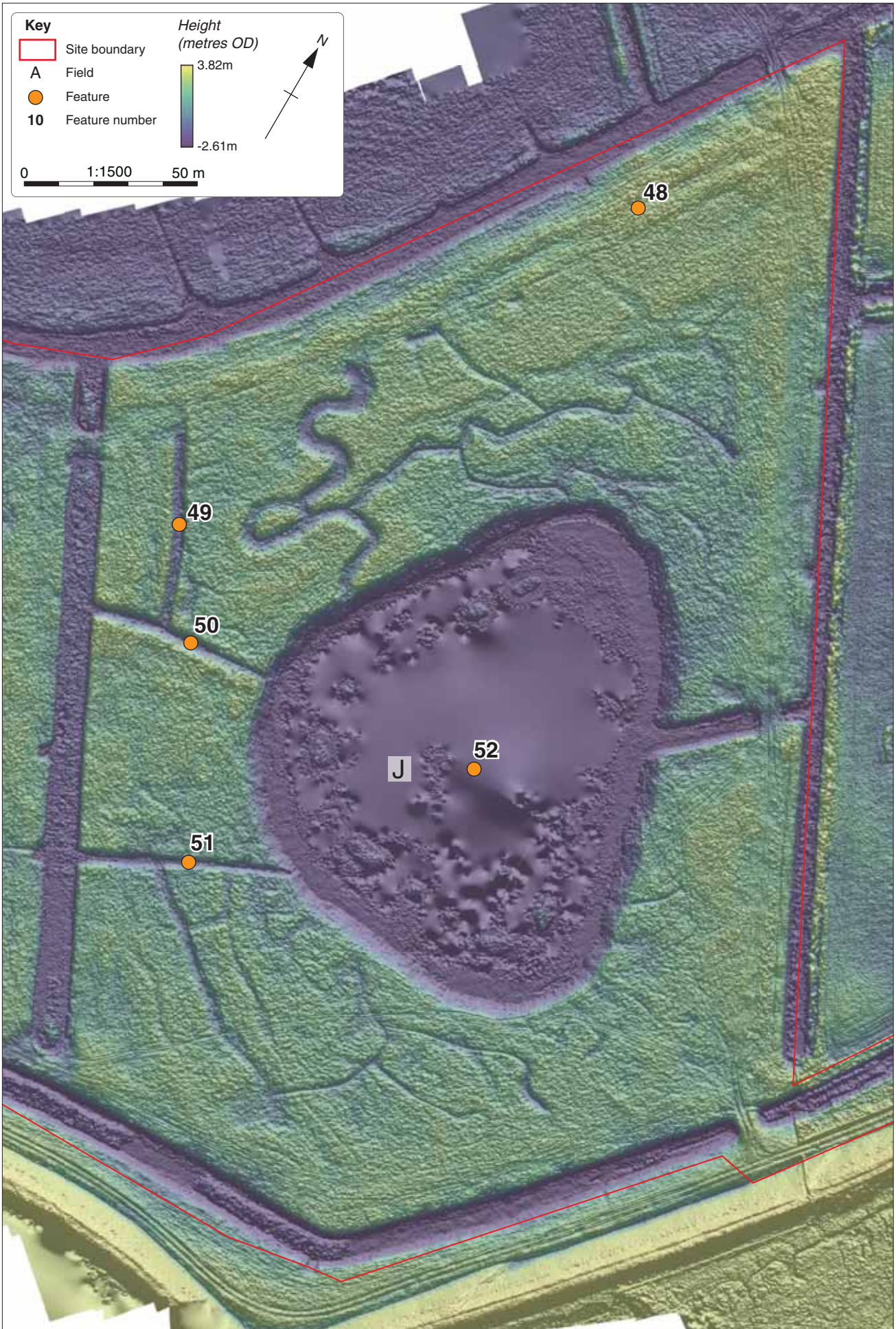


Figure 11: Field J digital elevation model

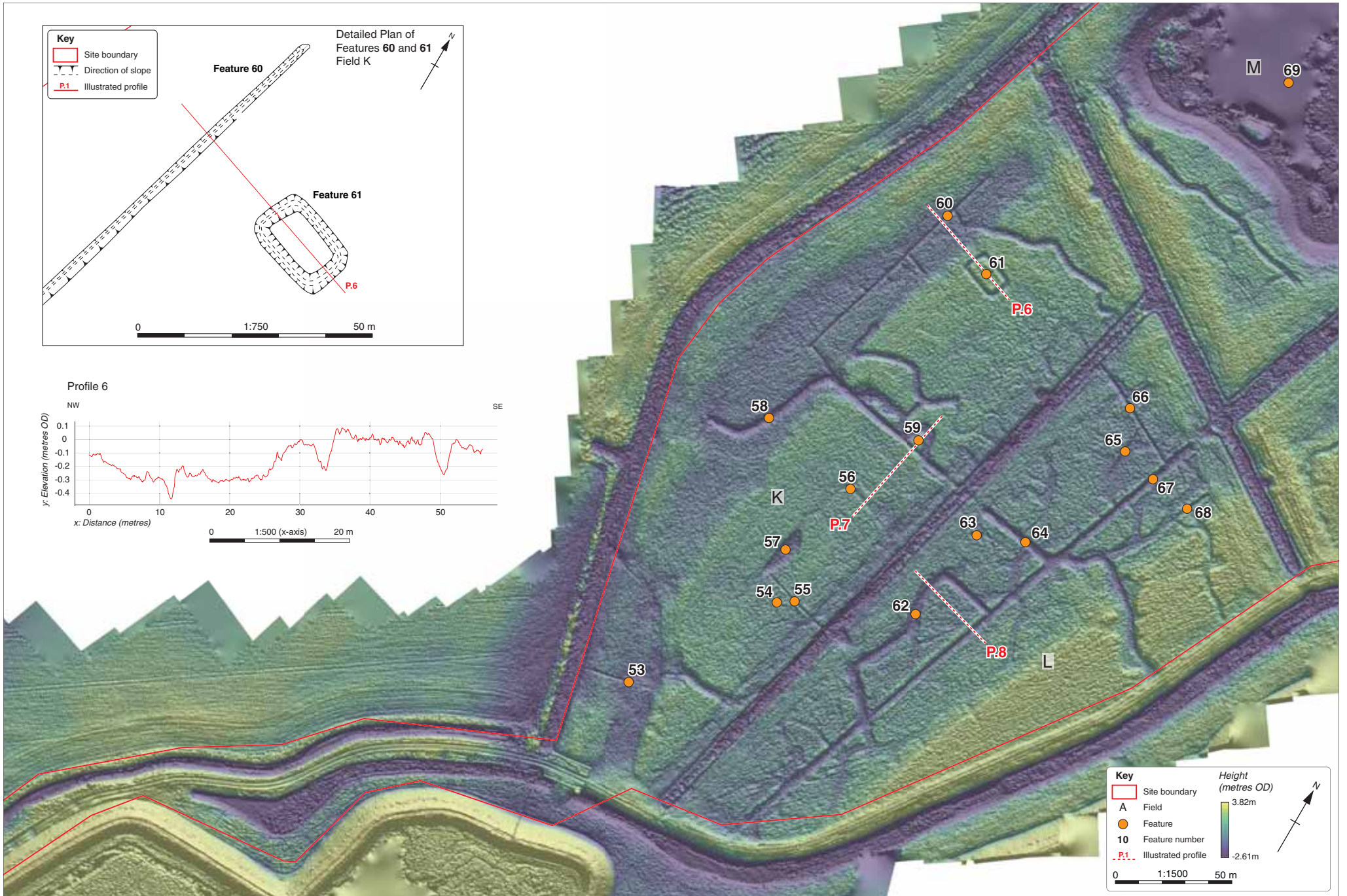


Figure 12: Fields K, L and M (west) digital elevation model, with hachure plan and profile of Features 60 and 61

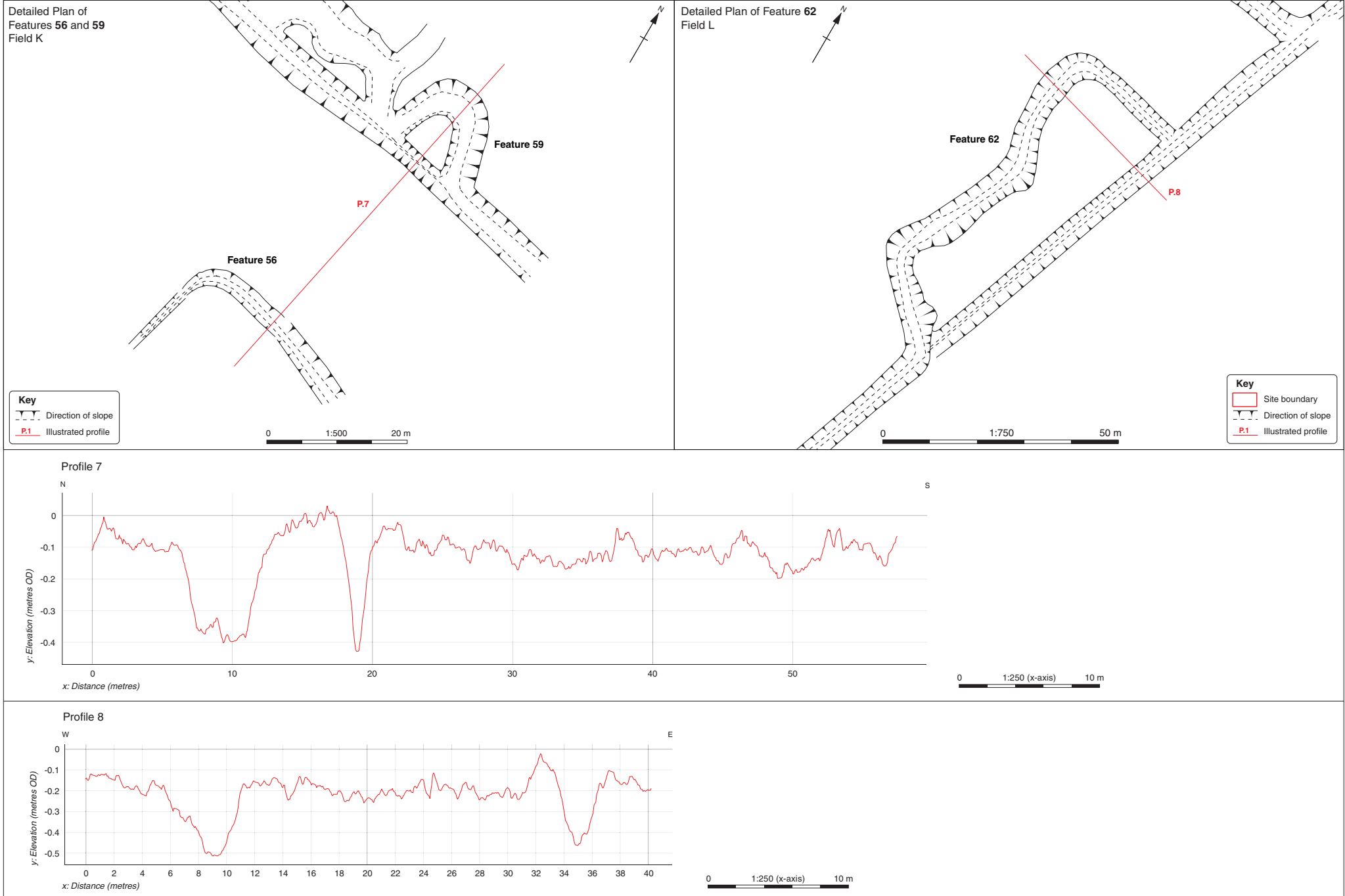


Figure 13: Hachure plans and profiles of Features 56 and 59 (Field K) and Feature 62 (Field K)

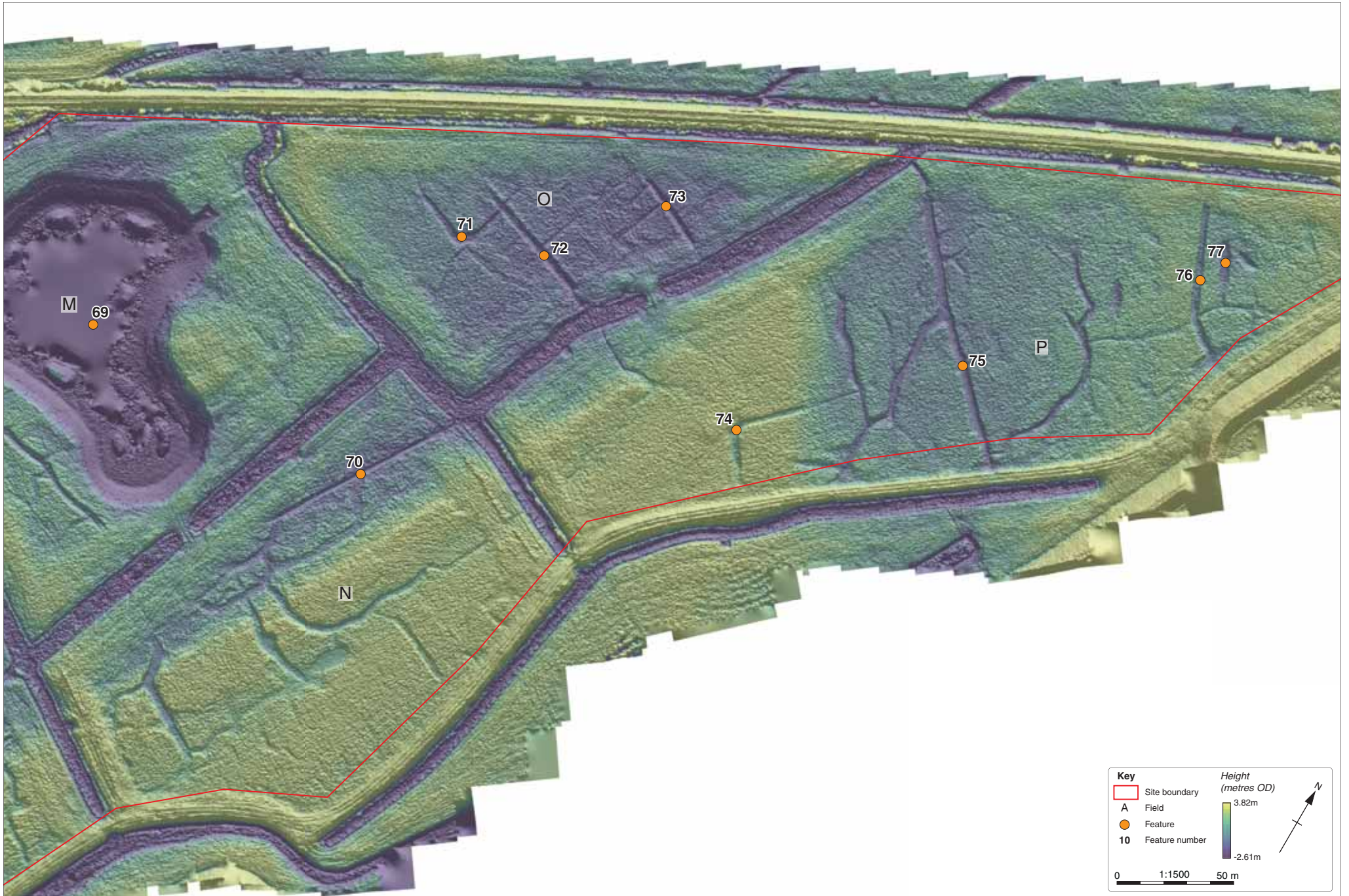


Figure 14: Fields M (east), N, O and P digital elevation model



Plate 1: Saltern, Feature 1, from the south-west, Field A



Plate 2: Ditch and bank, Feature 8, from the south-west, Field C



Plate 3: Ditch, Feature 9, from the east, Field C



Plate 4: Ditch, Feature 18, from the west, Field F



Plate 5: Ditch, Feature 67, from the north-east, Field L



Plate 6: Ditch, Feature 60, from the north-east, Field K



Plate 7: Ditch, Feature 55, from the south-west, Field K



Plate 8: Ditch, Feature 62, from the north-east, Field L





Plate 9: Ditch, Feature 75, from the south-west, Field N



Plate 10: Ditch, Feature 74, from the north-west, Field P



Plate 11: Platform, Feature 15, from the west, Field E



Plate 12: Demolished building and platform, Feature 16, from the north-east, Field F



Plate 13: Floated Water-Meadow, Feature 47, from the east, Field I



Plate 14: Sheep Cote, Feature 30, from the south-east, Field G



Plate 15: Sheep Cote, Feature 61, from the north-east, Field K



Plate 16: Possible Sheep Cote, Feature 17, from the south-west, Field F



Plate 17: Lockgate Mill, from the south-west



Plate 18: Lockgate Mill, from the south-east



Plate 19: South-east side door, from the south-east



Plate 20: North-west side door, from the north-west



Plate 21: South-west side window to the second floor, from the south-west



Plate 22: Aluminium cap roof replacement and south-east side window to the third floor, from the south-east



Plate 23: Iron linking gear and wheel within remains of scoopwheel housing, from the north-west



Plate 24: Remains of brick structure just north of the mill, from the north





Plate 25: Remains of whitewashing on ground floor walls



Plate 26: Remains of first and second floor timber floor structures



Plate 27: Internal mill workings, still *in-situ*



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