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West Midlands Interchange Staffordshire

LiDAR Data Assessment



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West Midlands Interchange Staffordshire

LiDAR Data Assessment

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Summary

Wessex Archaeology was commissioned by Ramboll-Environ to undertake a LiDAR Data Assessment of land at Four Ashes, Staffordshire. The assessment was carried out in order to establish the location of additional archaeological features present within the Site that are identifiable through the interrogation of LiDAR data-derived datasets. This study will support an application for a Development Consent Order (DCO), to be submitted to the Secretary of State (SoS) via the Planning Inspectorate (PINS).

The assessment resulted in the identification of features of archaeological potential in a fairly widespread distribution across the Site, with the exception of the Calf Heath Wood and Woodside Farm House area, where quarrying has appeared to remove any traces of possible archaeological activity.

A number of these features appear to represent the possible remains of ridge and furrow and other agricultural activity. Earlier land division, in the form of former field boundaries, is also a common feature across the Site. The cropmark features recorded in the Staffordshire Historic Environment Record are not visible in the LiDAR data, suggesting that subsequent agricultural activity in the area of the Site has removed any clear above-ground evidence.



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The assessment was carried out and the report by Richard Milwain. The report was quality controlled by Chris Breeden. Alexandra Grassam managed the project on behalf of Wessex Archaeology.



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LiDAR Data Assessment

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Ramboll-Environ to undertake a Light Detection and Ranging (LiDAR) Data Assessment of land at Four Ashes, Staffordshire (hereafter 'the Site', **Figure 1**), centred on National Grid Reference (NGR) 392132 309539.

1.1.2 The assessment was carried out in order to establish the location of additional archaeological features present within the Site that are identifiable through the interrogation of LiDAR data-derived visualisations. It supports an archaeological desk-based assessment (DBA) that was carried out to determine, as far as is possible from existing information, the nature, extent and significance of the historic environment resource within the Site and its environs, and to provide an initial assessment of the potential impact of development on the heritage assets that embody that significance (Wessex Archaeology 2017).

1.1.3 This study will form a technical appendix for an Environmental Impact Assessment (EIA) in support of an application for a Development Consent Order (DCO), to be submitted to the Secretary of State (SoS) via the Planning Inspectorate (PINS).

1.2 Site description

1.2.1 The Site comprises 287 hectares of fairly flat terrain, with an elevation range of 95m to 116m AOD. Elevation is lowest in the Marsh Farm area on the eastern edge of the Site, from where the terrain rises slowly eastwards towards the route of the M6.

1.2.2 It is bounded to the north by the A5 (Watling Street), to the east by the M6 and Stable Lane, to the south by Straight Mile and a section of the Staffordshire and Worcestershire Canal, and to the west by the A449. Areas outside of the Site boundary include the western half of Calf Heath Wood and the adjacent industrial estate and a small number of parcels along the northern boundary.

1.3 Archaeological background

1.3.1 The DBA (Wessex Archaeology 2017) examined the potential for the survival of buried archaeological remains within the Site and an additional 1km area outside of it, using information provided by the Staffordshire Historic Environment Record (SHER), the National Heritage List for England (NHLE), the Archaeological Data Service (ADS), historic mapping and primary and secondary sources held at the Staffordshire Record Office, Lichfield Record Office and William Salt Library and in Wessex Archaeology's own library.

- 1.3.2 There are no designated heritage assets within the Site, although four Scheduled Monuments located 200m to the north-west of the Site, alongside the route of Watling Street (which in part forms the northern boundary of the Site), provide clear evidence of a strong Roman presence in the area.
- 1.3.3 A small number of features present in aerial photography have been recorded within the Site, including linear earthworks (SHER number MST4946) representing the possible remains of former field systems or plough headlands, ring ditches and linear features to the north of Gravelly Way (SHER number MST1789) and a ring ditch to the north of Heath Farm (SHER number MST4205) (**Figure 1**).
- 1.3.4 No record of any previous intrusive archaeological investigation within the Site was identified during the preparation of the DBA.

2 METHODOLOGY

2.1 Data collection and processing

- 2.1.1 The LiDAR assessment was undertaken using Environment Agency (EA) Digital Terrain Model (DTM) LiDAR data sourced from the EA LiDAR data portal. The data were acquired in ASCII raster format with a 1m horizontal resolution and a vertical accuracy of ± 5 cm. The DTM data is pre-filtered, with vegetation and buildings removed, resulting in a 'bare earth' model of the terrain. The Site has complete coverage at 1m resolution.
- 2.1.2 ArcGIS 10.5 was used to display and analyse the LiDAR dataset and to record features. The Spatial Analyst extension was used as this provides additional tools that allow features within the datasets to be enhanced, making interpretation easier.
- 2.1.3 The data were merged prior to analysis using ArcGIS 10.5 to create a single DTM for the Site, from which a number of subsequent datasets were derived.
- 2.1.4 A series of hillshades of the LiDAR DTM were created, with the azimuth of the light source increasing clockwise from the north at 45° intervals. The hillshaded images provided a means of emphasising slight changes in height in the DTM, helping to highlight the banks and ditches characteristic of archaeological features (English Heritage 2010a: 37).
- 2.1.5 Principal Components Analysis (PCA) was then carried out on the resulting set of eight hillshades, creating a single dataset in which common values across the eight hillshades were retained, creating a single dataset representative of the eight input hillshade models (English Heritage 2010a: 23; **Figures 2 and 3**).
- 2.1.6 The Relief Visualization Toolbox 1.3 (Kokalj *et al.* 2011, Zakšek *et al.* 2011) was used to provide additional outputs, including a local relief model (LRM). The creation of a LRM involves removing the elevation trend of the larger landscape from the DTM, helping to enhance features of potential archaeological interest. The LRM was created because "archaeological features are generally of a much smaller scale than the landforms on which they lie" (Kokalj and Hesse 2017: 20). Through the creation of a LRM, "a less biased representation of small-scale topographic features [is created] and reflects more truthfully the relative heights and depths of these features with respect to the surrounding landscape" (*ibid.*: 22), increasing their visibility.
- 2.1.7 The LRM was displayed in ArcMap 10.5 using the recommended style settings for flat terrain (Kokalj and Hesse 2017: 23; **Figures 4 and 5**), with features tending towards banks visible as high values (white in the figures) and those tending towards ditches visible as low values (black in the figures).



2.2 Data interpretation and recording

- 2.2.1 The datasets outlined in section 2.1 were used to help transcribe features of archaeological interest in ArcMap 10.5. Archaeological features were mapped in accordance with guidance developed by the National Mapping Programme (English Heritage 2010b; English Heritage 2010c; English Heritage 2010d).
- 2.2.2 Features of archaeological interest were assigned consecutive 'WA' numbers, starting with **WA1**. A complete list of transcribed features, including descriptions, can be found in **Appendix 1**, where the NGR is calculated as the centroid for polygonal features and the midpoint for linear features.
- 2.2.3 The interpretation was complemented by the study of historic mapping, in the form of the 1827 Penkridge enclosure award map, the 1838 Brewood tithe map and historic Ordnance Survey (OS) mapping dating to 1890 and 1925. Features mapped on current 1:10000 scale OS mapping were not recorded during the present study.
- 2.2.4 Locations of known archaeological features were provided via the SHER data.
- 2.2.5 Where referred to in the text, the main archaeological periods are broadly defined by the following date ranges:

Prehistoric		Historic	
Palaeolithic	970,000 – 9500 BC	Romano-British	AD 43 – 410
Early Post-glacial	9500 – 8500 BC	Saxon	AD 410 – 1066
Mesolithic	8500 – 4000 BC	Medieval	AD 1066 – 1500
Neolithic	4000 – 2400 BC	Post-medieval	AD 1500 – 1800
Bronze Age	2400 – 700 BC	19th Century	AD 1800 – 1899
Iron Age	700 BC – AD 43	Modern	1900 – present day

3 RESULTS

3.1 Introduction

- 3.1.1 The assessment resulted in the transcribing of 60 features of archaeological interest, in a fairly widespread distribution across the Site, with the exception of the Calf Heath Wood and Woodside Farm House area (**Figures 6 and 7**), where quarrying has appeared to remove any traces of possible archaeological activity.
- 3.1.2 A number of these features appear to represent the possible remains of ridge and furrow and other agricultural activity, particular on the western edge of the site between the A449 and the railway line. Earlier land division, in the form of former field boundaries, is also a common feature across the Site.
- 3.1.3 There is also evidence of possible, small-scale gravel extraction, of unknown date, in the form of a small number of large cut features visible in the western area of the Site. These sub-circular features measure approximately 30m to 40m in diameter and generally have a depth of approximately 50cm. In the east of the Site these features may represent former ponds.

3.1.4 Other features of interest include **WA29**, a linear ditch appearing to represent both a former road or trackway and a former boundary.

3.1.5 The cropmark features recorded in the SHER are not visible in the LiDAR data, suggesting that subsequent agricultural activity in the area of the Site has removed any clear above-ground evidence in these areas.

3.2 Detailed results

3.2.1 The south-west corner of the Site, to the north of the recreation ground, includes a small number of features of unknown origin (**WA1-5**), although it is likely that they relate to recent agricultural activity.

3.2.2 Immediately to the north, between the A449 and the railway line, lie a number of blocks of possible ridge and furrow (**WA6**; **WA8-WA9**), all displaying broad ridge features commonly associated with medieval and earlier post-medieval agricultural activity. The features appear less well-defined and lie on a different alignment to the more recent agricultural features that appear to overlie them. **WA6** is cut by **WA7**, two bank features representing the remains of field boundaries present on the Brewood tithe map.

3.2.3 **WA9** is cut by two parallel banks (**WA10**) representing the remains of a former road or path depicted on the Brewood tithe map. The road crosses **WA9** from the south-east, meeting up with Gravelly Way adjacent to **WA11**, a large cut feature likely to be the result of gravel extraction in the field.

3.2.4 Further remnants of possible ridge and furrow can also be traced to the north of Gravelly Way (**WA12-13**; **WA16**; **WA18**), all sharing the broad form of the ridge features present to the south. Although more ephemeral than the features to the west of the railway line, **WA24** appears to form an eastwards extension of **WA16**, appearing to demonstrate that these features pre-date the construction of the railway.

3.2.5 Additional features present in this area include **WA14**, two parallel bank features visible in the same fields as **WA12** and **WA13**, and **WA15**, a large cut feature of sub-circular form that possibly represents the remains of earlier gravel extraction.

3.2.6 Evidence of former field divisions in the shape of a series of banks, **WA17**, can be seen in the field containing **WA16** and **WA18**. The central east-west aligned feature is present on historic OS mapping and is abutted by five further linear features that run perpendicular to it. The alignment of one of these (second to the west on the south side) appears to continue into the small area of woodland to the south.

3.2.7 The bank features (**WA17**) take a form that appears to be medieval in nature. These features lie perpendicular to the possible ridge and furrow (**WA16** and **WA18**), of possible medieval or post-medieval origin. The possible ridge and furrow (**WA16** and **WA18**) is either cut by, or cuts through, the north-south aligned banks in **WA17**, and so the features are associated with different phases of activity, although it is unclear which features are earliest.

3.2.8 Another feature in the north-west corner of the Site is **WA19**, a long ditch feature that can be traced for approximately 365m from the A449 eastwards to the railway line before curving round towards Watling Street in the north, where it can be traced for a further 725m. Sections of the ditch appear as field boundaries on historic mapping, while stretches also follow the path of a stream. It is difficult to trace its path beyond the Site boundary, making it difficult to ascertain its full size and form.



- 3.2.9 Its position encloses the possible ridge and furrow and bank features to the west of the railway line (**WA16-18**), alongside the possible ridge and furrow (**WA24**) and a bank feature (**WA20**) to the east of the railway line. It may have helped to form a former boundary.
- 3.2.10 Additional evidence of former field boundaries in the north-west corner of the Site, all visible on historic OS mapping abutting **WA19**, is visible by way of a small number of bank or ditch features (**WA20**; **WA23**; **WA25**; **WA28**). Other features present in this area of the Site include further evidence of probable gravel extraction (**WA26**) and another small block of ridge features, possibly of recent origin (**WA22**). A short section of ditch (**WA21**), is present to the north-west of **WA22** and may be related to **WA19** or **WA23**.
- 3.2.11 To the south of **WA19** and to the north of Calf Heath Wood lie a number of linear features present in the data as banks and ditches (**WA25**; **WA27-30**), some of which are present on historic mapping as field boundaries. **WA29**, visible as a ditch feature measuring 250m in length and extending into **WA31**, appears to represent the possible continuation of a road or trackway present on historic mapping (now Gravelly Way). It also follows the path of a former boundary present on the inclosure award map, suggesting that it may be one of the older features still visible within the Site.
- 3.2.12 Further blocks of ridge features, likely to be of more recent date than the examples of possible ridge and furrow to the west, are present to the north of Calf Heath Wood (**WA31**; **WA35-36**). Mapped (**WA33**) and unmapped (**WA34**) former field boundaries are also present in the area to the south of Watling Street, while within Calf Heath Wood itself lie a number of linear bank features (**WA32**), all unmapped but appearing to relate to mapped features within the woodland. These bank features are likely to be associated with modern woodland management, although they may also, in part, represent the remains of a former field system.
- 3.2.13 The eastern area of the Site offers a greater concentration of features than the central area. These include **WA38**, a linear feature representing a break of slope, and, **WA39**, a sub-circular large cut feature that appears to be deeper than the rest of the field to the south-east of **WA38**. Taken together, these features may represent the remains of a former pond.
- 3.2.14 Blocks of possible ridge and furrow (**WA40-41**) are visible to the north of Vicarage Road, visible as broad ridge features and taking a different alignment to the more recent agricultural activity also visible in these fields. Further possible traces are also visible in the field to the west (**WA42**), although these are more likely to represent evidence of more recent activity. **WA43**, present in the LiDAR data, has recently been removed by quarrying.
- 3.2.15 The fields adjacent to Woodside Farm House contain a small number of features. **WA44** is comprised of three linear features; of these, the two east-west aligned ditches are modern, although the north-south aligned feature may represent a former field boundary, as may **WA45**, located 200m to the west. **WA46**, a small mound of unknown form and date, may represent a spoil heap.
- 3.2.16 To the south of Vicarage Road lies further likely evidence of gravel extraction (**WA47**), alongside two blocks of faint ridge features (**WA48-49**), possibly representing the remains of ridge and furrow but equally likely to result from recent agricultural activity.
- 3.2.17 Clearer examples of the broader ridge features suggestive of ridge and furrow can be seen in the area of Calf Heath adjacent to the eastern boundary of the Site (**WA50-53**), of



which **WA51** provides the clearest example. **WA50** and **WA51** are similar in form to, and share an alignment with, the two blocks to the north of Vicarage Road (**WA40-41**), suggesting a similar date.

- 3.2.18 The number of visible features diminishes again in the area immediately north of Straight Mile, where evidence is limited to the remains of former field boundaries (**WA56** and **WA60**) and a small number of blocks of narrow, probably modern ridge features (**WA57-59**).

4 CONCLUSIONS

- 4.1.1 The LiDAR assessment has identified previously unidentified features which have the potential to be of archaeological interest. The majority of these appear to offer slight above-ground remains of medieval or post-medieval agricultural activity in the form of broad ridge features indicative of ridge and furrow and are of limited significance.
- 4.1.2 The form, age and extent of some features, such as the possible enclosure ditch (**WA19**), remain unclear, and cannot be ascertained in any detail through the interrogation of LiDAR data alone.
- 4.1.3 It appears that agricultural activity within the Site has probably removed evidence of above-ground archaeology in some areas, as evidenced by the fact that cropmarks present on aerial photographs and recorded in the SHER were not visible in the LiDAR data. Despite this, it remains possible that archaeological features lie just below the surface in these and other areas of the Site. Such features would be unlikely to be visible in the LiDAR-derived datasets.
- 4.1.4 Archaeological potential appears to be greatest in the western and eastern areas of the site, where the possible remains of medieval to post-medieval agricultural activity suggests a greater possibility of other earlier archaeology existing, albeit in a truncated form.



5 REFERENCES

5.1 Bibliography

- English Heritage. 2010a. The Light Fantastic: Using Airborne Lidar in Archaeological Survey.
- English Heritage. 2010b. NMP Database Recording Guidelines.
- English Heritage. 2010c. National Mapping Programme Draft Monument Recording Guidelines.
- English Heritage. 2010d. National Mapping Programme Draft Transcription Guidelines.
- Kokalj, Ž., Zakšek, K. and Oštir, K. 2011. Application of Sky-View Factor for the Visualization of Historic Landscape Features in Lidar-Derived Relief Models. *Antiquity* 85, 327: 263-273.
- Kokalj, Ž. and Hesse, R. 2017. Airborne laser scanning raster data visualization: A Guide to Good Practice.
- Wessex Archaeology. 2017. West Midlands Interchange, Staffordshire: Historic Environment Desk-Based Assessment. Unpublished client report.
- Zakšek, K., Oštir, K. and Kokalj, Ž. 2011. Sky-View Factor as a Relief Visualization Technique. *Remote Sensing* 3: 398-415.

5.2 Historic Environment Records

Staffordshire Historic Environment Record (SHER)

5.3 Cartographic and documentary sources

- 1827 Inclosure Award Map of Penkridge (SRO Q/RDc/22a)
- 1838 Map of the Parish of Brewood (SRO D5827/2/7/7)
- 1890 First Edition Ordnance Survey 6 inch map
- 1925 Ordnance Survey 6 inch map

5.4 Online resources

<http://environment.data.gov.uk/ds/survey>

URL last accessed on 8th June 2017

6 APPENDICES

6.1 Appendix 1: Gazetteer of transcribed features

WAID	Feature form	Description	Easting	Northing
1	Ditch	Two linear features within a field, possibly representing recent drainage features.	391529	308501
2	Extent of Area	A 0.2 hectare portion of ridge-like features running N-S and sharing the same alignment as the eastern features in WA3. The features are narrow and are probably recent in origin as they share an alignment with the railway line immediately to the east.	391603	308530
3	Extent of Area	A 0.9 hectare field containing narrow ridge-like features. The eastern features follow the same alignment as WA2. The western third of the field contains broader ridge features running on a E-W alignment, possibly if an earlier date.	391528	308590
4	Extent of Area	A 0.3 hectare field to the west of WA3 containing E-W aligned narrow ridge-like features, similar in form to WA2. The field is visible in its current layout on the tithe map.	391380	308564
5	Extent of Area	A 0.3 hectare field to the north of WA4 containing similar E-W aligned narrow ridge-like features. The field is visible in its current layout on the tithe map.	391380	308612
6	Ridge and furrow	A number of ridge features, broader in comparison to those to the south, are visible running E-W across a 4 hectare area, possibly representing the remains of ridge and furrow. The features appear less well defined than the apparently modern narrow N-S running features also present in the field.	391433	308806
7	Bank	Two slight linear features, the southern running N-S and the northern running E-W, within a field to the west of the railway line. The features, measuring 180m and 120m in length respectively, represent former field boundaries visible on the tithe map.	391424	308711
8	Ridge and furrow	An area of possible ridge and furrow, similar in form and sharing an alignment with those in WA6 to the south, is present across a 3.9 hectare area. As with WA6, the features appear less well defined than the apparently later narrow N-S running features also present in the field.	391375	309003
9	Ridge and furrow	A number of slight, broad ridge features, visible across 8.5 hectares (two fields) and on a N-S alignment, appearing to form a northern extension of the possible ridge and furrow to the south (WA8). The features are clearest in the east. The features are obscured slightly by the presence of later agricultural features. These features also appear to be cut by WA10 and so appear to pre-date the tithe map.	391305	309325
10	Bank	Two parallel SE-NW aligned linear features separated by a distance of c.23m in the same field as, and cutting, WA9. The features represent the path of a former road as depicted on the tithe map.	391252	309450
11	Large Cut Feature	A sub-circular cut feature measuring 44m x 36m and approximately 1m in depth, possibly resulting from gravel extraction. The feature is unmapped on historic and	391277	309465



WAID	Feature form	Description	Easting	Northing
		modern mapping.		
12	Ridge and furrow	A 4 hectare area of possible ridge and furrow to the north of WA9, visible as a series of broad, faint SE-NW aligned ridges. Traces appear to extend eastwards to WA13.	391221	309618
13	Ridge and furrow	Fainter traces of possible ridge and furrow, appearing to represent an eastwards extension of WA12 as the features appear similar in size and share an alignment. The features are present across 2.8 hectares.	391389	309693
14	Bank	Two parallel linear features visible in the same fields as WA12 and WA13. The northern feature, measuring 135m in length, represents a former field boundary present on historic OS mapping. The southern feature, measuring 340m, is unmapped, but may also represent the remains of a former field boundary.	391342	309717
15	Large Cut Feature	A sub-circular cut feature to the north of WA13, measuring 33m x 3m and approximately 60cm in depth, possibly resulting from gravel extraction. The feature is unmapped on historic and modern mapping.	391407	309859
16	Ridge and furrow	Faint traces of possible ridge and furrow across a 4.7 hectare area. The features are formed of broad ridges aligned E-W. The features are obscured slightly by the presence of later N-S aligned agricultural features. WA24 appears to form an eastwards extension, cut by and therefore appearing to pre-date the railway line.	391300	310073
17	Bank	A series of slight linear features present across the field containing WA16 and WA18. The central feature, 210m in length and aligned E-W, appears to represent a former field boundary recorded on historic OS mapping. Perpendicular to this are an additional six features, possibly representing additional unmapped former field boundaries.	391194	310049
18	Ridge and furrow	Faint traces of possible ridge and furrow across a 4.1 hectare area, appearing to form a northern extension of WA16 due to their similar form and shared alignment. The features are obscured slightly by the presence of later N-S aligned agricultural features.	391304	310342
19	Ditch	A ditch feature, incorporating sections of field boundaries mapped on both historic and modern OS mapping, can be traced E-W for 365m between the A449 and the railway line and for a further 725m from the railway line curving northwards to Watling Street. The feature encloses WA17-18, WA20 and WA24, all of which the feature appears to form a boundary for.	391685	310366
20	Bank	A 170m long linear feature representing a former field boundary as recorded on historic OS mapping.	391594	310327
21	Ditch	A short (30m long) section of ditch in a field to the south of Watling Street. It does not appear on historic or modern mapping, and may be related to field drainage.	391763	310386
22	Ridge and furrow	Traces of possible ridge and furrow, in the form of broad, E-W aligned ridge features, present across a 1.74 hectare field to the south of Watling Street.	391865	310322
23	Bank	A 150m long linear feature representing the remains of a former field boundary present on historic OS mapping.	391760	310280



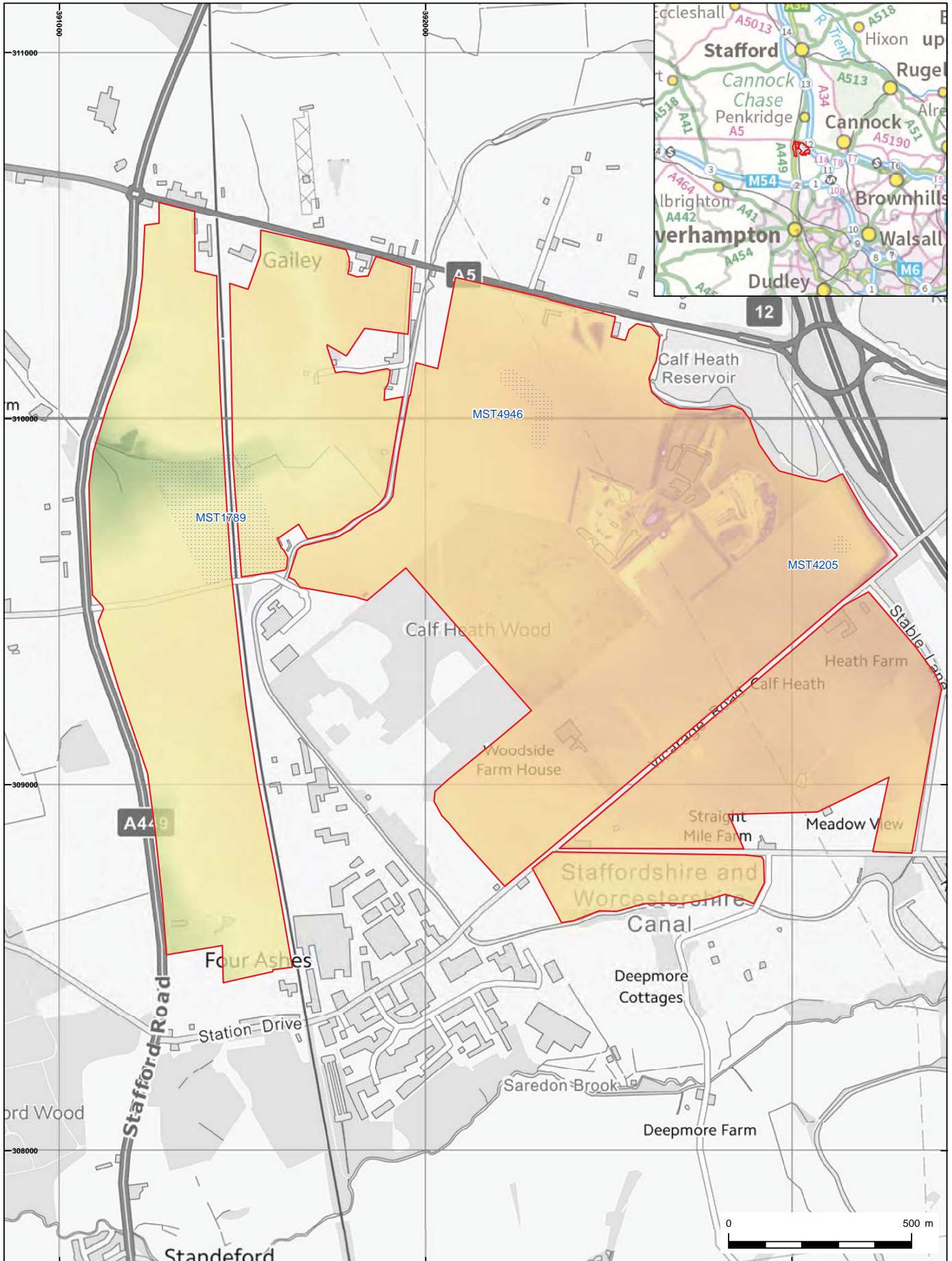
WAID	Feature form	Description	Easting	Northing
24	Ridge and furrow	Very faint ridge features present across a 2.5 hectare area, sharing a similar alignment to WA16 and appearing to form an eastwards extension. The features appear to pre-date the cutting of the railway line.	391540	310065
25	Bank	A linear feature measuring 125m in length, representing the remains of a former field boundary present on historic OS mapping.	391694	309985
26	Large Cut Feature	A sub-circular 28m x 29m large cut feature possibly resulting from gravel extraction. The feature is unmapped on historic and modern mapping.	391717	310023
27	Ditch	Two linear features, possibly representing recent drainage features.	391630	309936
28	Ditch	A 190m long SE-NW aligned linear feature appearing to represent a former field boundary recorded, for most of the feature's length, on historic OS mapping.	391596	309788
29	Ditch	A faint, 250m long linear feature, possibly represent a former trackway due to it appearing to represent the continued path of a road or trackway recorded on historic OS mapping. The feature also appears to follow the path of a former boundary, as depicted on the enclosure award map.	391771	309610
30	Bank	A 150m long linear feature, aligned SE-NW, representing the remains of a former field boundary present on historic OS mapping.	391791	309596
31	Extent of Area	Faint linear features, aligned SW-NE, present across a 3.3 hectare area. The features are likely to be related to agricultural activity and are possibly recent in origin.	391930	309683
32	Bank	A series of bank features within woodland, ranging in length from 65m-100m. The features are not present on modern OS mapping but appear related to other features that are, suggesting a recent date.	392325	309471
33	Ditch	A 175m long linear feature, aligned SE-NW and following in part the path of a former boundary recorded on historic OS mapping.	392146	309712
34	Bank	A faint, E-W aligned 330m long bank feature, possibly representing the remains of an unmapped historic field boundary.	392226	309848
35	Extent of Area	Five blocks of N-S aligned narrow ridge features, present across areas varying in size from 0.7 hectares to 3.1 hectares. The features are probably the result of recent agricultural activity.	392240	310135
36	Extent of Area	A 1.1 hectare area of narrow E-W aligned ridge features, probably the result of recent agricultural activity.	392566	310172
37	Ditch	A 30m long ditch feature in woodland, probably representing a modern drainage feature.	392957	309844
38	Break of Slope	A sharp break of slope visible as a 170m long feature, possibly reflecting the position of a former pond.	393153	309679
39	Large Cut Feature	A sub-circular 29m x 24m large cut feature, possibly representing part of a former pond. The feature is unmapped on historic and modern mapping.	393176	309608
40	Ridge and furrow	A 2.3 hectare area of broad ridge features, aligned SW-NE and following the alignment of fields as visible on the mapping from the inclosure award map to the	393121	309674



WAID	Feature form	Description	Easting	Northing
41	Ridge and furrow	present day. The features appear to represent an area of ridge of furrow that continues westwards into the adjacent field (WA41). A 3 hectare area of broad ridge features, following the same alignment, and in the same form as, those in the field to east (WA40). The features appear to represent the possible remains of an area of ridge and furrow and take a different alignment to more recent agricultural activity.	393011	309580
42	Extent of Area	A 1.3 hectare block containing a small number of broad ridge features, similar in form to WA41 (located 100m to the east) but aligned perpendicular to it. The features may represent the remains of ridge and furrow, but may also be the result of recent agricultural activity.	392859	309440
43	Extent of Area	An area of faint ridge-like features in the field to the west of WA42, with which they share an alignment and are likely to be of similar age. The features are contained within a 2.5 hectare area. Recently removed by quarrying.	392771	309366
44	Ditch	Three linear features, ranging from 180m to 200m in length, in a field to the south-east of Calf Heath Wood. The features may represent unmapped former field boundaries or recent drainage features.	392554	309336
45	Ditch	A 185m long linear feature aligned SE-NW. The feature may represent an unmapped former field boundary or a recent drainage feature.	392511	309118
46	Mound	A sub-circular 51m x 55m mound, approximately 50cm in height, to the west of Woodside Farm House, possibly representing spoil.	392317	309106
47	Large Cut Feature	A sub-circular 41m x 39m large cut feature to the south of Vicarage Road. The feature possibly represents the location of a former pond. The feature is unmapped on historic and modern mapping.	392822	309097
48	Extent of Area	A 2.3 hectare area of faint ridge features aligned SE-NW, possibly representing the remains of ridge and furrow but also possibly the remains of recent agricultural activity. Similar features are also present to the east (WA49).	392994	309179
49	Extent of Area	A 1.7 hectare area of faint ridge features, following the same alignment and form as those in the field to the west (WA48).	393069	309253
50	Ridge and furrow	Broad ridge features on Calf Heath (1.5 hectares), to the south of Heath Farm, aligned SW-NE and appearing to represent the remains of ridge and furrow. As with WA40 to the north, the features take a different alignment to recent agricultural features, suggesting an earlier date. The features continue to the east (WA51).	393175	309314
51	Ridge and furrow	A further 1.1 hectares of broad ridge features to the east of WA50, appearing to form a continuation across the later field boundary. The features appear to represent the remains of ridge and furrow.	393260	309385
52	Ridge and furrow	Broad ridge features, aligned SE-NW, present across a 1.7 hectare area and possibly representing the remains of ridge and furrow. Similar features are found in the field to the west (WA51).	393278	309139
53	Ridge and furrow	A 2.1 hectare area of broad ridge features visible to the west of WA52. The features are similar in form and share an alignment, suggesting that they also represent the	393148	309042



WAID	Feature form	Description	Easting	Northing
54	Large Cut Feature	possible remains of ridge and furrow. A sub-circular large cut feature measuring 29m x 28m, with a depth of approximately 1m. The feature represents the possible location of a former pond. It is unmapped on historic and modern mapping.	393276	308942
55	Ditch	A slight linear feature, measuring 95m in length and aligned SW-NE, in a field to the north of Straight Mille. The feature is unmapped but may represent a recent drainage feature.	393289	308855
56	Bank	A 90m long linear feature representing the remains of a former field boundary depicted on historic OS mapping.	393022	308918
57	Extent of Area	A 1.6 hectare area containing narrow ridge features aligned SE-NW. The features may represent the remains of recent agricultural activity. Additional features lie to the west (WA58).	393026	308910
58	Extent of Area	A 1 hectare area containing narrow ridge features aligned SE-NW, in the form of those to the east (WA57) and west (WA59). The features may represent the remains of recent agricultural activity.	392929	308908
59	Extent of Area	A 0.5 hectare area containing narrow ridge features aligned SE-NW, following the form of those to the east (WA58). The features may represent the remains of recent agricultural activity.	392859	308904
60	Bank	A 95m long linear feature, aligned N-S, representing the remains of a former field boundary recorded on historic OS mapping.	392628	308754



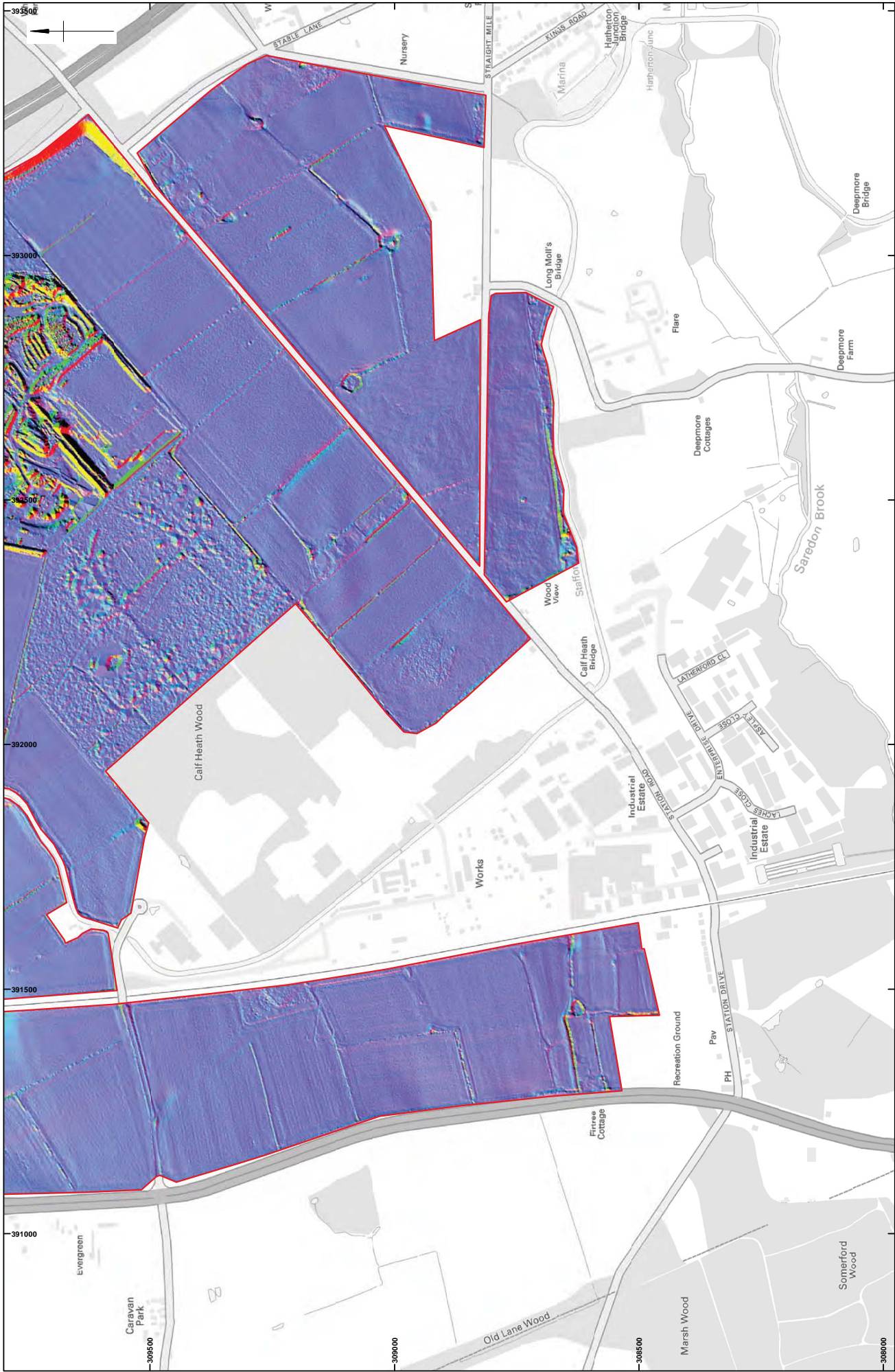
Site
 HER Records
 Value
 High : 116
 Low : 96

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Site location and digital terrain model (DTM)

Figure 1



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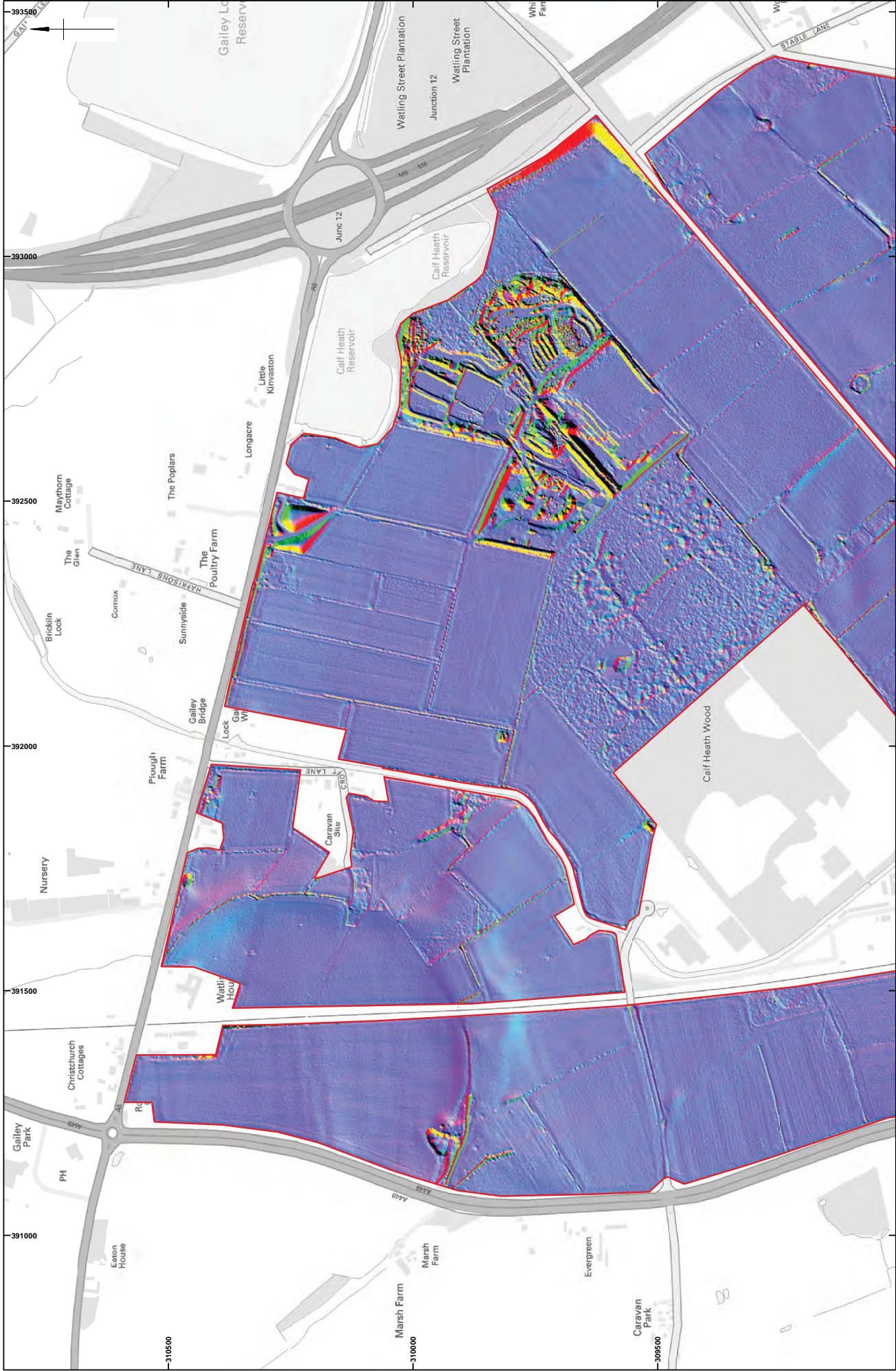
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0 500 m

Site

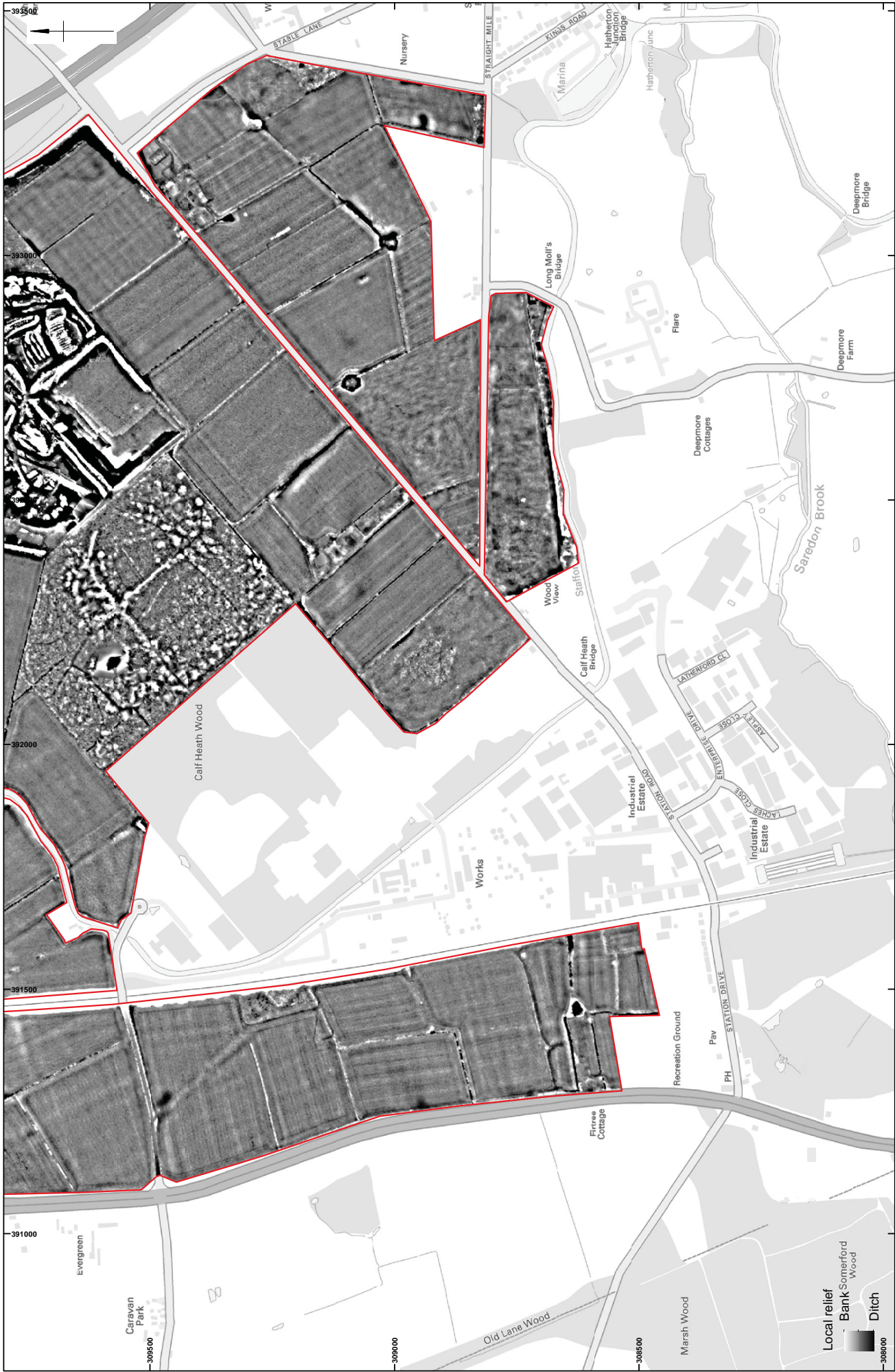
Principal Components Analysis (PCA) of hillshade models (south)

Figure 2



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Principal Components Analysis (PCA) of hillshade models (north) Figure 3



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0 500 m

Local relief model (south)

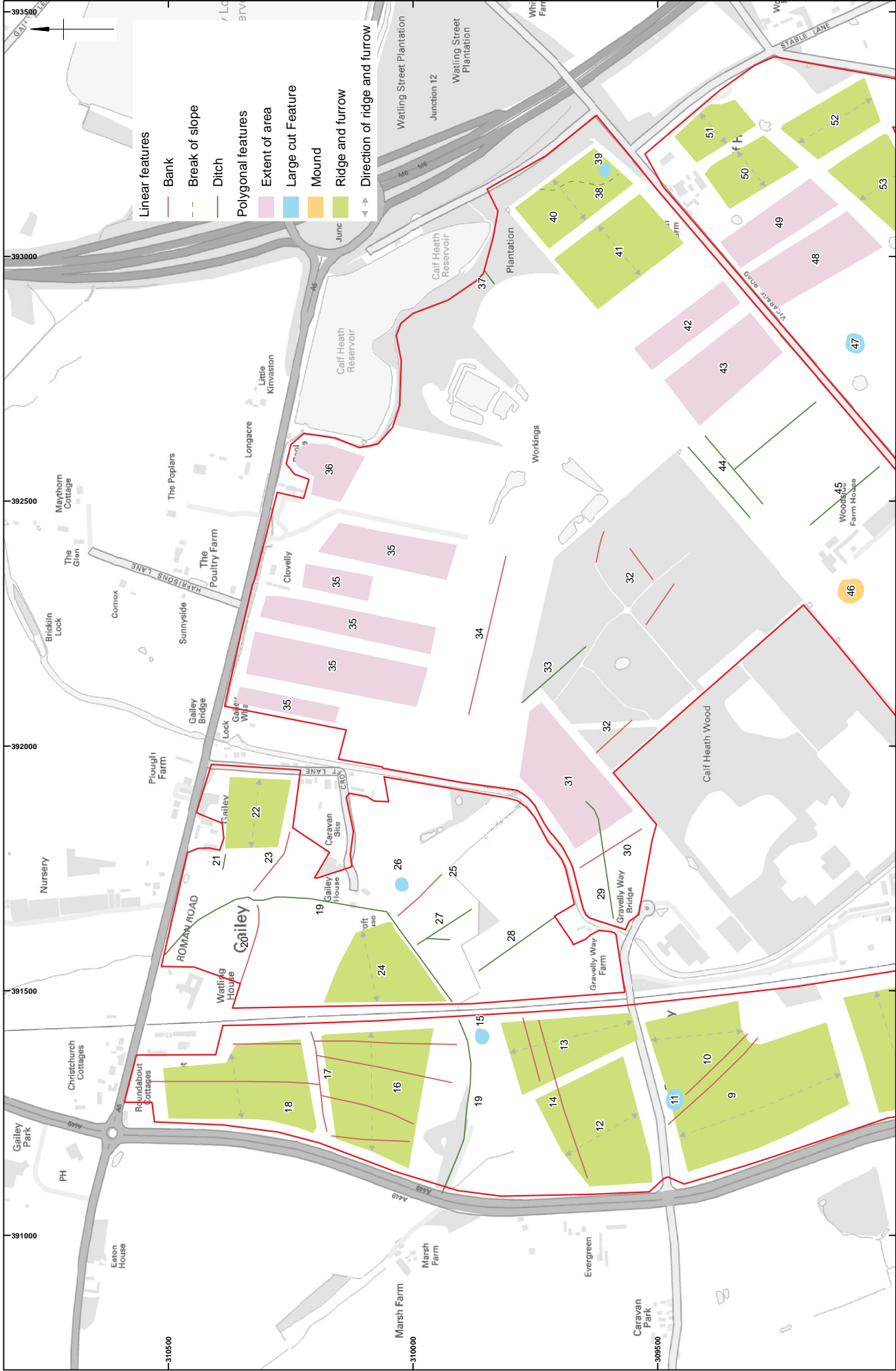
Figure 4



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Local relief model (north)

Figure 5



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Archaeological interpretation (north) Figure 7



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