

ENVIRONMENTAL STATEMENT (VOLUME III)

Appendix 8.3 Aerial Photograph and LiDAR Review

HyNet Carbon Dioxide Pipeline DCO

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 –
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1. INTRODUCTION

- 1.1.1. This Appendix presents the results of the archaeological remote sensing survey of the Newbuild Infrastructure Boundary for the DCO Proposed Development. The survey involved the systematic mapping, recording, analysis and interpretation of potential archaeological sites from historic aerial photographs and Light Detection and Ranging (LiDAR) data.
- 1.1.2. The Newbuild Infrastructure Boundary crosses the national boundary between Wales and England and two local authority boundaries: Flintshire County Council (FCC) and Cheshire West and Chester Council (CWCC) (Unitary Authorities). The area within the Newbuild Infrastructure Boundary is approximately 458 hectares. The linear corridor, approximately 35 km in length, extends from the north-west of England to the north-east of Wales - running from Elton in Cheshire, England (National Grid reference: NG 347230/377003) to south of Oakenholt, Flintshire, Wales (National Grid reference: NG 325318/371089) and passes through open pastures, grazing, arable fields, and industrial landscape. The locations of three Block Valve Stations sited along the route of the existing Flint Connection to Point of Ayr Terminal Pipeline in Flintshire, Wales are also proposed. The three proposed BVSs are comprised of: the Cornist Lane BVS located at the junction of Cornist Lane and Lleprog Lane (NGR 321717/372492), 3.7 km to the west of Flint); the Pentre Halkyn BVS located on B5121 (NGR 316714/372639); and the Babell BVS located on Racecourse Lane (NGR 313552/373575).

1.2. SCOPE

- 1.2.1. This appendix is a supplement to the Heritage Desk-Based Assessment (HEDBA) (**Appendix 8.1 - Heritage Environment Desk Based Assessment (HEDBA), Volume III**) and provides detailed information specific to the remote sensing analysis, including the sources, the methodology and the results. The key archaeological outcomes from the remote sensing survey have been integrated into the HEDBA to inform the historic environment baseline, and aid the holistic approach to, and interpretation of, archaeological potential and risk.
- 1.2.2. The geographic scope of the survey comprises the Newbuild Infrastructure Boundary. Archaeological features which were partly located within the Newbuild Infrastructure Boundary, but which extended out of the Newbuild Infrastructure Boundary, were mapped and included in the assessment.

- 1.2.3. The remote sensing survey comprises of two elements:
- Review of relevant Historic England's National Air Photograph Library (**Ref. 5.1**) documents and the Royal Commission of Ancient and Historical Monuments of Wales's Aerial Photography archive (**Ref. 5.2**); and
 - LIDAR (Light Detection and Ranging) – held by the Department of the Environment, Food and Rural Affairs (DEFRA) (**Ref. 5.3**) and Natural Resources Wales (**Ref. 5.4**).

1.3. **AIMS AND OBJECTIVES**

- 1.3.1. Archaeology has been a material consideration in the planning process since 1990 and its value is recognised in national and local planning policy. The aim of this appendix is to support the HEDBA which is achieved through four objectives:
- Supplement the baseline of the HEDBA, by:
 - identifying a more informed extent of existing archaeological assets; and
 - identifying any new potential buried archaeological assets.
 - Provide an awareness that currently documented heritage data sources do not represent a complete and exhaustive representation of the archaeology present, and that additional or a variance of known features are possible - especially in areas of greenfield, where little previous human development has occurred; and
 - Where possible, assess and provide an informed decision about the likely risk associated with the feature/area.

1.4. **LIMITATIONS**

Aerial Photographs

Coverage

- 1.4.1. The Historic England Aerial Archaeology Mapping Explorer, previously known as the Historic England National Mapping Programme, (**Ref. 5.5**) did not cover the Newbuild Infrastructure Boundary in the timeframe of this assessment and was therefore not used.
- 1.4.2. Twenty-two aerial photographs held within the Historic England archives (**Ref.5.1**) and identified as relevant were not held as prints and therefore could not be consulted. These aerial photographs were taken in 1959, 1978, 1985, 1992, 1997, and 1998.

- 1.4.3. The Royal Commission of Ancient and Historic Monuments of Wales (RCAHMW) archive (**Ref. 5.2**) search returned 66 aerial photographs within a 1 km buffer of the Newbuild Infrastructure Boundary. Only one was considered to be of potential use, due to the foreground and content of the photograph being within the Newbuild Infrastructure Boundary.
- 1.4.4. No relevant oblique/off-nadir aerial photos were available for the search area from either the Historic England archive (**Ref. 5.1**) or the RCAHMW archive (**Ref.5.2**).
- 1.4.5. The data gap was addressed by utilising the more recent (2000–22) images at Google Earth Pro (**Ref. 5.6**) which supplied full coverage of the area. Google Earth satellite imagery was used in accordance with observations provided by Scollar and Palmer (**Ref. 5.7**). These images show some crop marked buried features and are documented as part of **Annex A: Aerial Photograph and LiDAR Gazetteer of features identified** at sites 365-371.

Analysis

- 1.4.6. Interpretation of aerial photographs relies on the visual identification of heritage assets through the effects of growing crops and other vegetation, marks in soils, or as surviving features or earthworks which are more visible at times of clear low light. Aerial photographic evidence is limited by seasonal, agricultural, land use, meteorological, lighting and environmental factors which affect the extent to which either buried or upstanding archaeological features and structures can be detected. Unlike digitally processed LiDAR and other data, the azimuth of the sun cannot be changed on a conventional aerial photo. Some of the consulted photographs were blurry or faded, which reduced the visibility of the potential features in those areas.
- 1.4.7. At present day, most of the assessed land within the Newbuild Infrastructure Boundary is composed of fields under a mixture of arable cultivation and pasture. This presents limitations to the visibility of features, as a cropped arable regime of cereals often allows the formation of crop marks, whereas grassland/pasturage and non-cereal crops, unless seen in times of extreme moisture stress, can mask the appearance of buried features.
- 1.4.8. Aerial photographs cannot be used to detect features in heavily wooded areas in the same manner as LiDAR surveys. Buried features are also 'masked' in land use types that are not amenable to feature visibility or the formation of crop marks, such as woodland, scrub, unimproved pasture or alluvial areas. Medieval ploughing, producing the typical ridges and furrows caused by the turning of an ox-drawn plough, often mask underlying deposits on aerial imagery.

- 1.4.9. It is also important to note that identification and interpretation of features is subjective and can be influenced by other known heritage features and cultural remains in the vicinity. This may potentially limit the interpreter's openness to seeing atypical features in the data.
- 1.4.10. No sites or features have been identified from historic aerial photos which may be firmly dated to the prehistoric through to the early medieval periods within the Newbuild Infrastructure Boundary.
- 1.4.11. These limitations were considered carefully whilst interpreting features from aerial photographs and the interpretations are built up from observations of many photographs over different time periods, if available.
- 1.4.12. These limitations were not considered to affect the assessment as they are within the expected assessment criteria.

LiDAR data

Coverage

- 1.4.13. The publicly available LiDAR data does not provide full coverage of the Newbuild Infrastructure Boundary; there is substantial coverage from 1m resolution LiDAR data - approximately 61% of the Newbuild Infrastructure Boundary and approximately 18% coverage from 2 m resolution. Altogether, coverage of the available LiDAR dataset was 78.5% of the Newbuild Infrastructure Boundary. In total, LiDAR data was found to be available for 360 hectares.

Analysis

- 1.4.14. One of the principal limitations of the assessment is that features were identified and interpreted in the absence of ground level observations. Ground level observations from the walkover surveys were used to inform the assessment where possible but some areas of the Newbuild Infrastructure Boundary were inaccessible due to land access issues and the presence of large livestock. This can result in interpretation errors where localised variations in ground profile which are of very recent or natural origin can be mistakenly identified as archaeological features. This issue was alleviated by comparing the LiDAR images against conventional aerial photographic imagery (i.e., within the visible region of the electromagnetic spectrum), Google Earth satellite imagery (**Ref. 6**), and with observations made during the walkover surveys of the site undertaken in October and November of 2021 and in February and June of 2022.
- 1.4.15. LiDAR data 'resolution', driven by the returned 'points per m²' collected at the time of survey, can also influence the detection rates of archaeological features. This can occur where the spacing of point measurements is sufficiently wide to conceal or reduce the visibility of small (<1 m) archaeological features.

- 1.4.16. Although shaded relief images can greatly aid visualisation of LiDAR data, and a hillshade was applied in this analysis, no single direction of illumination can simultaneously reveal all relief features. For example, when a hillshade is lit from a single direction, any features aligned with the source of light can be hidden as they do not cast any shadow. This technical limitation was overcome by examining a series of hillshades illuminated from multiple directions.
- 1.4.17. The angle of illumination can also influence the visibility of relief features. For example, visualisation of subtle variations in relief may require low illumination elevation, which can in turn obscure detail in steeper areas of the image. As the imagery used during the analysis was illuminated from a single fixed angle, this may have influenced the detection rates of archaeological features. However, the effect of this is likely to be relatively slight, as the Newbuild Infrastructure Boundary is not characterised by dramatic changes in relief.
- 1.4.18. The filtering process which is applied to LiDAR data when generating a DTM may not be able to entirely remove the masking effect of low-level vegetation and can also result in some loss of detail.
- 1.4.19. The effectiveness of the successful identification of archaeology can be significantly influenced by a range of factors, such as the underlying geology, soil moisture content and vegetation cover.
- 1.4.20. Aerial photograph analysis is often based on sequences of historical imagery, which provide a series of 'snapshots' of the landscape under different conditions. In contrast, LiDAR and multi-spectral data are typically gathered at a single or series of closely spaced points in time. This can explain why features identified from aerial photographs cannot always be detected on LiDAR and multi-spectral images of the same area. For example, multi-spectral data collection may be undertaken outside of the window of opportunity where conditions are optimal for the detection of archaeological features which can be difficult to predict.
- 1.4.21. Much of the Newbuild Infrastructure Boundary coincides with arable fields which have been subject to intensive modern agricultural techniques. As a result, the prominence of archaeological features may have been greatly reduced by ploughing across large parts of the Newbuild Infrastructure Boundary. This may have resulted in a difference in the detection rate of archaeological features between fields which have been intensively ploughed, and areas which have not, such as within parks (unless extensively landscaped) or land which has predominantly been under pasture.
- 1.4.22. Due to the non-intrusive nature of this analysis, no sites have been identified from historic aerial photos within the Newbuild Infrastructure Boundary which may be firmly dated to the prehistoric through early medieval periods.

2. METHODOLOGY AND SOURCES

2.1. AERIAL PHOTOGRAPHY

- 2.1.1. The data from the aerial photographic cover search at the Historic England archives (**Ref. 5.1**) was received in excel spreadsheet form and were converted to CSV files to allow them to be integrated to the working GIS to assess the coverage of vertical aerial photos. The CSV displayed the approximate capture location, i.e. the location at which the photograph was taken. Relevant aerial photographs were identified by their 'capture location' being within a 1 km 'search area' of the Newbuild Infrastructure Boundary. The archive was visited to determine which of the identified aerial photographs were angled toward land within the Newbuild Infrastructure Boundary. This resulted in 35 relevant vertical aerial photographic sorties containing 101 individual frames taken between 1947 and 1998 over the Newbuild Infrastructure Boundary in Cheshire and Flintshire being identified and assessed within the Historic England archives.
- 2.1.2. Review of historic aerial photography helps understand the historic environment resource by revealing sites that are often difficult or even impossible, to see on the ground. Historic aerial photos especially provide information on features, sites or landscapes that may have since been removed, altered or hidden due to modern development, urbanisation or a change in land use. Interpretation and mapping of sites visible as cropmarks, soilmarks, and earthworks allows a better understanding of past landscapes to inform the baseline, and therefore risk and management strategies.
- 2.1.3. Aerial photos (captured either through vertical and oblique angles) can help identify and interpret earthwork sites, and cropmarks, and can help visualise the features or sites differently – especially when captured from different directions. Furthermore, looking at a wide range of photographs from different years can provide a perspective on the changing landscape, condition and preservation of the sites over time (**Ref. 5.8**).
- 2.1.4. Vertical aerial photographs only were reviewed for this analysis. Vertical aerial photographs are taken for military, commercial and general-purpose survey using a camera mounted inside a modified aircraft. The aircraft is flown on a pre-planned set of overlapping flight-lines which cover the survey area completely. The camera points straight towards the ground. The vertical viewpoint provides aerial photographic coverage from a fixed scale and constant 180° angles at the centre of each frame. Vertical aerial photographs carry inherent distortions introduced by variations in perspective and ground height but are 'map-like' in appearance.

- 2.1.5. The analysis excluded surviving historical features within the landscape and features that are obviously modern, as they would be known heritage features and, therefore, would not be identified as unknown buried archaeological remains. The potential origin of each feature was based on a consideration of its form and landscape context. Where possible, a broad date range was assigned to each feature by reference to conventionally defined archaeological periods, or if this was not certain or possible, an 'unknown' date was assigned. The archaeological periods were defined from Historic England's Periods List (**Ref. 5.9**) and are as follows:
- Prehistoric -1,000 000 to 43 AD:
 - Palaeolithic -1,000 000 to -10,000 (BC);
 - Mesolithic -10,000 to -4,000;
 - Neolithic -4,000 to -2,200;
 - Bronze Age -2,600 to -700; and
 - Iron Age -800 (BC) to 43 (AD).
 - Roman 43 to 410 (AD);
 - Early Medieval 410 to 1066;
 - Late Medieval 1066 to 1540;
 - Post-medieval 1540 to 1901; and
 - Modern 1901 to present.
- 2.1.6. The Welsh Research Framework (**Ref. 5.10**) identifies the same periods but suggests a slightly different data range for the Early Medieval and Later Medieval periods of 410 to 1100 and 1100 to 1539 respectively.
- 2.1.7. The following sources of aerial photographs were used for this analysis:
- Historic England Archive (**Ref. 5.1**): The Engine House, Firefly Avenue, Swindon. Air photo search enquiry number 130963, undertaken in March 2022, covered both the FCC and CWCC (mostly Cheshire) of the DCO Proposed Development. 79 aerial photographs were utilised for analysis;
 - Royal Commission on the Ancient and Historical Monuments of Wales Archive (**Ref. 5.2**): Search undertaken in October 2021. One aerial photograph was considered to be of potential use, due to the foreground and content of the photograph being within the Newbuild Infrastructure Boundary; and
 - Google Earth Pro: All timelines available of ortho-rectified mosaics of vertical aerial photographs on Google Earth Pro (**Ref. 5.6**).
- 2.1.8. The historic Aerial Photographs were not georeferenced or reproduced in this report but the images were used to plot the approximate location of features in GIS.

2.2. LIGHT DETECTION AND RANGING (LIDAR) DATA

- 2.2.1. LiDAR uses the nature and consistent speed of light pulses to build up a point cloud, and, by triangulating those points together, builds a detailed Digital Terrain Model (DTM) of the reflected surface. Furthermore, as light can penetrate vegetation it can build a picture below canopy and dense vegetation, allowing visibility of the ground (surface) where other techniques cannot. This allows not only individual feature detection but a broad insight into large areas of the ground and how it has been shaped and manipulated in the past.
- 2.2.2. The LiDAR data was downloaded from publicly available sources (Environmental Agency National LiDAR Programme accessed through DEFRA's geoportal (**Ref. 5.3**), and National Resources Wales LiDAR Composite Dataset, accessed on Lle Geoportal for Wales (**Ref. 5.4**)).
- 2.2.3. Features of potential archaeological interest were identified by visual examination of the LiDAR data with a 'hillshade' applied, in conjunction with other relevant datasets (outlined in **Section 3 of Appendix 8-1 - Heritage Environment Desk Based Assessment (HEDBA), Volume III**). A hillshade is a grayscale 3D representation of the surface, with the sun's relative position taken into account for shading the image. This hillshade tool within the 3D Analyst toolbox in ArcGIS 10.8.1 uses the altitude and azimuth properties to specify the sun's position. The 3D Analyst tool in ArcGIS 10.8.1 was used to examine changes in ground profile on the Digital Terrain Models (DTMs) to identify features of potential interest. Digitisation of identified features was then undertaken manually within ArcGIS 10.8.1.
- 2.2.4. The methodology for analysing the data was informed by best practice (**Ref. 5.11** and **Ref. 5.12**).
- 2.2.5. Extant historical features within the landscape, such as field systems, ponds, roads, farms and other structures were excluded where these are recorded on current Ordnance Survey mapping as these are known features within the landscape and therefore would not be considered as unknown buried heritage.
- 2.2.6. Identified features were assigned a unique numerical identifier (e.g. L 61) and briefly described. The potential origin of each feature was interpreted based on a consideration of its form, landscape context and other relevant datasets, described below. Where possible, a broad date range was assigned to each feature by reference to conventionally defined archaeological periods.
- 2.2.7. The following sources of LiDAR data were searched and used for this analysis:
- Environment Agency National LiDAR Programme (**Ref. 5.3**), accessed on DEFRA and downloaded on 10 January 2022; and
 - National Resources Wales LiDAR Composite Dataset (**Ref. 5.4**), accessed on Lle Geoportal for Wales and downloaded 1 March 2022.

3. ANALYSIS OF HISTORIC AERIAL PHOTOGRAPHS

3.1. OVERVIEW

- 3.1.1. A total of 71 features and groups of features of possible archaeological interest were identified through historic aerial photography within the Newbuild Infrastructure Boundary.
- 3.1.2. The possible features identified from aerial photographs during the analysis are listed and described in **Annex A: Aerial and LiDAR Gazetteer of Features Identified**. The principal findings of the analysis are presented chronologically below.

3.2. RESULTS

Prehistoric

- 3.2.1. No features of obvious/likely prehistoric origin were identified during this analysis.

Roman

- 3.2.2. No features of obvious/likely Roman origin were identified during this analysis.

Early Medieval/Late Medieval

- 3.2.3. No sites or features have been identified from aerial photos within the Newbuild Infrastructure Boundary which may be firmly dated to the early medieval period.
- 3.2.4. The Newbuild Infrastructure Boundary however appears to have been extensively farmed in the late medieval period evident through areas of eroded ridge and furrow features, plough scars and former field boundaries. Whilst the majority of the ridge and furrow visible on aerial photos date to the post-medieval period (see post-medieval section below), there is some evidence of the earlier Late Medieval ridge and furrow and ploughing scars (AP 306, 334, 345, 347). This pattern of parallel ridges and troughs were created by ploughing the land is wider in the late medieval period, typically becoming narrower as technology and methods improved in the post-medieval period.
- 3.2.5. Ridge and furrow can also be an indicator of medieval rural settlement patterns, graphically displaying the extent and location of settlement and land management limits. Generally, in the vicinity of relict ridge and furrow there may be remains of occupation, because of the increased likelihood of associated infrastructure, buildings and/or agricultural practice material.
- 3.2.6. The surviving ridge and furrow earthworks indicate that these fields have been used for pasture rather than as arable land, as modern ploughing would have largely eradicated any surviving ridge and furrow.

3.2.7. The late medieval Moated Site, Fishpond, Connecting Channel and its associated earthworks by Elton (Scheduled Monument, NHLE No. 1012122) are visible on a number of aerial photographs (AP 357, 358, 359, 360, 361, 362, 363, 364, 365). Further buried remains associated with the asset, whilst not evident on aerial photos, are likely within the Newbuild Infrastructure Boundary given its close proximity. Furthermore, nearby fields contained evidence of plough scarring suggesting potential obscuration of any ephemeral evidence.

3.2.8. There are no visible signs of deserted late medieval settlements; however, such remains are likely to lay beneath modern settlements and hamlets in this area.

Post-medieval

3.2.9. Within the Newbuild Infrastructure Boundary the post-medieval landscape is clearly visible on aerial photographs. The identified remains within the Newbuild Infrastructure Boundary mostly relate to the many aspects of agricultural activities which span the whole period. Plough scars (AP 311, 318 and 328), narrow ridge and furrow earthworks (AP 307, 308, 314, 323, 324, 325, 326, 327, 329, 330, 332, 335, 336, 337, 346, 348, 349, 350, 356 and 368) and former field boundaries (AP 305, 310, 312, 321, 333, 341, 353, 366, 369 and 371) indicate that the area within the Newbuild Infrastructure Boundary has been extensively farmed since late medieval/post-medieval times.

Undated

3.2.10. Within the Newbuild Infrastructure Boundary, there are several marks in crops and grass indicating the presence of potential buried boundaries (AP 342 and 351), ditch (AP 313, 317, 320, 331, 338, 339, 340, 343, 344, 355, 365 and 370) and pit features (AP 315, 316, 319, 322 and 352). There are also visible traces of paleochannels that run across the area of the Newbuild Infrastructure Boundary (AP 300, 301, 302, 303, 304 and 367). These surviving features can neither be assigned to archaeological periods nor can be confidently classed as archaeology.

4. LIDAR RESULTS

4.1. OVERVIEW

- 4.1.1. A total of 200 features and groups of features of possible archaeological interest were identified on the LiDAR imagery within the Newbuild Infrastructure Boundary (this total includes 11 features associated with the Scheduled Monument at Elton (NHLE 1012122) located in very close proximity to the Newbuild Infrastructure Boundary).
- 4.1.2. The features identified have been predominantly classed into the following categories: surviving ridge and furrow earthworks, relict field boundaries, disused drainage channel and ditch features, boundary ditches, and enclosures. These features largely relate to agricultural activity.
- 4.1.3. A single potential enclosure ditch feature was identified through LiDAR north-west of Moston, Cheshire. With additional research and input from the Cheshire Planning Development Archaeologist, this is interpreted to be part of a Second World War encampment (L 173).
- 4.1.4. Features identified during the LiDAR analysis are described in **Annex A** and illustrated in **Annex B: Figures (Figures 8.3.3 and 8.3.4)**. The principal findings of the analysis are presented below.

4.2. RESULTS

Prehistoric

- 4.2.1. No features of obvious/likely prehistoric origin were identified during this analysis.

Roman

- 4.2.2. No features of obvious/likely Roman origin were identified during this analysis.

Early Medieval/Late Medieval

- 4.2.3. The Moated site, fishpond and connecting channel at Elton (NHLE 1012122) is a Scheduled Monument (**Ref. 5.13**) that lies adjacent to the Newbuild Infrastructure Boundary. The Scheduled Monument is clearly visible through LiDAR data (L 190, Figure 8.3.5). Further buried remains associated with the asset are found in the LiDAR data – especially to the east, south-east and south-west. Given its proximity to the Newbuild Infrastructure Boundary, it is likely some aspects of the Scheduled Monument will fall within the Newbuild Infrastructure Boundary. Furthermore, the fields to the west and south-west, within the Newbuild Infrastructure Boundary, contained evidence of plough scarring suggesting potential obscuration of any ephemeral evidence.

- 4.2.4. Built between about 1250 and 1350, it is one of the most notable features in the LiDAR data (L 190). The moated site consists of a slightly raised island surrounded by a moat approximately 12 m wide x 1.7 m max. depth. The monument also has a causeway and outer banks with an adjoining fishpond and connecting channel. According to Historic England, the site contains a diversity of component parts and survives in a relatively undamaged condition, virtually untouched by modern development. The site retains considerable archaeological potential for the recovery of evidence of the building that originally occupied the island (Historic England, 1991). Ditch features associated with the moated site are noted outside the boundaries of the Scheduled Monument within the field that the monument is sited in. The hedged field boundary at the west of the monument is excluded from the scheduling, however, the ground beneath it is included. The following anomalies are potentially associated with the Scheduled Monument due to their proximity:
- Linear drainage features: L 191, 192, 198;
 - Former field boundaries: L 191, 194, 195, 197; and
 - Ridge and furrows and plough scars: L 12, 15, 17, 18, 193, 199, 200.
- 4.2.5. One of the most common feature types identified during this assessment were characteristic medieval and/or post-medieval ridge and furrow. This pattern of parallel ridges and troughs were created by ploughing the arable land. Most examples display straight and narrow sets of ridges which were most likely created in the post-medieval period. However, five examples of ridge and furrow landforms, recorded to the south of Saughall (L 72, 73, 75, 76, 77 and 78; Figure 8.3.6), display an S-shape indicating that these were created earlier, likely in the late medieval.
- 4.2.6. Across the Newbuild Infrastructure Boundary evidence of ridge and furrow shows varying levels of preservation in response to location and intensity of subsequent land use. Given the clarity of some of the ridge and furrow features it appears that many of these fields were turned over to grazing instead of crop cultivation toward the end of the late medieval or through the post-medieval periods and therefore have not been obscured through subsequent ploughing.
- 4.2.7. Distributed intermittently across the Newbuild Infrastructure Boundary, post-medieval ridge and furrow are a very common feature identified through LiDAR data within the Newbuild Infrastructure Boundary. Notable concentrations of ridge and furrow earthworks were identified east and west of Mollington (L 49, 51, 56, 59, 60, 61, 62, 67, 68, 70, 73, 74; **Figure 8.3.6 and 8.3.7**) and 16 further at Deeside (L 104, 106, 107, 110, 112, 116, 117, 118, 119, 121, 122, 125, 127, 134, 170, 174; **Figure 8.3.6 and 8.3.7**). The LiDAR data indicates these earthworks have narrow ridges, suggesting that these earthworks may be of post-medieval date.

4.2.8. A number of past field boundaries have been identified through the LiDAR data within the Newbuild Infrastructure Boundary, and are likely remnants of previous field systems. These field boundaries define the previous field systems which vary in size but are mostly rectangular in shape. Linear features, which respect or align with the existing field systems and hedgerows were considered to be former field boundaries. It is likely that the pattern of these field systems is a product of the Enclosure acts of the 18th and 19th centuries; however, it is also possible that the spatial patterning of these field systems may correspond with earlier land divisions. This includes some components of medieval open field systems, where individual farmers looked after their own strips of land. By the 20th century, most of the enclosed fields were combined, which resulted in the loss of numerous field boundaries (L 6, 8, 10, 21, 39, 50, 52, 53, 54, 55, 71, 81, 83, 91, 92, 96, 109, 113, 128, 144, 151, 152, 155, 156, 159, 160, 161, 167, 168, 178, 179, 184, 194, 195 and 197) which can be seen on **Figures 8.3.3 and 8.3.4.**

Modern

- 4.2.9. One potential enclosure ditch (L 173) is visible on LiDAR located 22 m to the north-east of the Newbuild Infrastructure Boundary at Grove Road in Mollington, Cheshire (**Figure 8.3.3 Sheet 3** and **Figure 8.3.4 Sheet 3**). The feature appears sub-rectangular in form, covering 0.5 hectares and on top of a hill. The LiDAR data indicates the ditch feature to be very shallow and is cut by a modern field boundary. The feature (L 173) was also noted during the geophysical survey (Area 158, as shown on Figures 172 and 173 in **Appendix 8-4 - Geophysical Survey Report (Volume III)**).
- 4.2.10. Discussions with the Cheshire West and Cheshire Planning Development Archaeologist as a result of the geophysical report (email dated 27/06/2022 and shown in **Annex C**) suggested that the feature is part of a Second World War encampment. The Cheshire Archaeology Planning Service provided the Cheshire West and Cheshire Planning Development Archaeologist with RAF photographs, CPE\UK\1935 no.1021–1022, 17/1/1947, showing the encampment in that location. It was noted that this has been included within the phase II of the National Mapping Project but that the reference numbers in the GIS data provided were incorrect making this difficult to trace (email dated 27/06/2022).

Undated

- 4.2.11. There is also a number of linear depressions and banks visible in the LiDAR data within the Newbuild Infrastructure Boundary. There are 33 linear banks and depressions that did not appear to respect existing or former field systems (L 13, 16, 20, 23, 25, 29–32, 34, 35, 38, 47, 50, 69, 79, 86–88, 90, 93, 105, 108, 111, 115, 129, 138, 139, 147, 166, 172, 185, 192, 198). The majority possibly represent drainage systems (L 13, 16, 25, 29–31, 34, 35, 38, 47, 50, 69, 79, 86-88, 90, 93, 108, 111, 115, 129, 138, 139, 147, 166, 172, 185, 192, and 198), or footpaths (**Figures 8.3.3 and 8.3.4**). Where the linear banks and depressions that did not appear to respect existing or former field systems, it is plausible that some of these features represent considerably older features with greater significance.
- 4.2.12. Two parallel, linear features (L 130) may represent the remains of a post-medieval disused railway line (**Figure 8.3.8**). The remains are now cut by a modern road (A550).
- 4.2.13. Twenty-six of the identified anomalies (L 5, 7, 9, 14, 24, 27, 28, 33, 44, 48, 66, 94, 120, 123, 124, 141, 142, 143, 145, 148, 158, 162, 165, 175 and 181) were discrete features, mostly sub-circular or sub-oval in plan (**Figures 8.3.3 and 8.3.4**). Their size varied greatly, ranging from 2.5 to 58 m in diameter. These depressions were intermittently distributed within the Newbuild Infrastructure Boundary, and they were mostly identified within or at the edges of agricultural fields.
- 4.2.14. Some of these features may be of natural origin, but it is likely that the majority are a result of human activity. The original purpose and date of these discrete anomalies cannot be distinguished with certainty based on the remote sensing data, but it is likely that many of these features represent extraction pits and industrial activities. It is possible that some of the ponds that currently exist within the Newbuild Infrastructure Boundary may also have originated as extraction pits.
- 4.2.15. It is likely that many of these features are post-medieval as they are not cut by other anomalies and therefore were potentially open in the post-medieval period. However, it is possible that some of them may be earlier features or natural in origin. Most of the discrete features are not cut by other anomalies within the Newbuild Infrastructure Boundary, which potentially means that they were open and used in the post-medieval period.
- 4.2.16. The Newbuild Infrastructure Boundary crosses two reclaimed marshlands, the Ince Marshes at the eastern end of the Newbuild Infrastructure Boundary and the Saltney Marshes on the south side of the River Dee. Palaeochannels (a former river, stream or channel) were noted within both areas (L 0–4, 98–100, 183, and 187) which can be seen on **Figures 8.3.3 and 8.3.4**. The palaeochannels in the former Saltney Marshes are noted on historic maps from

the 18th century specifically the plans for the Dee canalisation activities. Although palaeochannels are generally regarded as important within the study of hydrology and geomorphology, they are included here as they are fundamental to understanding the local environment which would have influenced the location of a site or settlement. They would have provided water, transportation links, and fertile land for crops.

4.3. CONCLUSIONS

- 4.3.1. Analysis of historic aerial photographs and available LiDAR data has resulted in 196 features (either new or new parts of known features) of potential historical interest across the Newbuild Infrastructure Boundary (207 in total including the Scheduled Monument and other features in very close proximity to the Newbuild Infrastructure Boundary). The results of the assessment were consistent with the expectations, given the rural character of the Newbuild Infrastructure Boundary. Some features were recorded from both datasets.
- 4.3.2. The features identified within the Newbuild Infrastructure Boundary predominately relate to late medieval and post-medieval agricultural activity and some potentially post-medieval quarrying activity. Cheshire and Flintshire were extensively farmed in the late medieval and post-medieval period, and the assessment has identified evidence of this agricultural activity as ridge and furrow earthworks, relict field boundaries, drainage systems, and multiple discrete features within the Newbuild Infrastructure Boundary.
- 4.3.3. The majority of late medieval and post-medieval agricultural features are considered of low heritage value. Earthwork examples of late medieval and post-medieval ridge and furrow, especially where they help interpret and record past settlements and landscapes, could be considered to be of a higher value if well-preserved and within a definite context. Ridge and furrow is becoming a dwindling resource due to urban expansion and modern agricultural practices (which remove the resource) which may change the general understanding of the resources' significance.
- 4.3.4. Effects from direct physical impacts on sub-surface heritage assets during the construction stage are anticipated on identified heritage features within the Newbuild Infrastructure Boundary. Avoidance of any archaeological remains is preferable but if avoidance is not practicable identified features within the construction corridor should be preserved through archaeological excavation and recording.
- 4.3.5. It should be noted that while approximately 200 features have been identified through this assessment, the aforementioned limitations (See **Section 1.4**) of the data sources and their coverage (for example, LiDAR coverage was not available for approx. 21.36% of the Newbuild Infrastructure Boundary) across sections of the Newbuild Infrastructure Boundary means that there is a high

possibility that there are more potential features which are still unmapped. Despite this, the analysis has identified a considerable amount of new and partially new potential features or groups of features within the Newbuild Infrastructure Boundary and has dramatically informed the historic environment baseline. These features have been included into the HEDBA (**Appendix 8.1 - Heritage Environment Desk Based Assessment (HEDBA), Volume III**), Gazetteer (**Appendix 8.2 - Gazetteer of Heritage Assets, Volume III**), and **Chapter 8 – Cultural Heritage (Volume II)** of the ES.

5. REFERENCES

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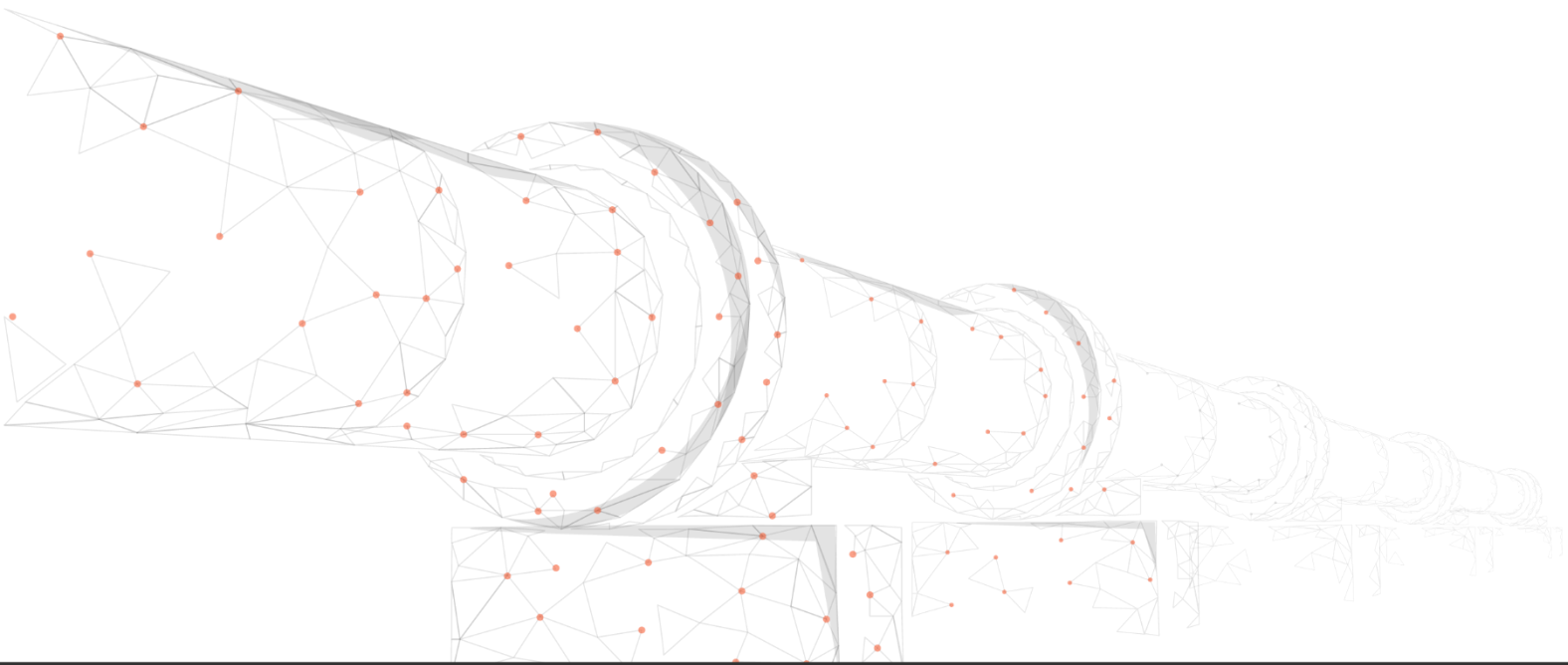
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Annexures



Annex A

GAZETTEER OF FEATURES IDENTIFIED

ANNEX A - GAZETTEER OF FEATURES IDENTIFIED

Table A.1 is a gazetteer of features identified within the Newbuild Infrastructure Boundary during an analysis of historic aerial photographs and LiDAR. Each entry either has a LiDAR feature reference number (L) or an Aerial Photo feature ref (AP). The gazetteer should be read in conjunction with the historic environment features map (see **Annex B**).

Table A.1 - Gazetteer of Features Identified Through Aerial Photographs and LiDAR

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
0	300	Potential paleochannels.	Unknown	RAF/540/700 5150; OS/69352 10; OS/92226 83
1	301			
2	302			
3	303			
4	304			
5		A potential pit feature measuring approx. 13 m in diameter.	Unknown	
6		Remains of an approx. 210 m long former field boundary.	Post-medieval/ modern	
7		Two pit features, possibly related to previous extraction. The northern feature measures approx. 5 m in diameter and the southern feature measures 7 m in diameter.	Unknown	
8	305	Remains of a potential former field boundary.	Post-medieval/	OS/92226 127

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
			modern	
9		Feature is of uncertain origin, potentially natural.	Unknown	
10		Remains of a 160 m long potential former field boundary.	Post-medieval/ modern	
11	306	A block of potential ploughing scars across 0.6 hectares.	Unknown, possibly late medieval/ post-medieval	RAF/540/700 5192; OS/92226 127
12	307	A block of ridge and furrow, contained within a 5.5 hectares area.	Possibly post-medieval/ modern	OS/92226 145
13		Linear, potential ditch feature.	Unknown	
14		A discrete feature of uncertain origin.	Unknown	
15		A possible block of faint ridge and furrow, located across 4.4 hectares.	Post-medieval/ modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
16		A prominent 120 m long ditch feature running across a field of ridge and furrow.	Unknown, possibly late medieval/ post-medieval	
17	308	Remains of a block of ridge and furrow, located across 1.8 hectares.	Post-medieval/ modern	OS/92226 144; OS/92226 145
18	309	Faint block of ridge and furrow and plough scars, contained within a 3.3 hectares area.	Post-medieval	OS/71105 2; OS/92226 143
19		A block of parallel plough scars. Faint ditch running across plough scars.	Late medieval/post-medieval	
20		A 71 m long linear feature adjacent to modern road. It may be recent in origin.	Unknown	
21	310	A 168 m long linear feature, possible representing a former field boundary.	Late medieval/post-medieval	OS/80137 25; OS/92226 144
22	311	A block of land with visible plough scars across it.	Unknown, possibly post-medieval/ modern	MAL/71136 40; RAF/540/700 5156; OS/71105 2, OS/92226 146

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
23	312	Two parallel linear depressions, both slightly curved. The one on the south is approx. 70 m long, the one on the north is approx. 55m long.	Unknown	MAL/71136 41; MAL/71136 40; OS/92226 145; OS/92226 146
24		Sub-circular mound feature, 93 m in diameter. It may be of natural origin.	Unknown, potentially prehistoric	
25	313	A prominent, 183m long linear ditch feature that runs across a field. Only 132m of it is inside of the Red Line Boundary.	Unknown	OS/80137 24; RAF/CPE/UK/1996 4179
26	314	A block of faint ridge and furrow, located across 2.6hectares.	Post-medieval/ modern	MAL/71136 40; RAF/CPE/UK/1996 4179; OS/92226 143; OS/80137 24
27	315	A small pit feature, 10m in diameter.	Unknown	OS/71105 2
28	316	A small pit feature, 7m in diameter.	Unknown	OS/71105 2
29		A prominent, 260m long ditch feature running across a field.	Unknown	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
30		Linear ditch feature, running across a field. The feature may be of more recent date.	Unknown, possibly post-medieval/modern	
31	317	A long linear depression, running across a field. It may be a ditch feature.	Unknown	MAL/71136 40; MAL/71136 41
32	318	A 220 m long linear anomaly running across a field. The anomaly may reflect recent agricultural activity.	Unknown, possibly post-medieval/modern	RAF/CPE/UK/1996 4179; OS/92226 146; OS/92226 147
33		A sub-oval depression in a field, possibly related to previous extraction. 9 m in diameter.	Unknown	
34		A linear ditch in a field. In the eastern end it splits into two ditches. Possibly representing drainage features.	Unknown, possibly post-medieval/modern	
35				
36		A parcel of possible ridge and furrow - the features may also relate to recent agricultural activity.	Unknown, possibly post-medieval/modern	
37		A small block of faint ridge and furrow, located across 0.7 hectares. May represent recent agricultural activity.	Unknown, possibly post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
38		A 56 m long ditch feature. It is adjacent to the M56 - may be recent in origin.	Unknown, possibly post-medieval/modern	
39		A 40m long linear ridge running across a field. It may represent the remains of a former field boundary.	Unknown, possibly post-medieval/modern	
40		A prominent 168m long linear ridge running across a field.	Unknown	
41		A possible, faint block of ridge and furrow, located across 1 hectare.	Unknown, possibly post-medieval/modern	
42		A possible, faint block of ridge and furrow, located across 0.3 hectares.	Unknown, possibly post-medieval/modern	
43		A prominent, 180 m long ridge feature, running across a field.	Unknown	OS/92153 689
44	319	A potential pit feature, 7 m in diameter.	Unknown	
45		Remains of a possible linear feature in a field. It may be recent in origin.	Unknown, possibly post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
46		A prominent, 98 m long ditch feature running across a field.	Unknown	OS/92153 689
47	320	A prominent, 160 m long, NW-SE aligned linear ditch/drainage channel running across a field.	Unknown	
48		A sub-rectangular depression in a field, 6m in diameter.	Unknown	
49		Blocks of possible ridge and furrow and plough scars, located across 2 hectares.	Unknown, possibly post-medieval/modern	OS/92153 689
50	321	A prominent 200 m long linear feature, representing the remains of a former field boundary.	Post-medieval/modern	
51		A small parcel of possible ridge and furrow, that cover an area of 0.8 hectares.	Post-medieval/modern	
52		Two parallel linear features, representing the remains of former field boundaries. The features aligned SW-NE t and measure approx. 230 m (northwest) and 260 m (southeast) in length.	Post-medieval/modern	
53		Remains of a field boundary, related to feature 50.	Post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
54		A 75 m long, SW-NE aligned feature representing the remains of a former field boundary.	Post-medieval/modern	
55		A linear feature aligned northwest-southeast that represents the remains of a former field boundary.	Post-medieval/modern	
56		A block of possible ridge and furrow, contained within a 2.4-hectare area.	Post-medieval/modern	
57		Potential archaeology, the anomaly might represent the remains of a ditch or a drainage channel	Unknown	
58		Potential archaeology, the anomaly might represent the remains of a ditch or a drainage channel.	Unknown	
59	323	Four blocks of possible ridge and furrow. The three smaller areas range from 0.3 to 0.72 hectares. The largest block that is situated in the south is contained within 1.69 hectares area.	Post-medieval/modern	RAF/CPE/UK/1996 1176
60	324			RAF/CPE/UK/1996 1176
61	325			RAF/CPE/UK/1996 1176
62	326			
63		Potential archaeology. The feature is of uncertain origin.	Unknown	RAF/CPE/UK/1996 1176

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
64	327	A corner of a possible block of ridge and furrow. Only 0.05 hectare of the earthwork is within the boundary of the proposed development.	Unknown, possibly late medieval/post-medieval	OS/89139 954
65	328	A block of possible plough scars contained within a 1-hectare area.	Unknown, possibly post-medieval/modern	
66		Potential discrete feature - the feature is of uncertain origin.	Unknown	RAF/540/760 5215
67	329	Possible block of ridge and furrow and plough scars. The features are faint and some may reflect recent activity.	Unknown, possibly post-medieval/modern	RAF/540/760 5215; RAF/CPE/UK/1996 1176
68	330	A block of possible ridge and furrow, this block may be related to modern agricultural activity.	Post-medieval/modern	RAF/CPE/UK/1996 1176
69	331	A 38m long ditch feature, aligned N-S.	Unknown	RAF/CPE/UK/1996 1176; OS/89139 922; OS/89139 954
70	332	A block of ridge and furrow, contained within a 2.4 hectares area.	Post-medieval/modern	OS/92153 615

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
71	333	A series of linear features representing the remains of a former field boundary.	Post-medieval/modern	RAF/540/760 5245
72	334	A small parcel of possible ridge and furrow, that cover an area of 0.9 hectares.	Late medieval/post-medieval	RAF/540/760 5245
73	335	A block of faint, possible ridge and furrow.	Unknown, possibly post-medieval/modern	RAF/540/760 5245
74	336	A block of faint, possible ridge and furrow.	Unknown, possibly post-medieval/modern	RAF/540/760 5245
75		Four blocks of ridge and furrow across four parcels, possible remains of medieval cultivation. S curve at end of furrow.	Late medieval	
76				
77				
78				
79		A potential drainage channel feature, running across a field. Perhaps used for water management purposes.	Unknown	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
80		There are multiple plough scars across the 1.7 hectares area, indicating potential post-medieval agricultural activity.	Unknown, possibly post-medieval/modern	
81		Remains of a former field boundary.	Unknown, possibly post-medieval/modern	
82		There are multiple plough scars across the parcel, indicating post-medieval/modern agricultural activity.	Post-medieval/modern	
83		Remains of a former field boundary.	Unknown, possibly post-medieval/modern	
84		There are multiple plough scars and faint block of ridge and furrow across these two parcels, indicating potential post-medieval agricultural activity.	Post-medieval/modern	
85	337			OS/92154 36
86	338	A 60 m long linear depression, potentially indicating a ditch feature.	Post-medieval/modern	OS/92154 36
87	339, 340	Two parallel linear features, potentially representing two ditches. Both features are approx. 150 m long. They are within a parcel that shows signs of heavy cultivation.	Post-medieval/modern	OS/92154 36
88				

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
89		This parcel contains plough scars and ridges, overall showing signs of heavy agricultural use.	Post-medieval	
90		A linear, 150 m long ditch feature parallel to a road. Only 112 m of the ditch is within the proposed development. It may be recent in origin.	Post-medieval/modern	
91		Two parallel linear features, representing the remains of former field boundaries. The features are aligned NW-SE.	Post-medieval/modern	
92				
93		A linear depression, potentially representing the remains of a 45 m long ditch feature, aligned SW-NE.	Post-medieval/modern	
94		A half-circular depression, 47 m in diameter. It is adjacent to a road now, which probably cuts the feature. It may represent the remains of a pond feature.	Post-medieval	
95		A block of ridge and furrow and plough scars, indicating potential post-medieval agricultural activity.	Post-medieval/modern	
96	341	A series of linear features representing the remains of former field boundaries.	Post-medieval/modern	OS/92153 570

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
97		Three blocks of parcels with the remains of multiple paleochannels across them.	Unknown	
98		Remains of potential paleochannels.	Unknown	
99				
100				
101	342	A ridge feature, running SW-NE.	Unknown	OS/92153 545; OS/92153 570
102	343	Field drains.	Modern	OS/92153 545
103				
104		A block of possible faint ridge and furrows. All features are aligned NW-SE. The features might reflect recent activity.	Unknown	
105		A linear depression running NE-SW. The feature is 102 m in length.	Unknown, potentially post-medieval/modern	
106		A small (0.4 hectares) block of faint ridge and furrow.	Post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
107		A small block of faint ridge and furrow, contained within a 0.5 hectares area. The features may be of more recent date.	Post-medieval/modern	
108		A 30 m long linear ditch feature, aligned NE-SW.	Unknown	
109		Remains of a former field boundary, abutted by modern field boundaries.	Late medieval/post-medieval	
110		Remains of a block of ridge and furrow feature in a field. They are located across approx. 0.9 hectares on a SW-NE alignment.	Post-medieval/modern	
111		A 65 m long linear ditch feature, running NE-SW across a field.	Unknown	
112		A block of faint plough scars across a field, contained within a 0.6 hectares area. It may be recent in origin.	Unknown, possibly post-medieval/modern	
113		Remains of a former field boundary abutted by modern field boundaries.	Unknown, possibly late medieval/post-medieval	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
114		The remains of a faint block of ridge and furrow. Only approx. 0.2 hectares are located within the boundary of the proposed development.	Post-medieval/modern	
115	344	A 18m long linear ditch feature, aligned NE-SW.	Unknown	OS/63154 87
116	345	A small parcel of possible ridge and furrow. The features align NE-SW.	Unknown, possibly late medieval/post-medieval	
117		A block of faint ridge and furrow, located across 2.2 hectares.	Post-medieval/modern	
118		A faint block of ridge and furrow, located across a 0.5-hectare parcel.	Unknown, possibly post-medieval/modern	
119		A block of ridge and furrow, aligned NE-SW. The features are only partially within the boundary of the proposed development.	Unknown, possibly late medieval/post-medieval	
120		A circular pit feature, 16 m in diameter.	Unknown	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
121	346	A faint block of furrows and ridges, aligned NE-SW. Only approx. 0.9 hectares of the block of features are located within the boundary of the proposed development.	Unknown, possibly post-medieval/modern	RAF/CPE/UK/1935 2014
122	347	A small block of plough scars, and ridge and furrow, located across 0.5 hectares.	Unknown, possibly late medieval/post-medieval	RAF/CPE/UK/1935 2014
123		A 9m long sub-oval pit feature. Uncertain origin.	Unknown	
124		A sub-rectangular depression in a field, 8m in diameter.	Unknown	
125	348	A block of faint ridge and furrow, located across 0.8 hectares.	Unknown, possibly post-medieval/modern	OS/92153 498
126		A ridge feature, running approx. NW-SE.	Unknown	OS/92153 498
127	349	A block of faint ridge and furrow. Only 1 hectare of this block is within the boundary of the proposed development.	Unknown, possibly post-medieval/modern	
128		A faint, 70 m long linear feature, potentially representing the remains of a former field boundary.	Unknown, possibly post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
129		An L-shaped ditch feature, measuring a combined 105 m.	Unknown, possibly late medieval/post-medieval	
130		Two parallel, linear features, abutted by modern roads. They might be the remains of a railway.	Post-medieval	
131		A prominent ridge feature, potentially it belongs to the block of ridge and furrow adjacent to it.	Unknown, potentially post-medieval/modern	
132		An interrupted linear ridge feature, running across NE-SW of a field.	Unknown	
133		Area of large- scale brickworks extraction.	Post-medieval	
134	350	A block of ridge and furrow - only approx. 1.8 hectares of the block is located within the boundary of the proposed development.	Post-medieval/modern	OS/92153 475
135		A 33 m long faint ridge feature running across a field.	Unknown	
136		A prominent, 83 m long ridge feature running across a field, aligned NW-SE.	Unknown	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
137		A faint, 145 m long curvilinear depression across a field.	Unknown	
138		A prominent ditch feature, the feature runs beyond the boundary of the proposed development.	Unknown	
139		A 98 m long ditch feature (the ditch terminates beyond the limits of the boundary of the proposed development). It may represent the remains of a drainage feature.	Unknown	
140		A faint, 98 m long depression across a field. It may be related to agricultural activity.	Unknown	
141		Three potential pit features, aligned N-S, possibly related to previous extraction.	Unknown	
142				
143				
144		A prominent, 164 m long linear feature. It is possibly the remains of a former field boundary.	Unknown, possibly post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
145		A potential pit feature, measuring approx. 5m in diameter.	Unknown	
146	351	A 63 m long ridge, aligned NE-SW.	Unknown	RAF/CPE/UK/1996 2201
147		A potential L-shaped ditch feature, measuring a combined 109 m.	Unknown	
148	352	A potential small pit feature, 2.7m in diameter.	Unknown	RAF/CPE/UK/1996 2201
149		A 187 m long L-shaped ridge feature. Uncertain origin.	Unknown	
150		A long, sinuous depression across a field. Uncertain origin.	Unknown	
151		A 407 m long linear depression, possibly the remains of a former field boundary.	Unknown, potentially post-medieval/modern	
152		The remains of a possible old field boundary.	Post-medieval/modern	
153		A 161 m long sinuous depression - it may be recent in origin as it leads up to a house.	Unknown, potentially post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
154		An irregularly shaped feature of uncertain origin, adjacent to a road.	Unknown, potentially post-medieval/modern	
155		An L-shaped remains of a former field boundary.	Post-medieval/modern	
156		The remains of a field boundary. The feature extends beyond the limits of the boundary of the Proposed Scheme.	Post-medieval/modern	
157		A 188 m long ridge feature across a field, probably related to agricultural activities.	Unknown, possibly post-medieval/modern	
158		A small pit feature, 9 m in diameter. It is possibly related to former extraction.	Unknown	
159		Faint traces of linear features, they possibly represent former field boundaries.	Unknown, possibly post-medieval/modern	
160		The faint traces of a 109 m long linear feature, possibly representing the remains of a field boundary.	Post-medieval/modern	
161		A prominent, 200 m long remains of a former field boundary.	Post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
162		A prominent, 112m long linear feature across a field.	Unknown	
163		A sub-oval pit feature (18 m in diameter), possibly related to previous extraction.	Unknown	
164		A slightly curved, 70 m long ridge adjacent to a road. It may be recent in origin.	Unknown	
165		A sub-oval pit feature, 58 m in diameter. It is possibly related to former extraction.	Unknown	
166		A 46 m long linear ditch feature, aligned NE-SW.	Unknown	
167	353	Remains of a former field boundary.	Post-medieval/modern	OS/80137 14; RAF/540/700 5150
168		An interrupted linear feature, forming the remains of a field boundary. The features measure a combined 134 m.	post-medieval/modern	
169		Remains of an L-shaped ridge feature across a heavily cultivated field. The feature measures a combined 90 m.	Unknown	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
170		A faint block of possible ridge and furrow, located across 0.3 hectares.	Unknown, possibly post-medieval/modern	
171	354	An 83 m long ridge feature across a field. Uncertain origin, it might be natural.	Unknown	OS/92153 545
172		A 55 m long linear ditch feature, aligned NE-SW.	Unknown	
173	355	This sub-rectangular feature is a World War II encampment.	Modern	OS/92153 685; CPE\UK\1935 1021; CPE\UK\1935 1022 (1021 and 1022 not included in the Swindon search material, a copy of these photos were sent to us by Mark Leah, the Cheshire LPA's archaeological advisor via email)
174	356	A block of ridge and furrow, contained within a 1.8 hectares area.	Unknown, possibly post-medieval/modern	OS/92153 685
175		Sub-circular feature, 19 m in diameter. The feature might be of natural origin.	Unknown	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
176		The continuation of #30.	Unknown, possibly post-medieval/modern	
177		A 47 m long ridge, potentially of recent origin and related to agriculture.	Unknown, possibly post-medieval/modern	
178		Remains of a 96 m long former field boundary.	Unknown, possibly post-medieval/modern	
179		Remains of a former field boundary across a field (192 m long).	Post-medieval/modern	
180		A 40 m long linear depression, aligned NW-SE.	Unknown, possibly post-medieval/modern	
181		Discrete anomaly of unknown origin. 36 m in length, aligned NE-SW.	Unknown	
182		Faint ridge in a field, aligned NW-SE. May be of natural origin.	Unknown	
183		Paleochannel	Unknown	
184		Faint ditch feature, probable field boundary remains	Post-medieval	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
185		Faint ditch feature, possible drainage feature	Unknown	
186		Forked embankment near former paleochannels	Late medieval/post-medieval	
187		Possible paleochannel	Unknown	
188		Area of former colliery works (noted as Old Colliery on OS 2nd edition 1897 map and Willow Park Colliery on CPAT HER)	Post-medieval	
189		A block of land with plough scars across it.	Unknown, possibly post-medieval/modern	
190	357, 358, 359, 360, 361, 362, 363, 364, 365	Scheduled Monument Moated Site, Fishpond and Connecting Channel, Elton (National Heritage List Entry No. 1012122)	Medieval	OS/80137 25; OS/71105 2; OS/80138 7; OS/80138 8; OS/92226 123; OS/92226 143; OS/92226 144; OS/92226 145; OS/92226 146
191		A linear feature aligned northeast-southwest. May represent the remains of a former field boundary or a ditch feature.	Unknown, possibly late medieval/Post-medieval	

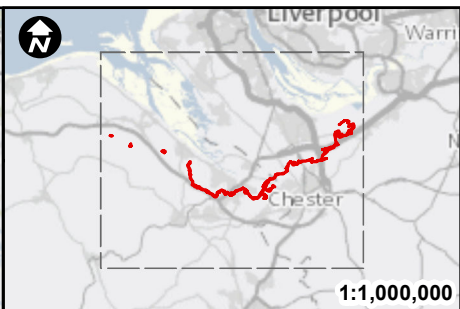
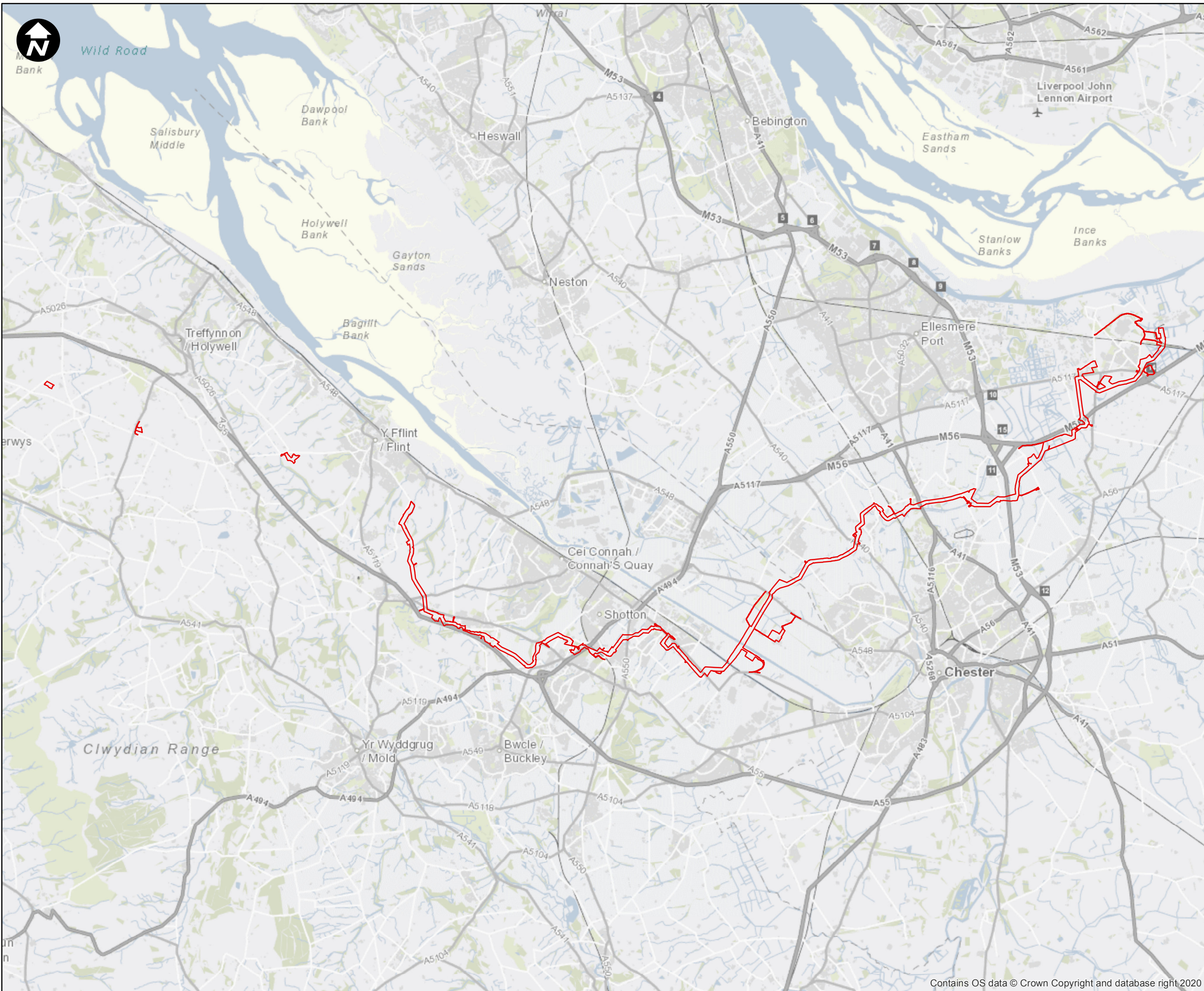
LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
192		A 174 m long linear drainage feature across a field.	Unknown	
193		Faint plough scars and ridge and furrows just south of the Scheduled Monument (Moated Site, Fishpond and Connecting Channel, Elton).	Late medieval/post-medieval	
194		An L-shaped feature, representing a former field boundary.	Late medieval/Post-medieval	
195		Potential remains of a former field boundary.	Late medieval/Post-medieval	
196		A sub-rectangular discrete feature of unknown origin.	Unknown	
197		Remains of a linear feature, possibly representing a former field boundary. The feature is abutted by a modern road.	Post-medieval/modern	
198		Remains of a slightly curved linear feature across fields, possibly representing a drainage channel.	Unknown	
199		A small block of ridge and furrows, contained within a corner of a modern parcel.	Late medieval/Post-medieval	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
200		A block of ridge and furrows contained within a 2.3 hectares area and clearly enclosed within #197 (field boundary remains).	Possibly late medieval/Post-medieval	
	365	Faint remains of a 62 m long linear feature. It may either be a modern pathway or a masked ditch feature (N: 53° 13' 14.28" W: 2° 55' 53.42" as seen on Google Earth Pro Imagery taken in 2005).	Unknown, possibly post-medieval/modern	
	366	Faint remains of field boundaries (N: 53° 12' 58.49" W: 2° 56' 53.85" (NGR SJ 36774 69218) as seen on Google Earth Pro Imagery taken in 2005).	Unknown, possibly post-medieval/modern	
	367	Remains of paleochannels (N: 53° 12' 45.71" W: 2° 57' 45.77" (NGR SJ 35806 68836) as seen on Google Earth Pro Imagery taken in 2005).	Unknown	
	368	Remains of a block of ridge and furrow (N: 53° 11' 32.72" W: 3° 00' 00.25" (NGR SJ 33280 66615) as seen on Google Earth Pro Imagery taken in 2003).	Unknown, possibly post-medieval/modern	
	369	Remains of former field boundaries (N: 53° 11' 48.27" W: 3° 00' 22.38" (NGR SJ 32876 67101) as seen on Google Earth Pro Imagery taken in 2003).	Unknown, possibly post-medieval/modern	

LiDAR feature (L) ref.	Aerial Photo feature (AP) ref.	Description	Period	HE Aerial Photograph Reference (Sortie and Frame number)
	370	Remains of a rectangular enclosure ditch (N: 53° 11' 53.35" W: 3° 01' 29.24" (NGR SJ 31637 67276) as seen on Google Earth Pro Imagery taken in 2006).	Unknown	
	371	Remains of a narrow field parcel (N: 53° 11' 51.48" W: 3° 03' 05.75" (NGR SJ 29845 67244) as seen on Google Earth Pro Imagery taken in 2006).	Unknown, possibly post-medieval/modern	

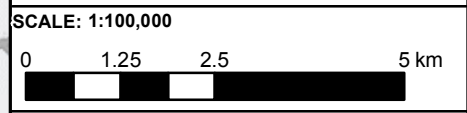
Annex B

FIGURES



Key:
 Newbuild Infrastructure Boundary/
 Study Area

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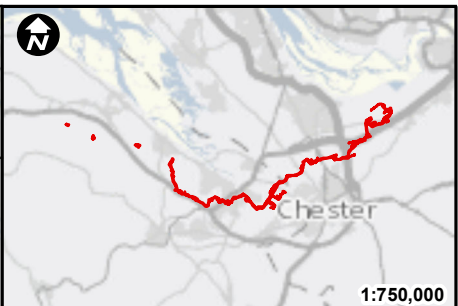
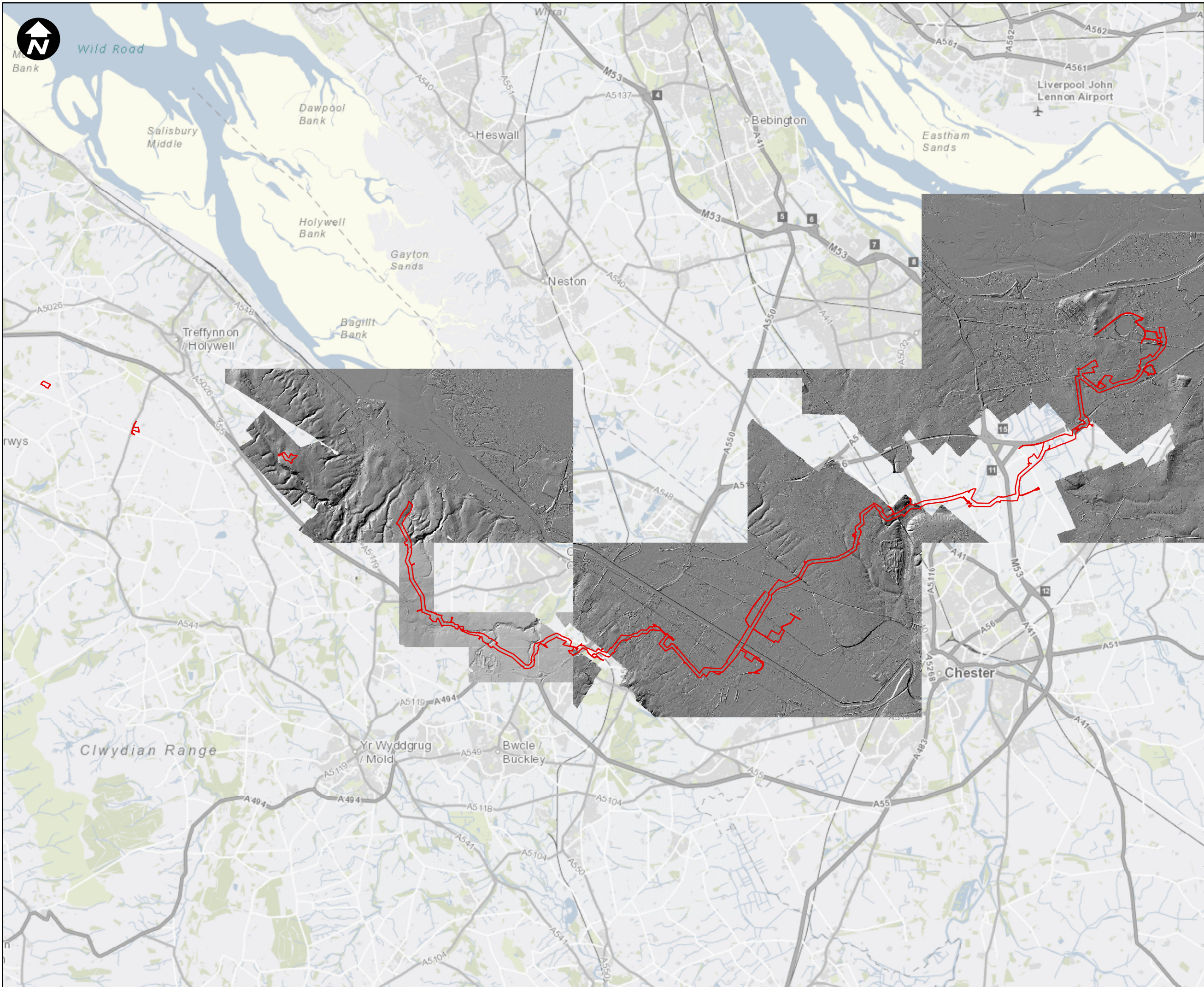
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 Red Line Boundary Location Map**

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 Newbuild Infrastructure Boundary

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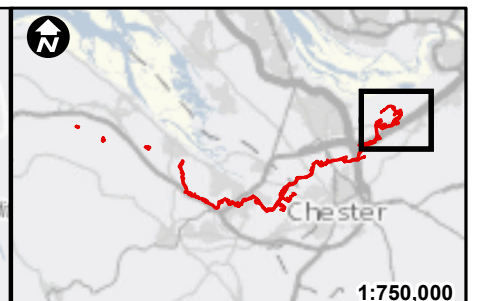
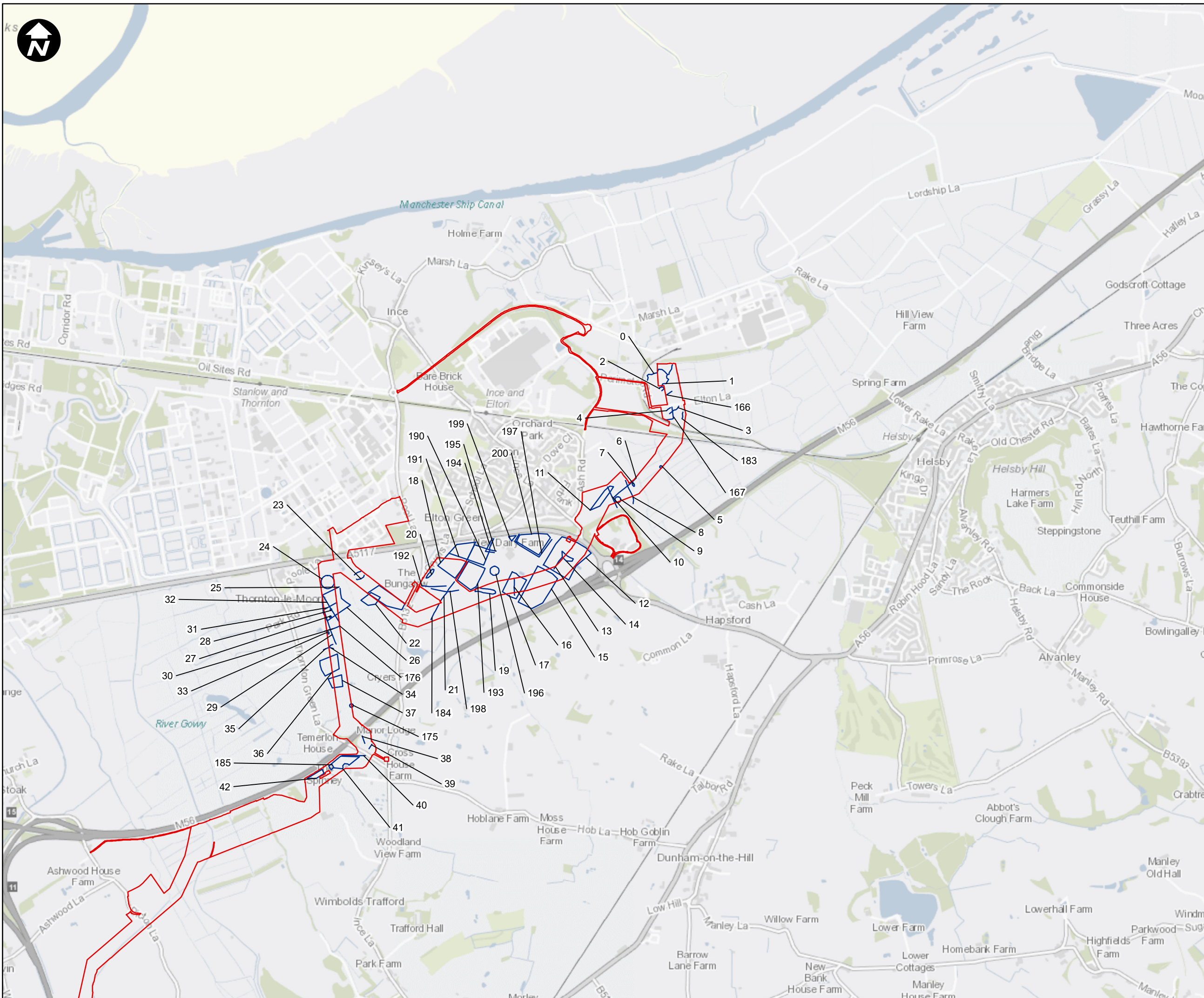
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 Figure 8.3.2: Extent of LiDAR Coverage

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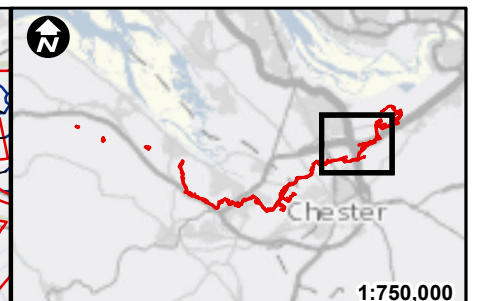
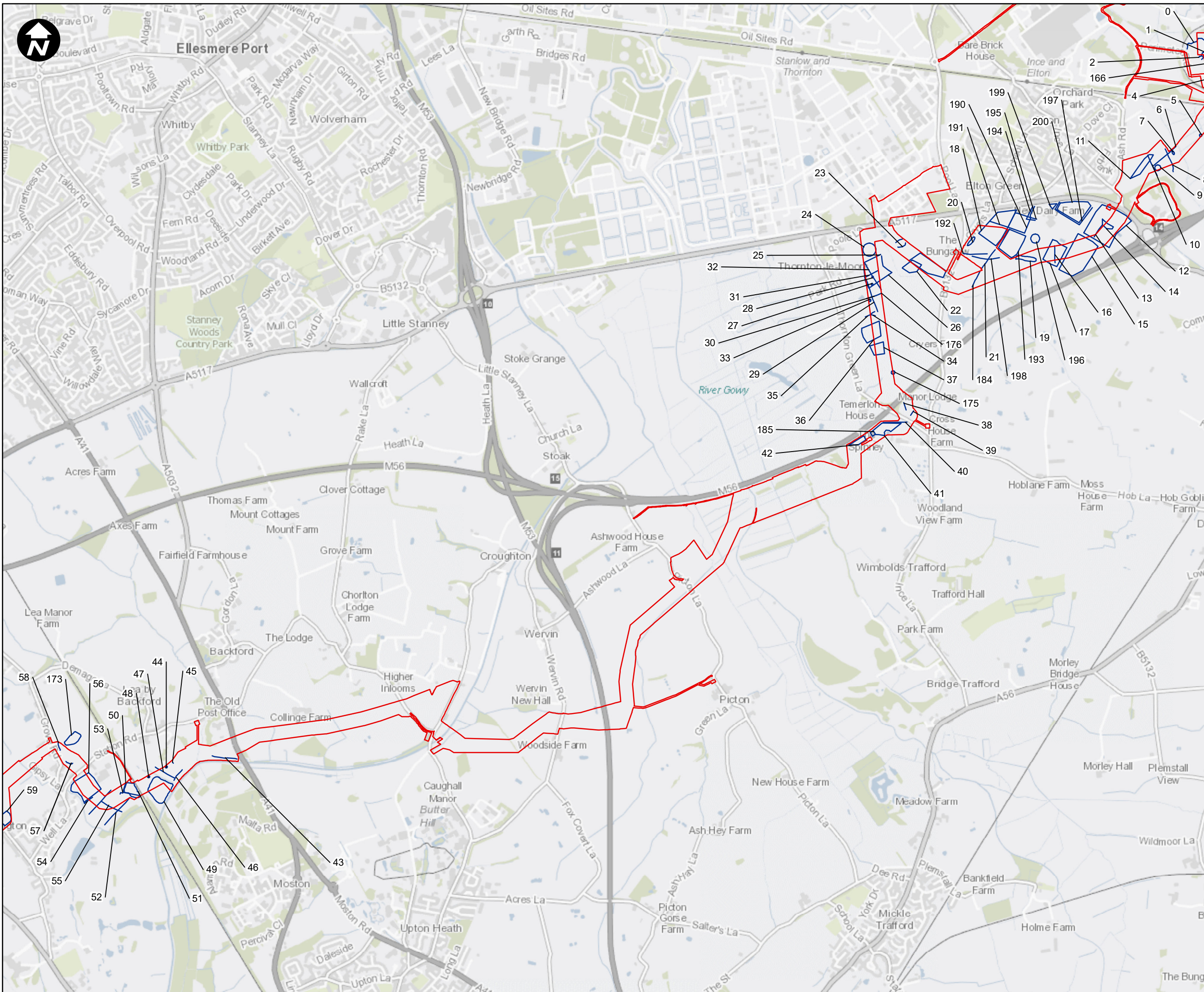
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 Location map with LiDAR Anomalies 1
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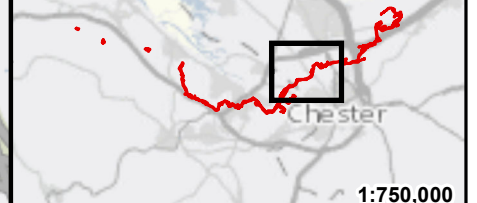
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 Location map with LiDAR Anomalies 1
 SHEET 2 of 7

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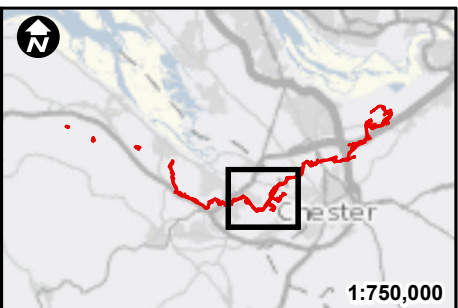
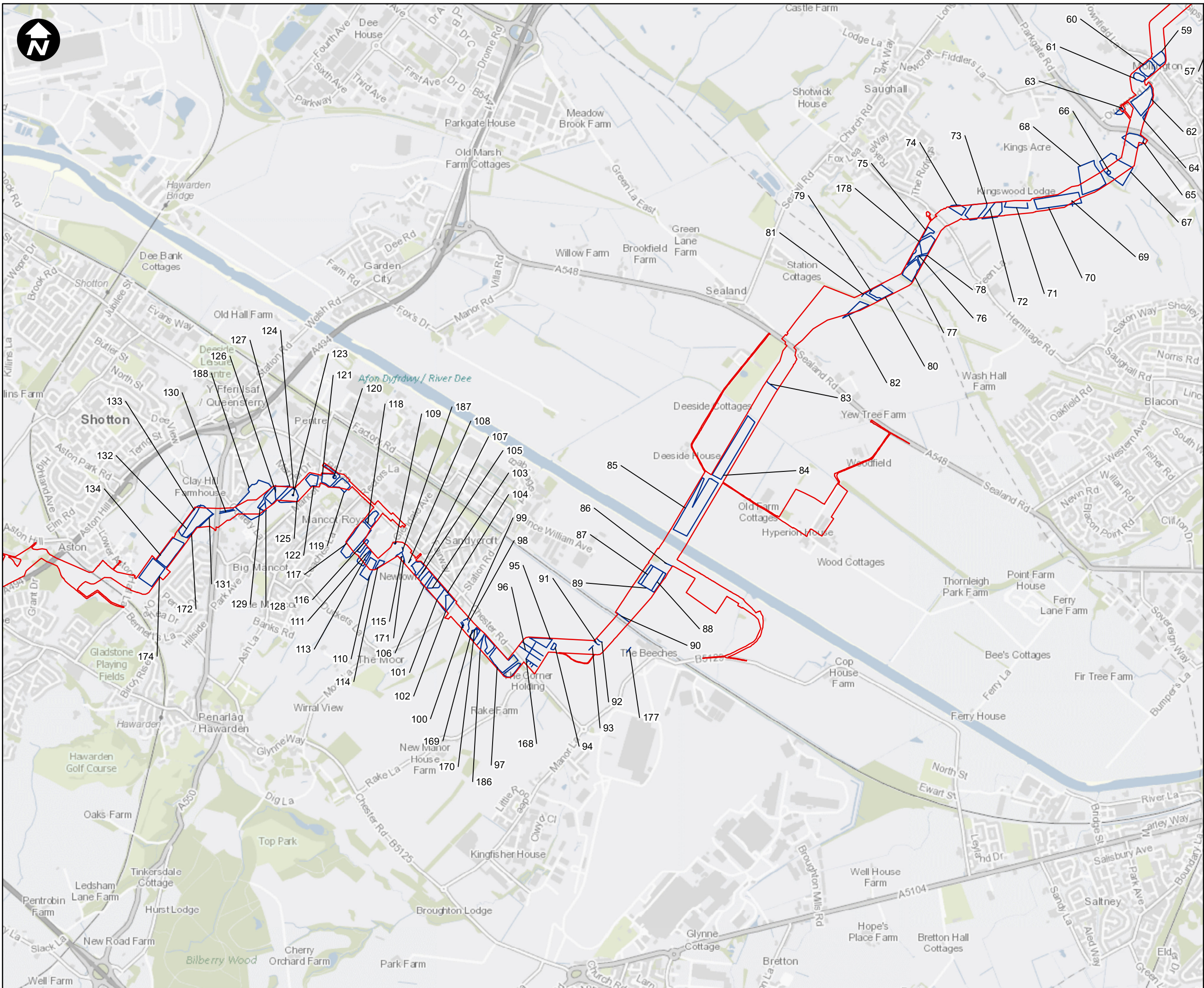
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Location map with LiDAR Anomalies 1
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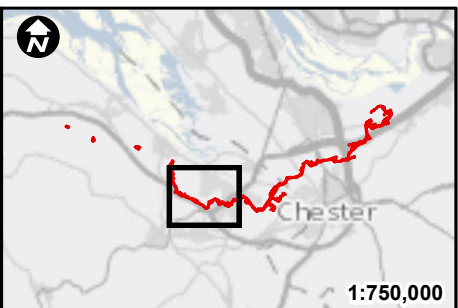
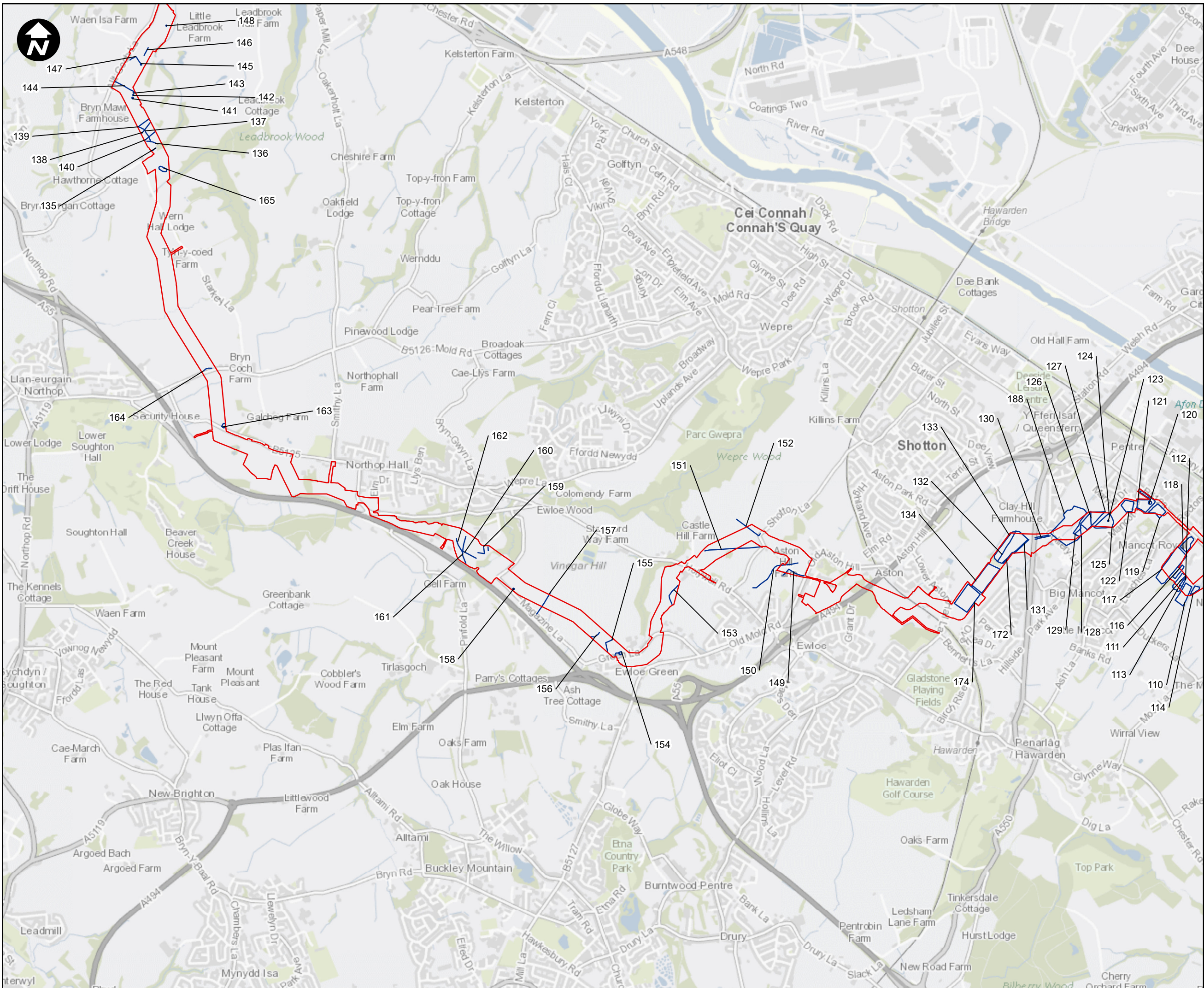
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 Location map with LiDAR Anomalies 1
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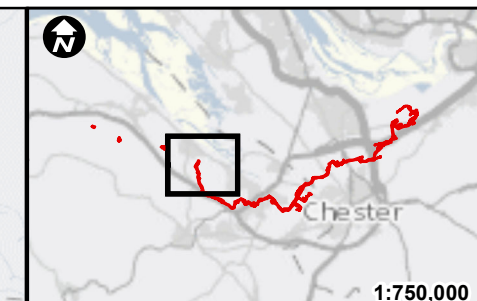
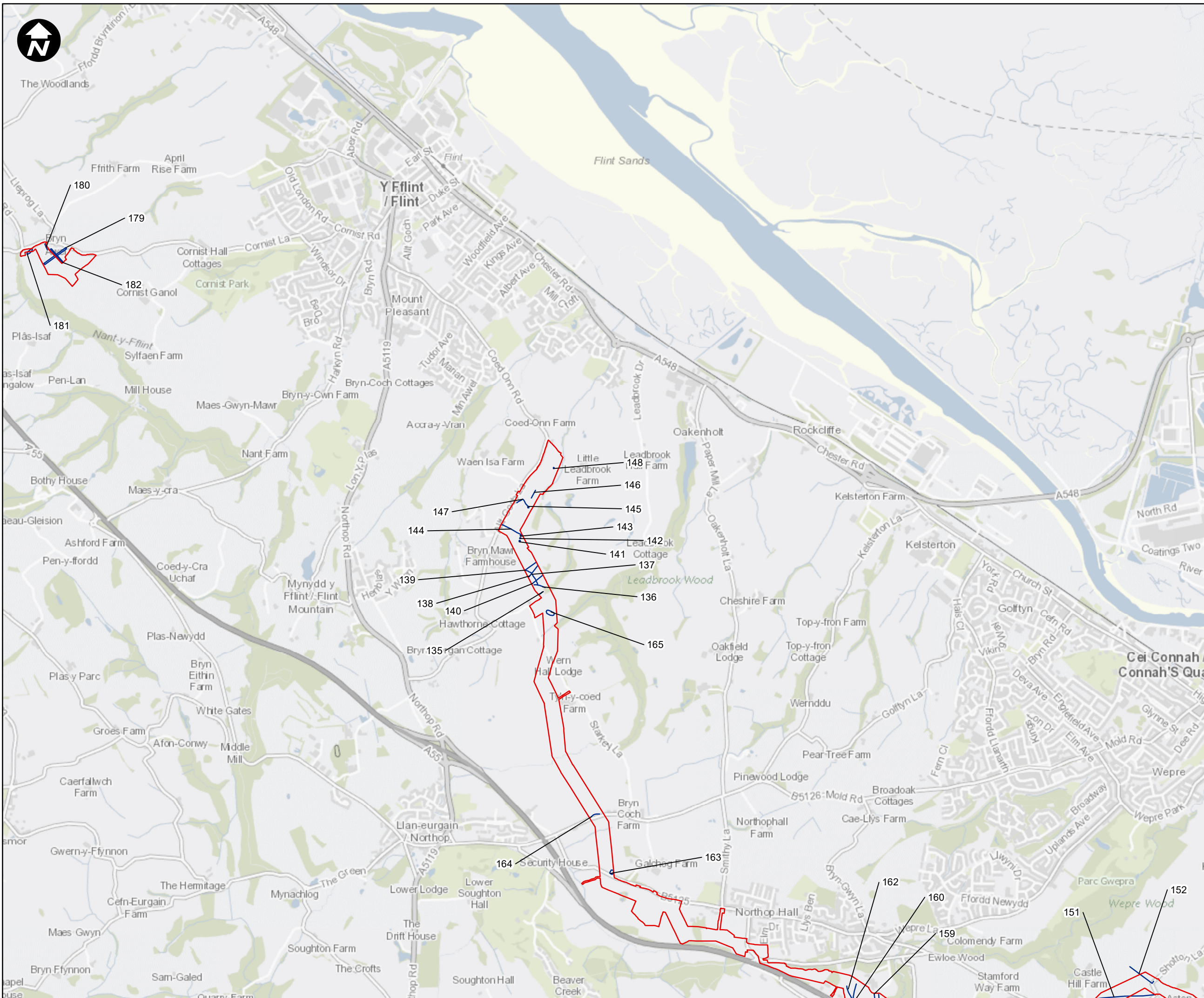
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 Location map with LiDAR Anomalies 1
 SHEET 5 of 7

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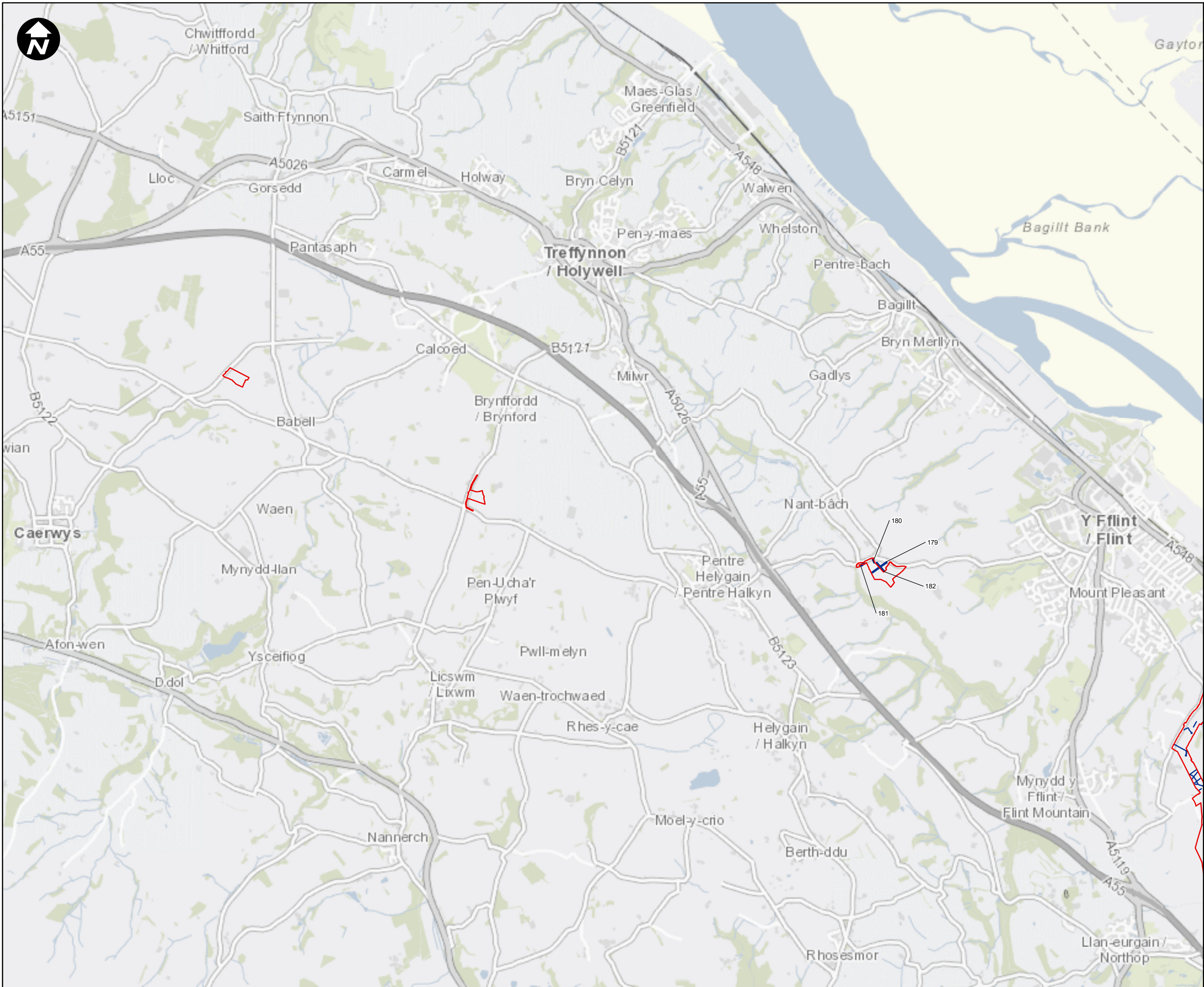
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 Location map with LiDAR Anomalies 1
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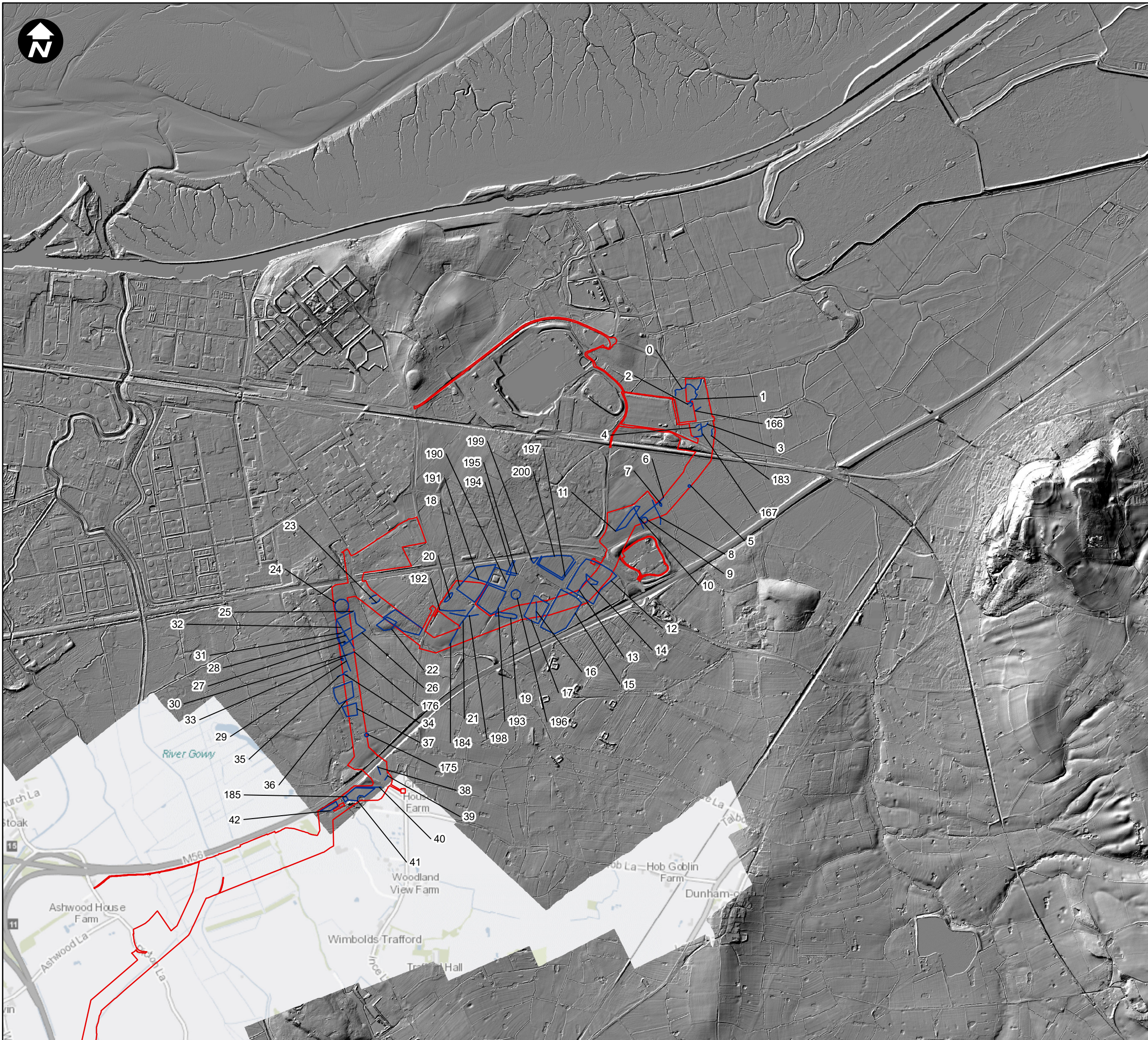
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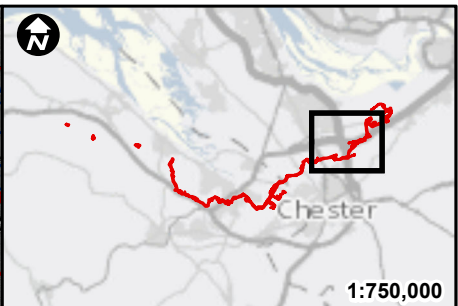
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 Location map with LiDAR Anomalies 2
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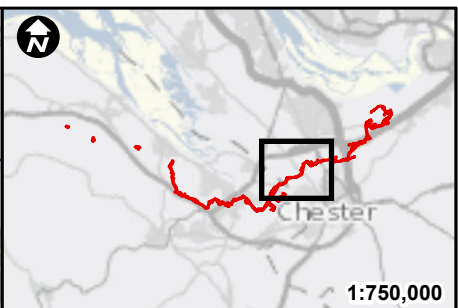
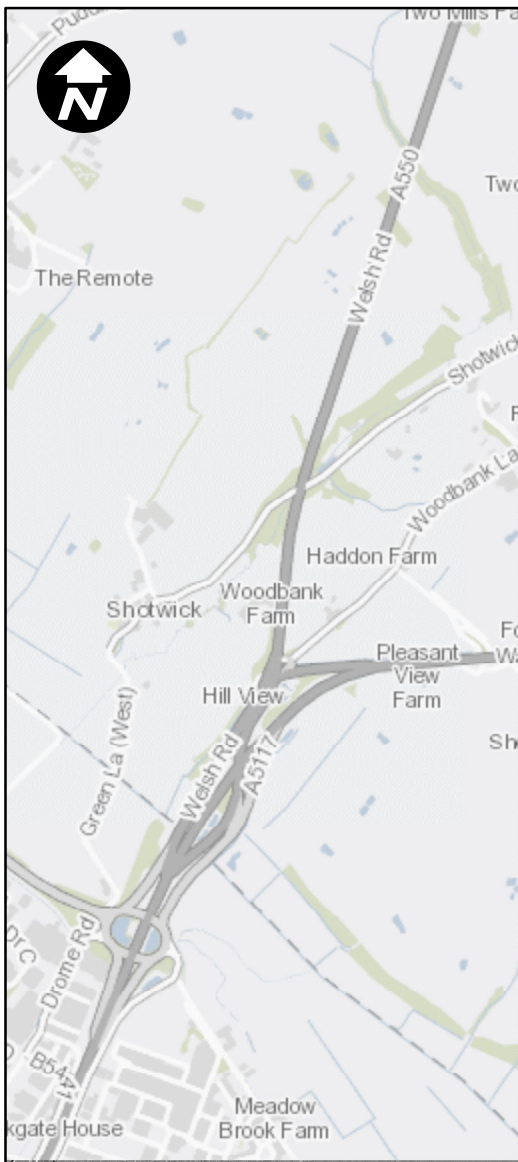
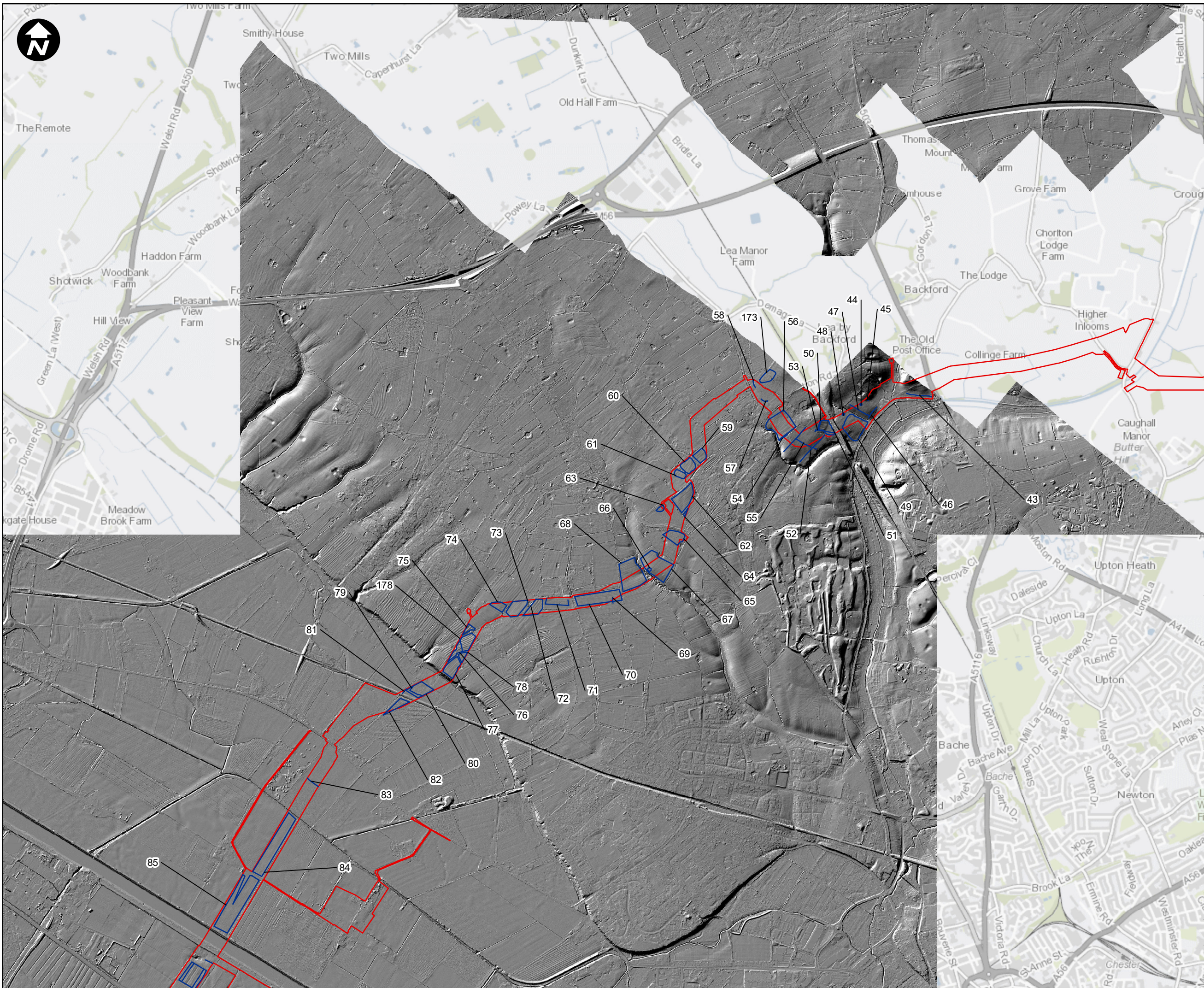
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 Location map with LiDAR Anomalies 2
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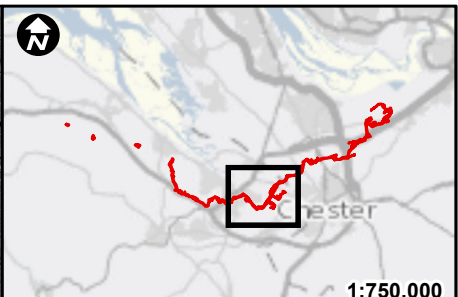
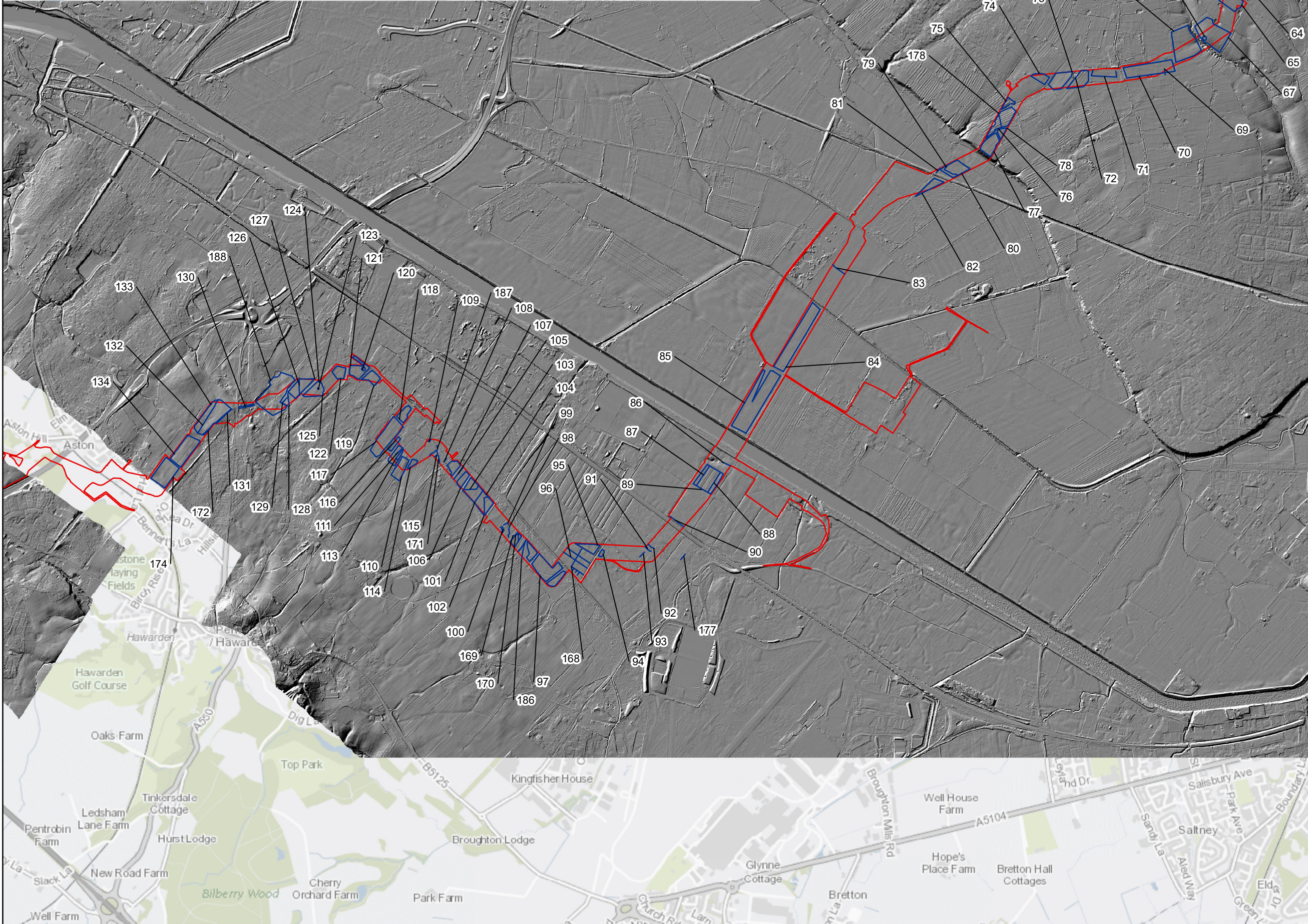
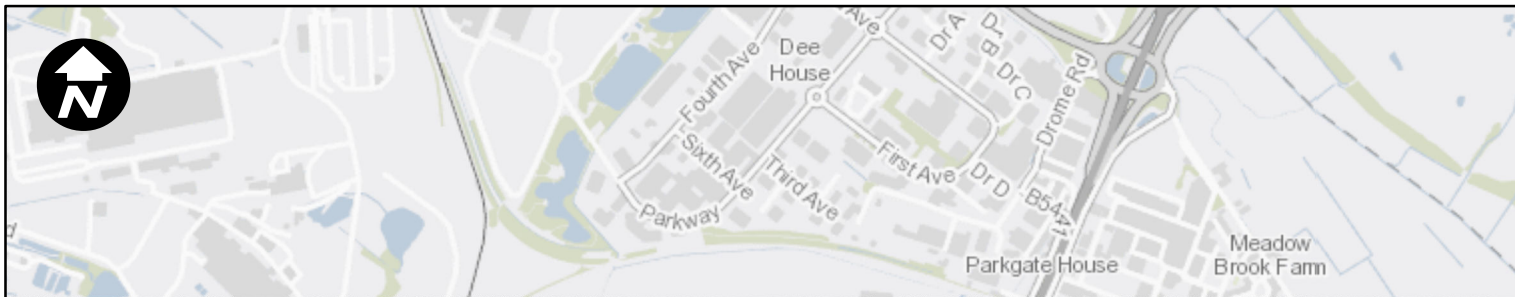
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 Location map with LiDAR Anomalies 2
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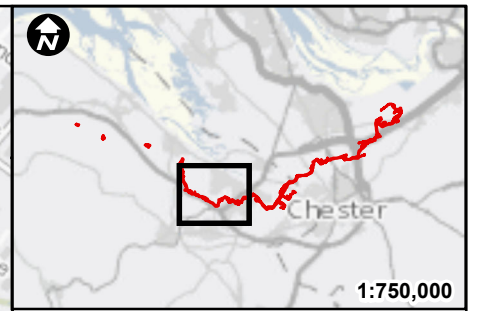
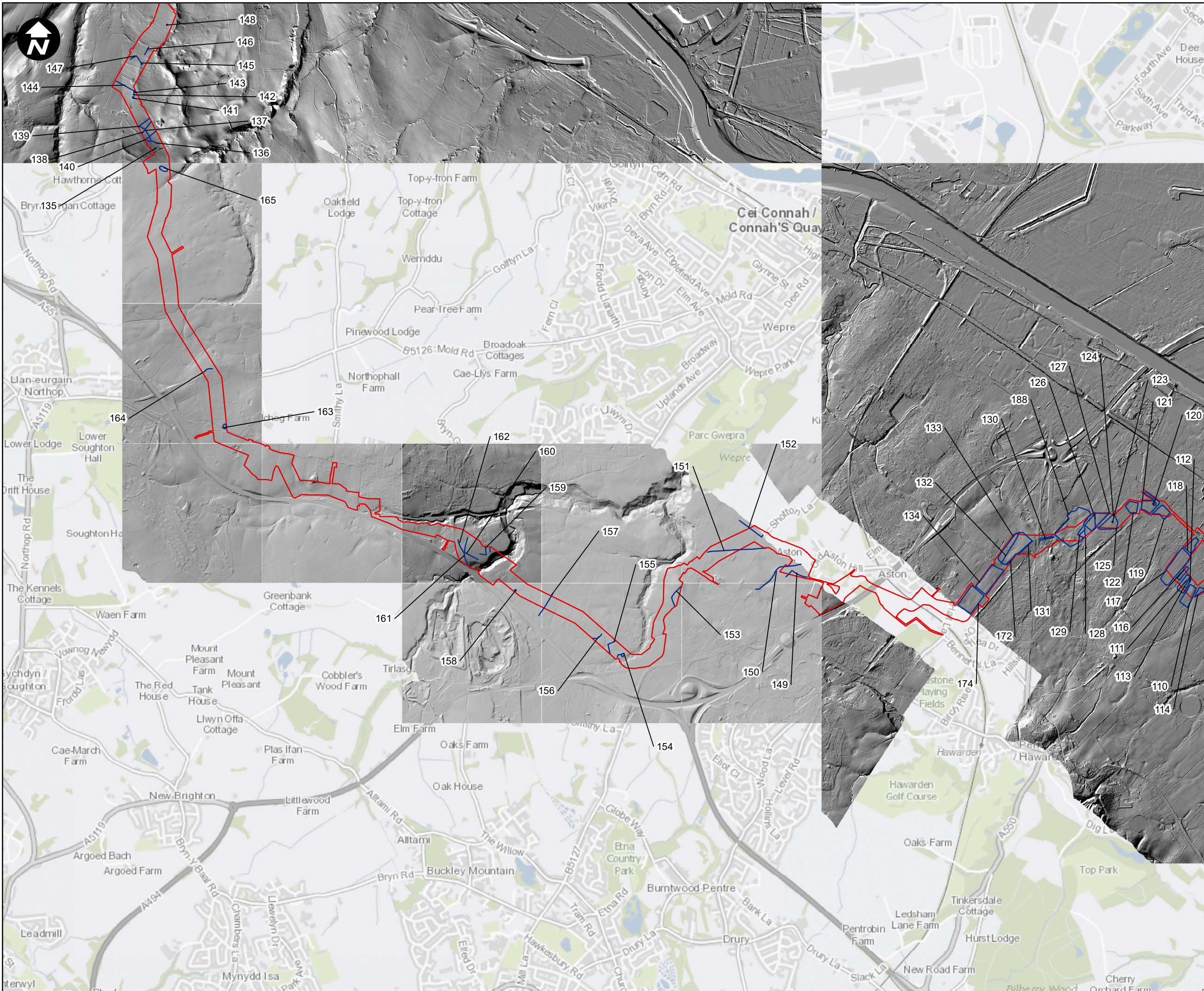
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 Location map with LiDAR Anomalies 2
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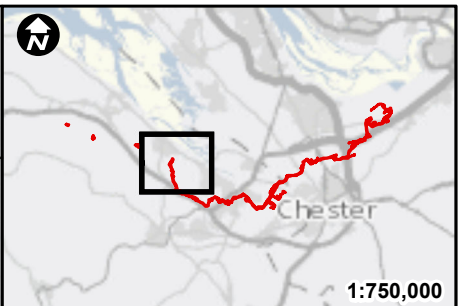
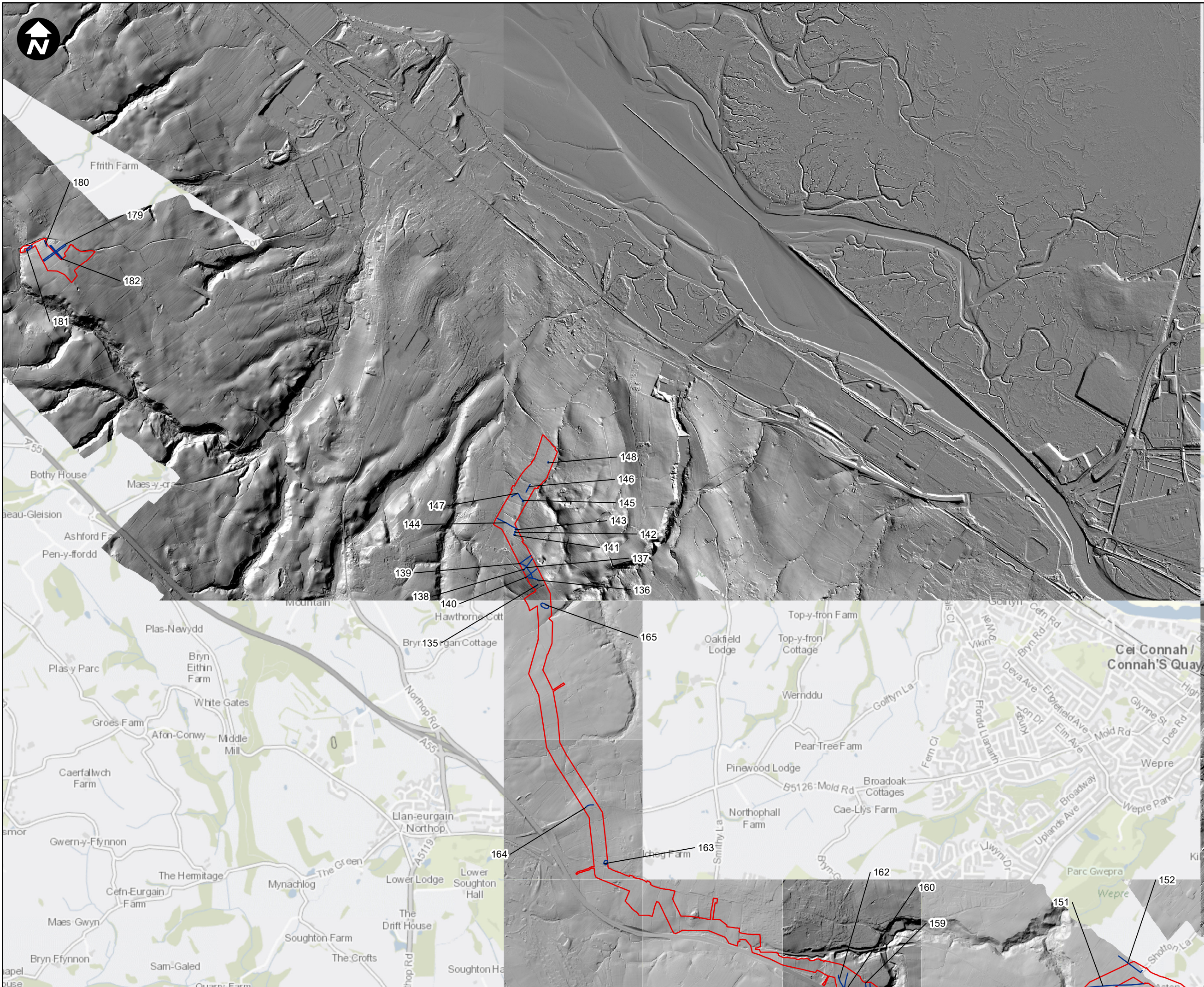
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 Location map with LiDAR Anomalies 2
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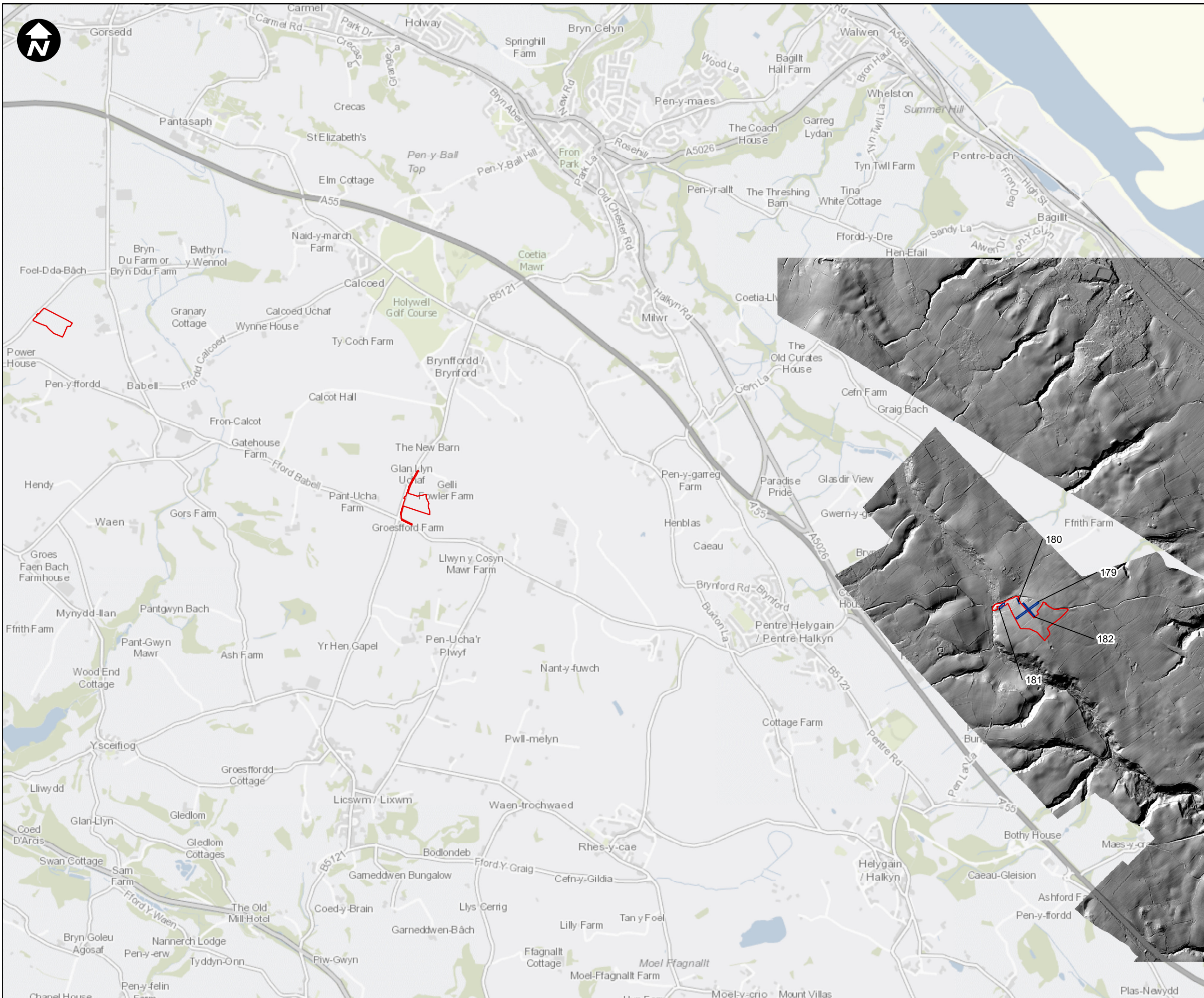
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 Location map with LiDAR Anomalies 2
 SHEET 6 OF 7

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 Location map with LiDAR Anomalies 2
 SHEET 7 OF 7

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Key:

- ▭ Newbuild Infrastructure
- ▭ Boundary / Study Area
- ▭ Identified LiDAR Anomalies
- ▭ Scheduled Monument

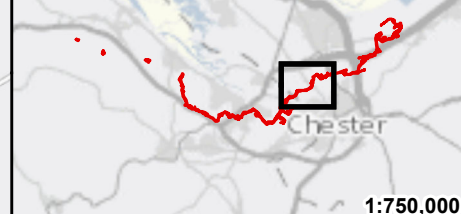
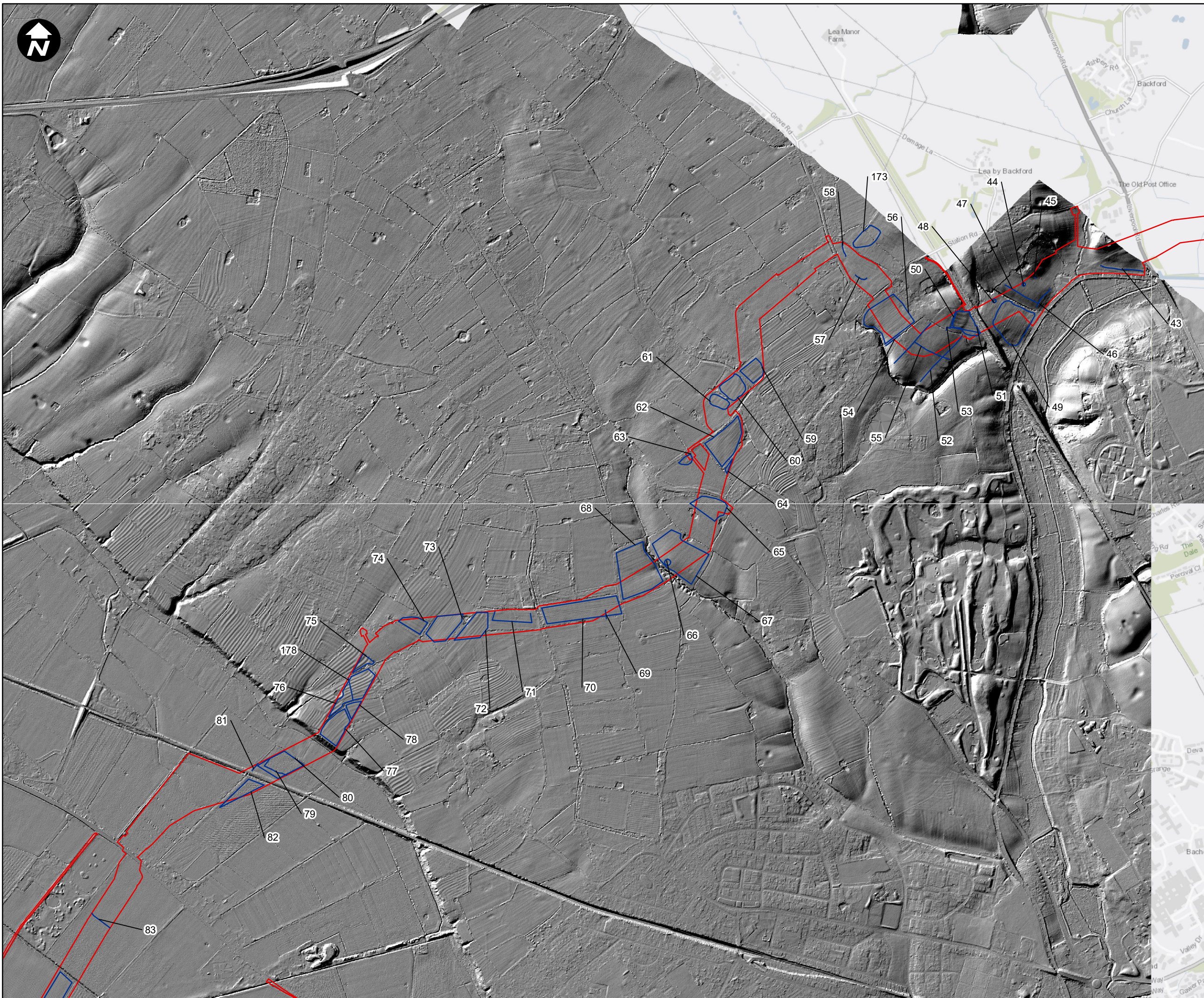
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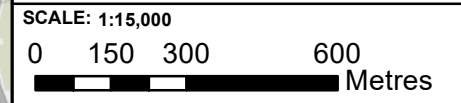
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HyNet Carbon Dioxide Pipeline

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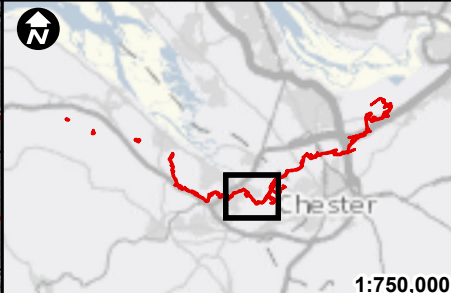
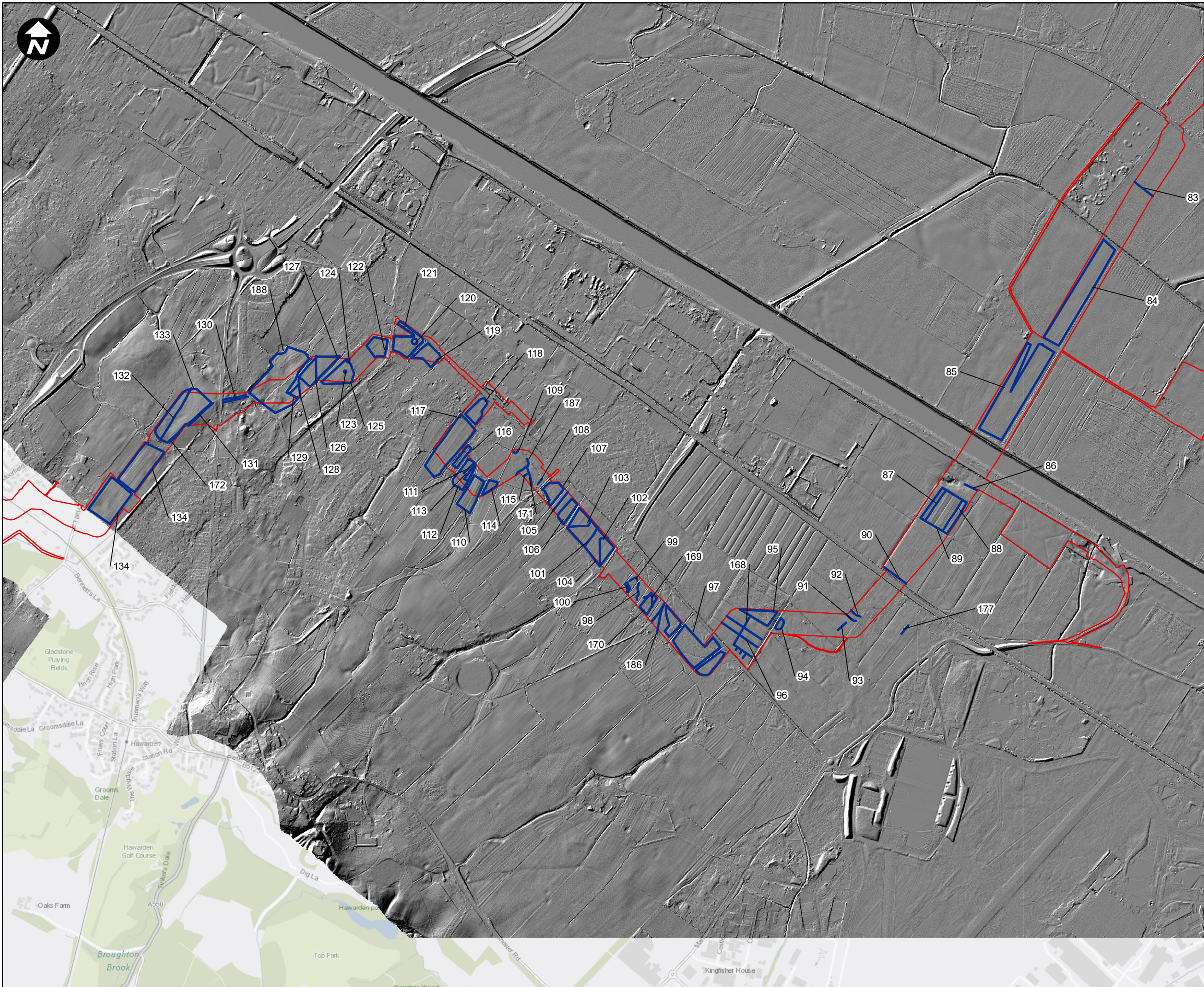
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 EN070007-APP-ES-8.3.6 Sheet 1



1:750,000

Key:

- Newbuild Infrastructure Boundary/ Study Area
- Identified LiDAR Anomalies

SCALE: 1:15,000

0 200 400 600 Meters

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HyNet North West

PROJECT TITLE
HyNet Carbon Dioxide Pipeline DCO

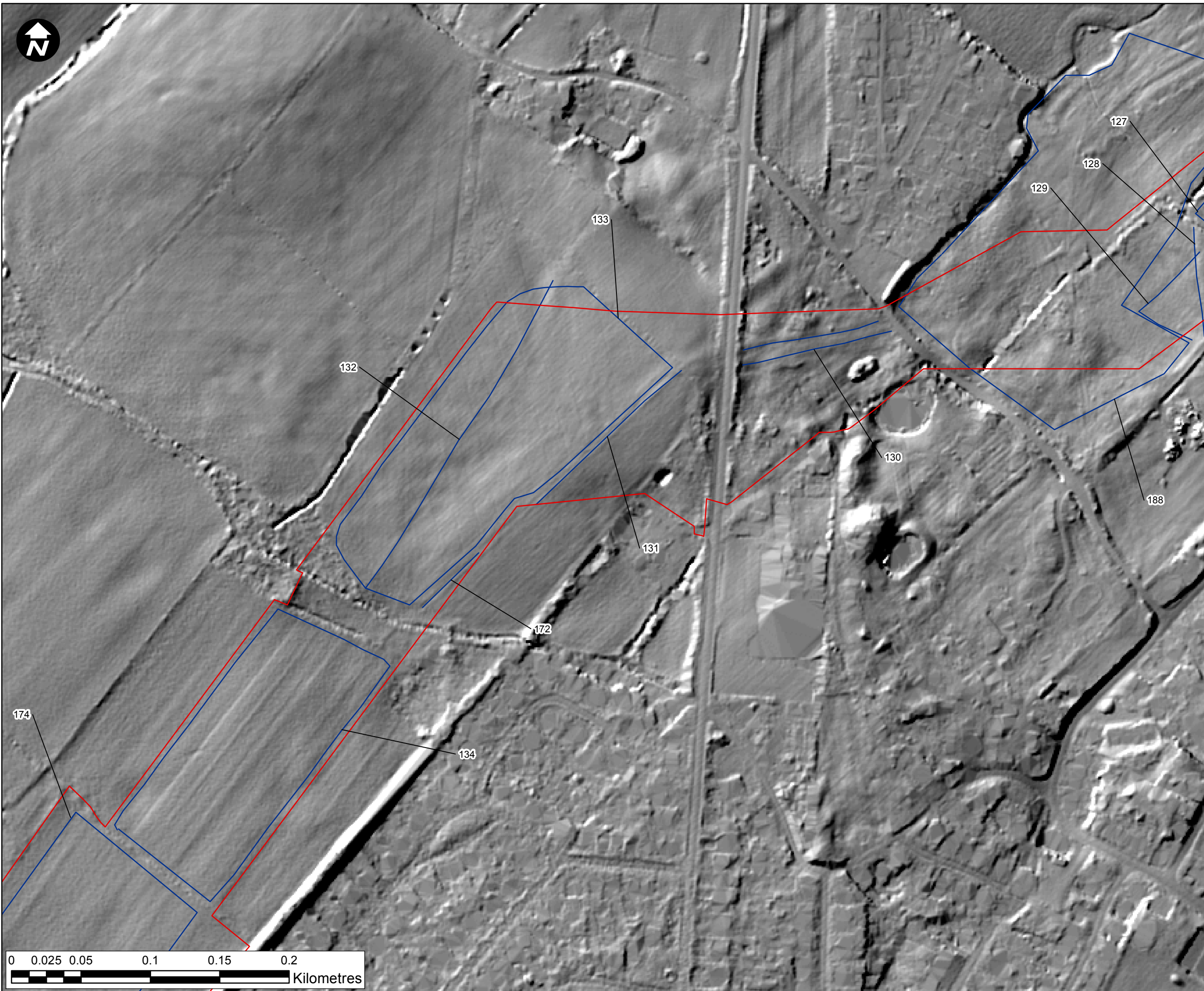
DRAWING TITLE
 Figure 8.3.7 - LiDAR Data showing ridge and furrow earthworks near Deeside

DRAWING STATUS
 Final for DCO Examination - submitted at Deadline 7

DRAWN NB	CHECKED JH	APPROVED EA	AUTHORISED MT
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SCALE @ A3 SIZE 1:15,000	DATE 01/09/2023	REVISION C
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DRAWING NUMBER
 EN070007-APP-ES-8.3.7



Key:

- Newbuild Infrastructure Boundary / Study Area
- Identified LiDAR Anomalies

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HyNet North West

PROJECT TITLE
HyNet Carbon Dioxide Pipeline

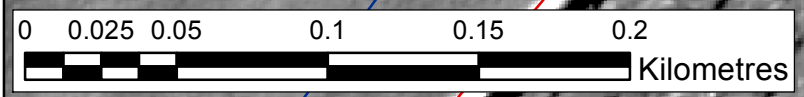
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 Figure 8.3.8: Transcribed features and Hillshade model showing a disused railway (ID: 130)

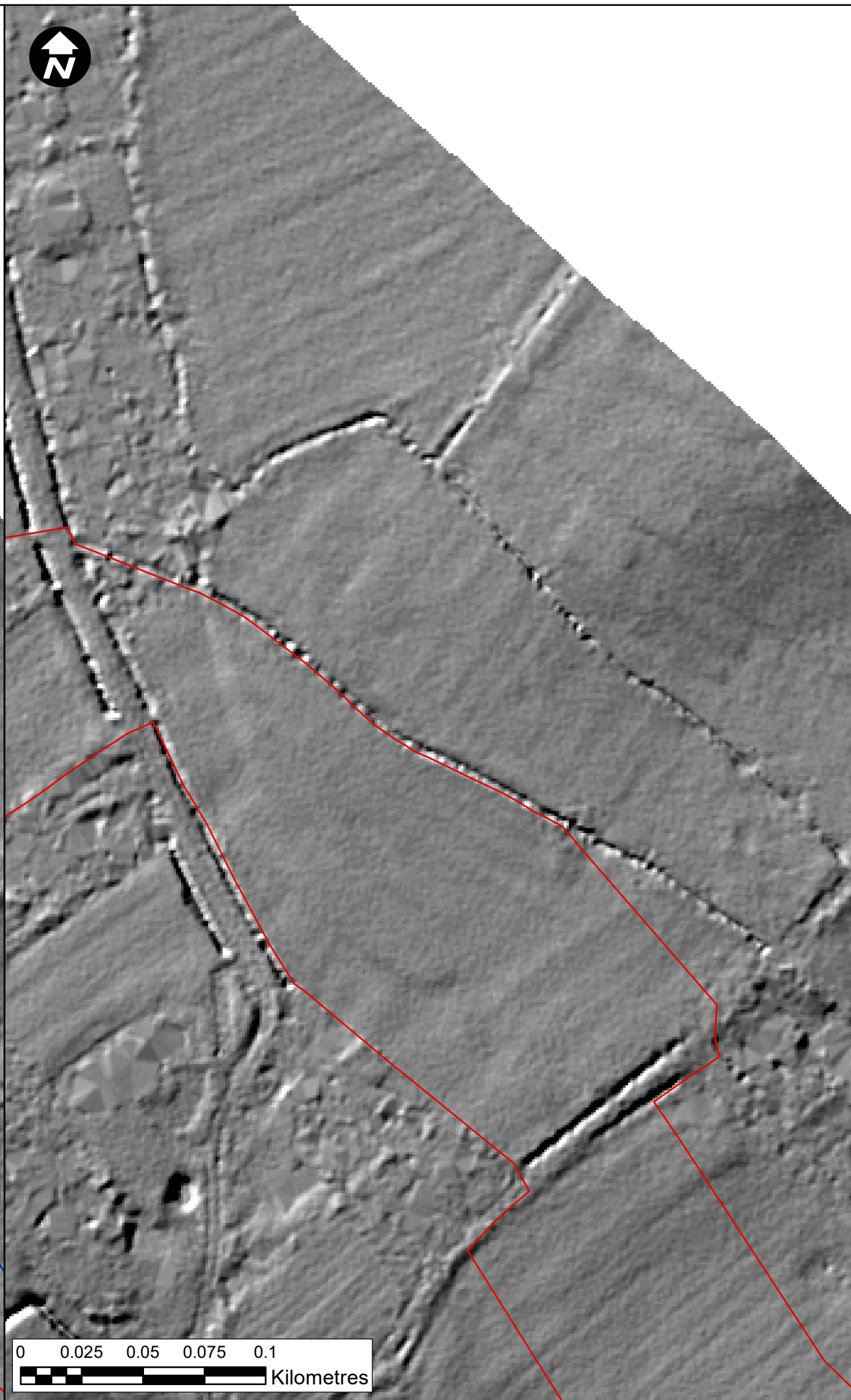
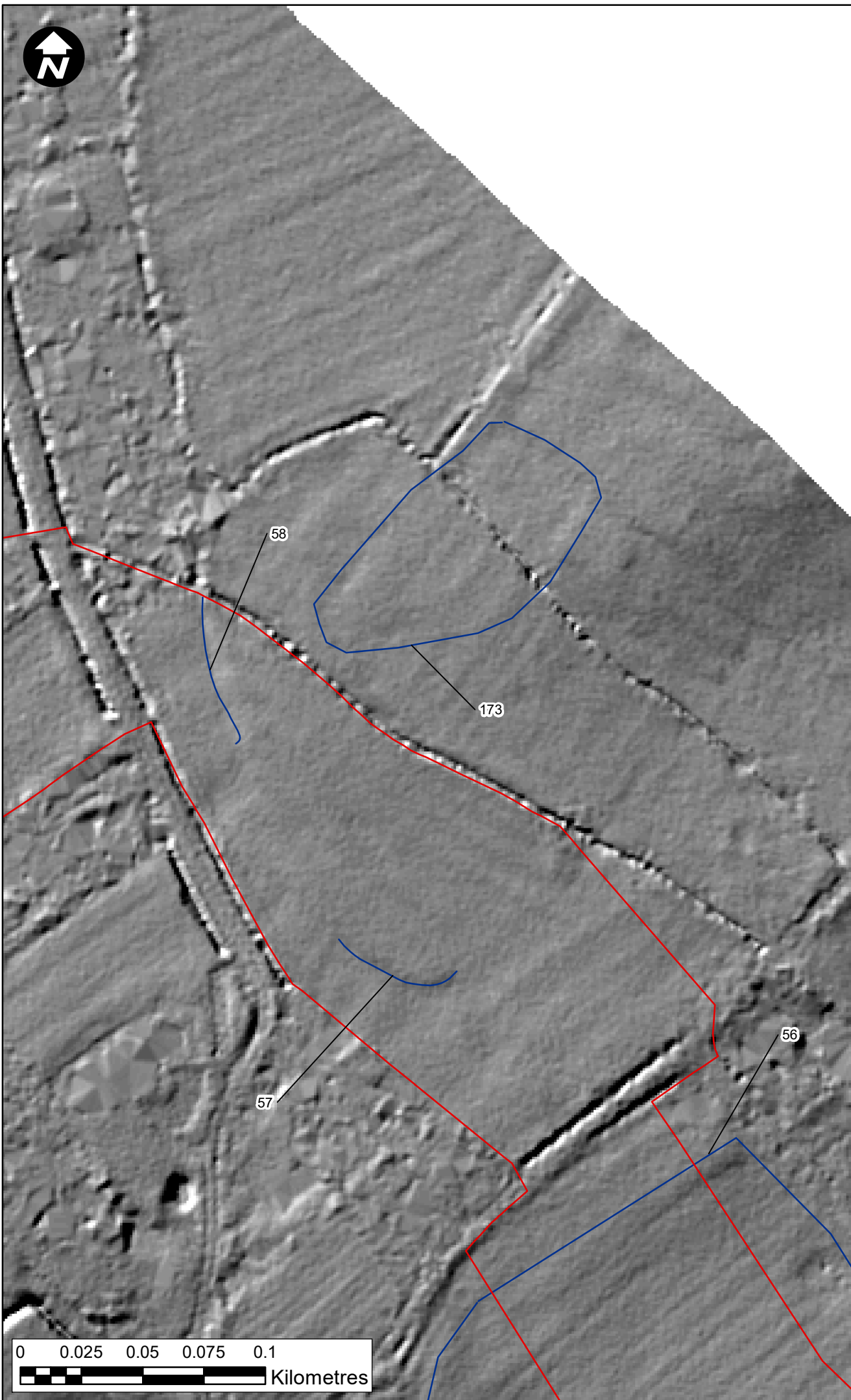
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DRAWING NUMBER
 EN070007-APP-ES-8.3.8





Key:
 Newbuild Infrastructure Boundary /Study Area

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HyNet North West

PROJECT TITLE
HyNet Carbon Dioxide Pipeline

DRAWING TITLE
 Figure 8.3.9: Hillshade model showing a sub-rectangular Second World War encampment north-east of Mollington

DRAWING STATUS
 FOR INFORMATION

DRAWN PM	CHECKED JH	APPROVED AB	AUTHORISED EM
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SCALE @ A3 SIZE 1:2,000	DATE 26/07/2022	REVISION P00
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DRAWING NUMBER
 EN070007-APP-ES-8.3.9

Annex C

CORRESPONDENCE

Ives, Lucy

From: [REDACTED]
Sent: 27 June 2022 12:11
To: LEAH, Mark
Subject: HyNet CO2 Pipeline: Geophysics
Attachments: [REDACTED]

Hi Mark,

The attached is from RAF aerial photographs CPE\UK\1935 no.1021-1022, 17/1/1947. It was mapped by the phase II NMP project, but the reference numbers are wrong in the GIS data they supplied, so I can't find the associated records on the Heritage Gateway.

Best wishes

Rob

Rob Edwards

Historic Environment Records Officer

Cheshire Archaeology Planning Advisory Service (Total Environment)

Cheshire Shared Services

Tel:

Email:

Location: