Cheshire NMP and Lidar Project: Sampling the Peak Fringe, Cheshire Plain and Mersey Valley

A National Mapping Programme Project Report

Historic England Project Number 6923

Report by Ian Hardwick

Archaeological Research Services Ltd

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1 SUMMARY

This report describes and assesses the methodology and results of the survey, using aerial photographs and lidar imagery, of four project areas examining different landscapes across Cheshire. The project was completed to Historic England (HE) National Mapping Programme (NMP) standards and is a pilot project for Cheshire, funded by Historic England through the National Heritage Protection Commissions Programme (NHPCP) and supported by the Cheshire Archaeology Planning Advisory Service (CAPAS).

The project was carried out by an Archaeological Research Services Ltd (ARS) Assistant Projects Officer, based with HE's Historic Places Investigation (North) team in York.

The survey covered a total of 206 Ordnance Survey kilometre grid squares, in four blocks. These are the Peak District fringe to the north-east of Macclesfield (72 km squares), an area of lowland east Cheshire between Chelford and Congleton (43km), an area of the urban fringe north-west of Warrington (28km) and an area of the Dee Valley around Farndon and Tilston (63km). The project area overlapped slightly with parts of western Derbyshire in Block 1 and was mapped up to the border with Wales in Block 4. Combined, the four areas cover approximately 8.6% of the total area of Cheshire. The main products of the project were digital transcriptions of the form and extent of archaeological features seen on aerial imagery with supporting descriptions in the National Record of the Historic Environment (NRHE, available via the Pastscape website at http://pastscape.org.uk/). The project was carried out between July 2015 and January 2017.

The project mapped and recorded a wide range of archaeological sites dating from the Neolithic period to the 21st century. The range of site types and level of archaeological survival varied greatly between the four mapping blocks. These differences reflect the differing exploitation and use of the landscapes within each of the various project areas. A total number of 726 new records were created in the NRHE database and a further 55 existing records were enhanced, while 710 records were new to the Historic Environment Record and 71 existing entries were updated. The only potential amendments to the National Heritage List of England (NHLE) were located within Block 4, largely pertaining to updating the location and extent of medieval settlement remains and a potential new Roman fortlet site which may merit further investigation.

2 ACKNOWLEDGEMENTS

The Cheshire NMP and Lidar Mapping Project was funded by Historic England through the National Heritage Protection Commissions Programme (NHPCP). The project was undertaken by Archaeological Research Services Ltd in partnership with the Cheshire Archaeology Planning Advisory Service, who contributed through access to the Historic Environment Record (HER) data and air photograph collections. Liaison and advice throughout the course of the project was provided by Rob Edwards and Jane Monk.

Thanks are due to the Historic England Archive (formerly English Heritage Archive) for supply of aerial photographs, in particular Luke Griffin and the Archive Services Team.

Thanks are also due to the Cambridge University Collection of Aerial Photography (CUCAP) for the supply of imagery from their collection, and the Environment Agency for free access to their online lidar catalogue.

Quality Assurance and continual guidance was supplied by members of Historic England's York-based Historic Places Investigation (North) team (formerly Aerial Investigation and Mapping): Dave MacLeod, Dave Knight, Matthew Oakey and Sally Evans.

Thanks are also due to the Chester Society for Landscape History and Society for Landscape Studies, particularly Mike Headon, for allowing the setting up of a stand and poster in order to publicise and raise awareness of the project at their annual conference based in Chester.

3 INTRODUCTION

The Cheshire NMP and Lidar Mapping Project was undertaken in order to provide a sample of surveyed archaeological landscapes and sites examined to National Mapping Programme (NMP) standards (see below) and a broad assessment of the various threats to archaeology within the county of Cheshire. This was developed by ARS Ltd and CAPAS, together with HE, in order to augment and update the Cheshire HER and National Record of the Historic Environment (NRHE) and assist with maintaining the Heritage at Risk Register and National Heritage List of England for monitoring of Scheduled Monuments.

Cheshire was chosen for an aerial mapping project as it has previously experienced very little in the way of NMP coverage (Holgate 2015), with only the fringe of the Staffordshire Phase 2 NMP (Bax 2015) on its south-eastern border, and the North-West Rapid Coastal Zone Assessment (Johnson 2009) covering an area of approximately 1km inland from the Mersey and Dee estuaries.

There is a wide range of landscape types and geologies in Cheshire which have greatly influenced past settlement, agricultural land use and industrial exploitation in the county (Holgate 2015). The four blocks mapped as part of this project were chosen in order to sample as broad a range of these different landforms and activities as possible, as follows.

- Block 1 investigated the western fringe of the Peak District, a predominantly upland landscape comprising the foothills of the southern Pennines to the north-east of Macclesfield. The landscape here has been dominated by rough pasture and parkland, with small amounts of stone and coal extraction and the existing archaeological record relatively limited. The block chosen was the largest of the mapping areas at 72km^2 (3% of the county).

- Block 2 examined a lowland area of the eastern Cheshire Plain between Chelford in the north and Congleton in the south, dominated by pasture and limited arable and with a number of known smaller estates and military sites. The level of archaeological survival was relatively unknown and the area is under threat from expansion of existing sand and gravel extraction, resulting in a sample survey area of 43km^2 (1.8% of the county).

- Block 3 sampled a low-lying landscape in the Mersey valley in the north of the county, of very different character to the Cheshire Plain to the south and under threat from the urban expansion of Warrington and small-scale aggregates extraction. The mapping area selected was the smallest in the project at 28km^2 (1.2% of Cheshire) and encompassed the large air force base and associated military features at Burtonwood.

- Block 4 mapped a lowland agricultural area of the western Cheshire Plain, along the Welsh border (largely formed by the River Dee). The area is under threat from agricultural intensification in the form of mega-dairying and maize cultivation and includes

a number of Scheduled monuments and extensive medieval ridge and furrow systems. The area initially comprised a block of 62km^2 (2.6% of the county) in the project design, but mapping was taken up to the border with Wales where needed due to river meanders, etc. (amounting to a further approximate 1km^2).

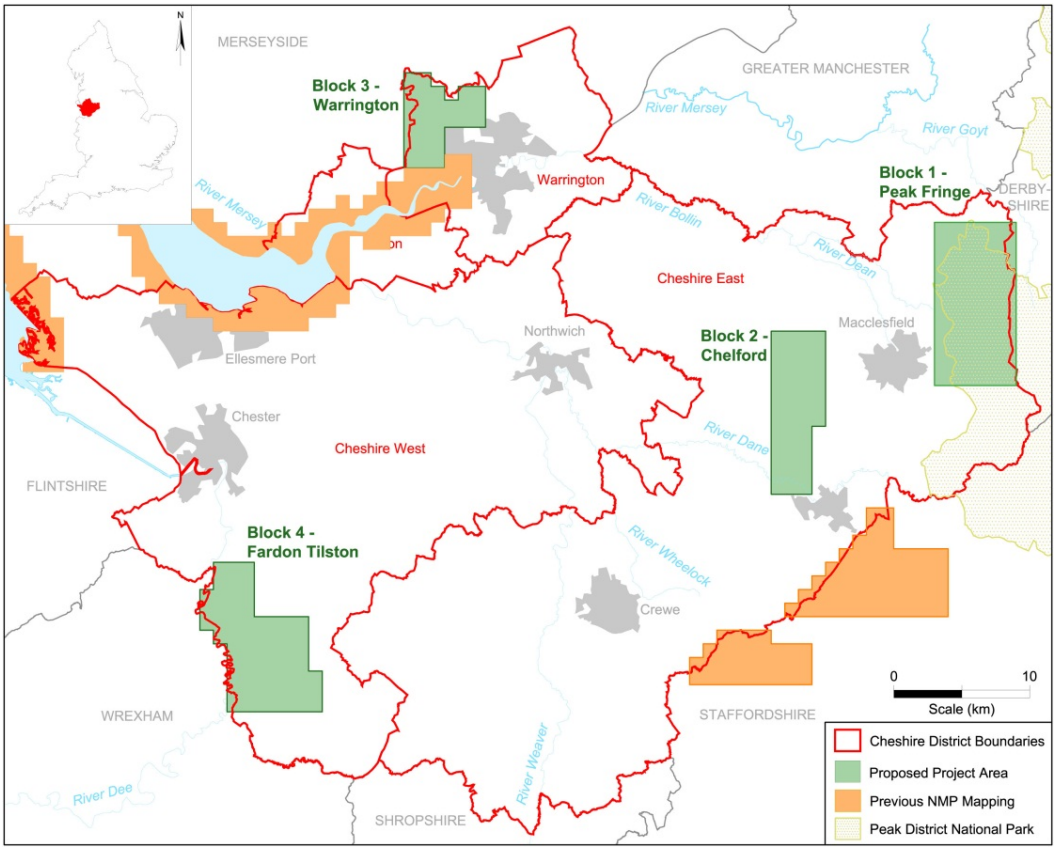

Figure 1. The Cheshire NMP and Lidar Mapping Project's four project areas (green) and previous NMP projects (orange) within the region.

The Historic England standard for air photograph mapping and recording is applied to projects under the banner of 'The National Mapping Programme' (NMP). NMP standards include the use of all available aerial photographs and lidar to map and record archaeological features, whether they are buried features revealed as cropmarks, soilmarks or parchmarks, or features visible at the surface, such as earthworks and structures. This includes sites ranging in date from the Neolithic through to the near-present, including 20th-century industrial and military features. The standard products of NMP projects are a report and a digital archaeological map to be used in conjunction with Ordnance Survey mapping, and linked to monument records in the NRHE, suitable for use by local HERs.

4 PROJECT MANAGEMENT

The project was funded by Historic England (HE) and undertaken by Archaeological Research Services Ltd (ARS).

The Project Board was made up of Jonathan Last (HE NHPCP Project Assurance Officer), Dave MacLeod / Matthew Oakey (HE NMP Quality Assurance Officers), and Rob Edwards and Jane Monk (CAPAS HER Officers). The Project Executive was Robin Holgate (ARS Ltd). The wider Project Liaison Group also included Andrew Davison (HE Principal Inspector of Ancient Monuments) and Kate Kendall (HE Heritage at Risk Projects Officer).

Ian Hardwick (ARS Ltd) was the Project Officer / Project Manager who carried out the survey, recording and report production between July 2015 and January 2017.

The HE NMP Quality Assurance Officers for the air photo mapping were Dave MacLeod and Matthew Oakey, and quality assurance was carried out on approximately 30% of the total mapped area (100% of Block 1 as the mapping block was the first NMP external work undertaken by the Project Officer, followed by the usual 5% recommended by NMP on the remaining blocks). The HE team also provided advice, training and support where necessary and helped ensure the interpretation, mapping and recording were conducted according to NMP standards.

The project ran for 18 months beginning in July 2015, with mapping and recording completed in December 2016 and the report finalisation in January 2017.

5 SCOPE OF THE SURVEY

5.1 Geographical Scope

The project area comprises four blocks (see Figure 1 above), designed to sample four very different landscapes within Cheshire and mapping a total of around 8.6% of the county to NMP standards. This survey was conducted over a total area of 206km^2 (Figures 2-4 below) within the districts of Cheshire East, Cheshire West and Warrington.

Figure 2. The Cheshire NMP project areas: geographical scope of Block 1 (red polygon).The yellow boundary indicates the edge of the Peak District National Park.

The following overview was composed using the National Character Area profiles, together with geology data obtained from the British Geological Survey's online Geology of Britain viewer, examined at a scale of 1:50,00, and soil data from the Cranfield Soil and Agrifood Institute (NRSI) Soilscapes Viewer accessed online, at a scale of 1:50,000.

Block 1 falls largely within the South West Peak National Character Area (NCA) 53 (Natural England 2017a), an area of upland and associated foothills in the south-west region of the Pennines. A large amount of the area is within the Peak District National Park and the eastern edge of the block runs approximately along the county boundary, including a small amount of Derbyshire. The bedrock is largely made up of Carboniferous Millstone Grit with bands of sandstone and other gritstones and some small coal measures extending south from the edge of the Lancashire coal field, with a mix of seasonally wet, acidic loamy and peaty soils on the upper slopes and freer draining but still slightly acidic soils at lower altitudes. This combination and the rugged topography results in a landscape largely made up of strong ridges of moorland with wooded cloughs and small streams (some now reservoirs) with any lower-lying areas comprising permanent grassland divided into small fields of pasture. Settlement consists of small, dispersed farmsteads and isolated villages and large areas of the block were ideal for large parkland estates, such as Lyme Park and Macclesfield Royal Forest. Given the lack of recent intensified agriculture or other development, it might also be expected that earthworks predating the post medieval landscape may survive well. However, the rugged upland topography and poorer soils also make it less probable that past extensive field systems for arable and accompanying larger settlement were ever present in amounts greater than today; any non-pastoral remains are more likely to be associated with the aforementioned estate parklands, extractive industries and the occasional funerary monument. The results of the project (Section 7.1) appear to bear this out, with mapped features comprising only two new enclosures and isolated cairns and barrows, a small number of boundaries and structures associated with Lyme Park and deer enclosure on Toot Hill, and a greater number of industrial sites such as stone quarrying and coal extraction.

In contrast, Block 2 (Figure 3) is almost entirely contained within the Shropshire, Cheshire and Staffordshire Plain NCA 61 (Natural England 2017d), a very large area of lowland flat or gently undulating pasture. The project area itself comprises the valley of the River Dane to the immediate north of Congleton and the landscape of small river valleys and low, rolling hills, patchy woodland and small lakes beyond. The bedrock consists of mudstone and sandstone overlain by till and glacio-fluvial sand and gravel deposits and with a mixture of wet and permeable slightly acidic loamy and clayey soils. The nature of the topography, soils and small meres has resulted in a landscape of small parkland estates such as at Alderley, Capesthorne and Somerford and predominantly grazing pasture with a mix of farms and small villages. Smallscale sand and gravel extraction has developed into largescale aggregates removal in the 20th century, a potential threat to any archaeological remains. Due to the nature of land-use, cropmark development is unlikely and earthwork survival patchy at best though with greater potential within parkland. Again, the results of the aerial survey (Section 7.2) bear this out, with earthwork survival seemingly limited to the various small parklands, a general dearth of cropmarks visible on imagery and a general lack of extensive arable field system or settlement pre-dating the post medieval pastoral landscape.

Figure 3. The Cheshire NMP project areas: geographical scope of Block 2.

Block 3 (Figure 4 below) is very different again, located approximately half within the Lancashire Coal Measures NCA 56 (Natural England 2017b) and the rest within the Mersey Valley NCA 60 (*ibid.* 2017c). The predominant underlying bedrocks of Carboniferous coal measures and pebbly sandstones, overlain by till and small areas of fluvial gravel and slightly acidic clayey soils, gives rise to a topography of gentle hills in the north and the lowland flatter landscape of the Mersey valley further south in the block. The coal measures have resulted in the nearby mining towns to the north-west and the large collieries like that at Bold, whilst the fringes of the port and military town of Warrington dominate the south-east. Between these is a mosaic of military and industrial features, including small-scale extraction, interspersed with rich agricultural land comprising predominantly arable. It is likely, given the strong agricultural and recent extensive industrial exploitation and 20th century military development around RAF Burtonwood, that the block

contains very limited earthwork survival, though there is potential for cropmark development. Military and industrial remains are the prevalent archaeology however. The results of the project (7.3) would seem to confirm the lack of archaeological earthworks or cropmarks surviving in the area, apart from the already-Scheduled medieval moated sites, along with the predominance of later post medieval and 20th century industrial and military remains amongst the mapped features.

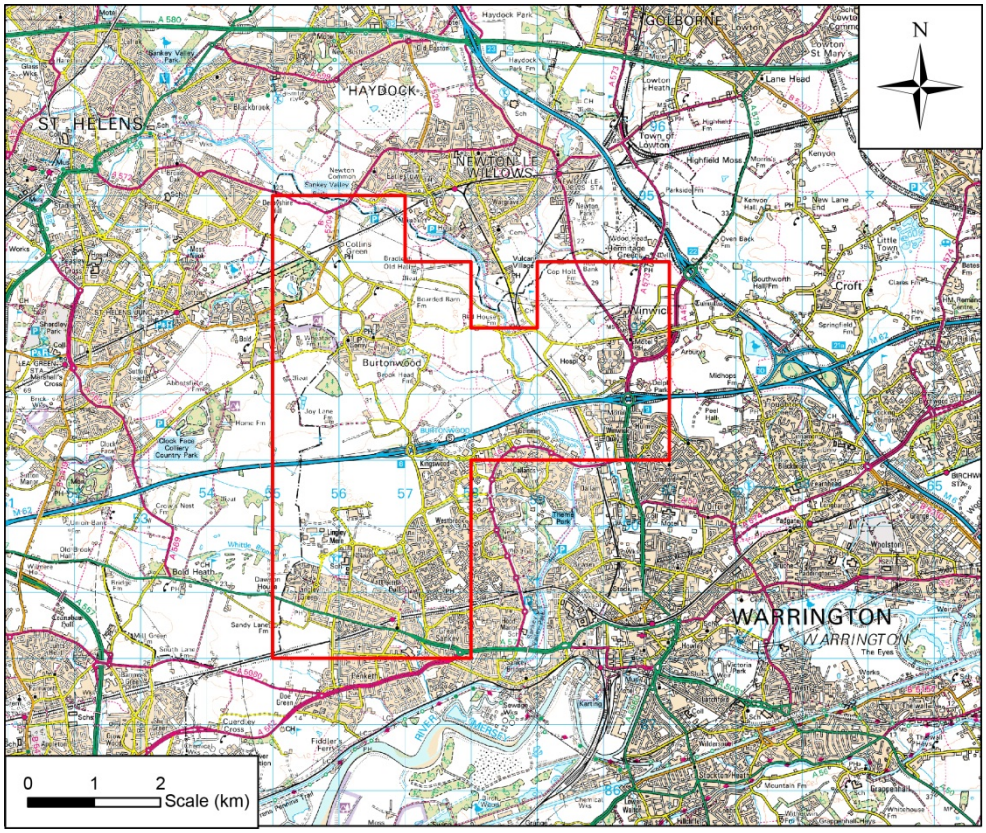

Figure 4. The Cheshire NMP project areas: geographical scope of Block 3.

Whilst the majority of Block 4 (Figure 5) is part of the Shropshire, Cheshire and Staffordshire Plain NCA 61 (Natural England 2017d), it is quite different in landscape character to Block 2. Though it is largely a lowland area of flat and gently undulating, rich pasture it is less topographically diverse due to its location within the broad valley of the River Dee, which forms the western boundary of the area and the Welsh border. The mapping was extended where necessary beyond the straight line of the block's edge to fill in mapping within meanders. The geology of the area is largely gravelly sandstones and conglomerates overlain by tills (and riverine sediments in around the Dee's environs). The exception to this flattish landscape is the south-eastern part of the block, which becomes slightly more rugged as it enters the edge of the Cheshire Sandstone Ridge NCA 62 (Natural England 2017e), caused by the outcropping bedrock of Triassic red sandstones. The gentle topography and freely-draining slightly acidic clay soils have resulted in the primarily rich pastoral landscape dotted with small towns and villages such as Farndon and Malpas, as well as a large number of small marl pits. The lack of recent intensified arable agriculture has resulted in a high potential for earthwork survival of earlier features though limits the likelihood of cropmark development. It was hoped that the previously known earthwork survival of areas of medieval

open field system and settlement remains in this area would be mapped by the project, and the results (Section 7.4) would appear to support this, with extensive medieval agricultural remains, settlements and high status sites surviving as extant earthworks on historic aerial photography and the majority surviving on the latest lidar imagery.

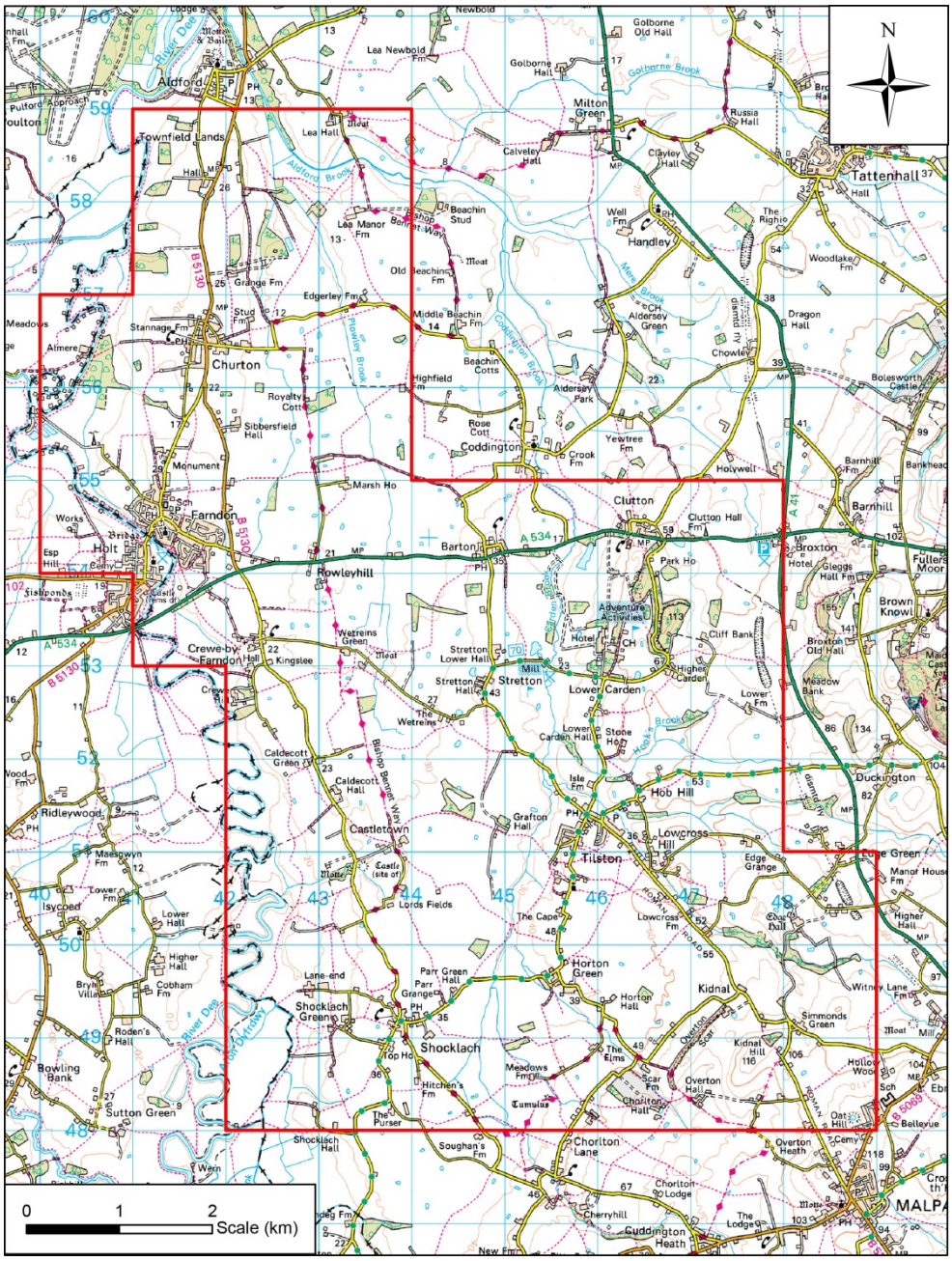

Figure 5. The Cheshire NMP project areas: geographical scope of Block 4.

5.2 Archaeological Scope

The aim of the project (adhering to NMP standards) is to increase our understanding of the historic environment and provide a basis for further archaeological work. This is achieved by the mapping and recording of all archaeological features identified on air photographs and (where

available) lidar, visible as earthworks, cropmarks, soilmarks, parchmarks and structures. The sphere of interest for the project follows NMP guidance (Winton 2015) and is summarised in Appendix 4.

5.3 Sources

All readily-available air photographs were consulted, together with 16-direction hill-shaded lidar (where coverage was available) from the following collections.

● The HE Archive was the primary source of photography, with four loans consisting of a total of 5507 vertical and 299 oblique photographs. The vertical photography was made up from a number of sources, predominantly comprising RAF, Ordnance Survey (OS) and Meridian Airmaps Ltd (MAL) photography dating between 1945 and 1996. The oblique photography also came from a wide variety of sources, including RAF military obliques, and ranged in date from 1945 to 2003. These comprised both digital and print formats. The vertical photographic coverage was highly variable between the four mapping areas, with a very large amount of photographs in Block 3 (the largest number of any block for the smallest area) and for the least gain. They were however very useful for comparison with lidar imagery and earlier runs useful for mapping features now levelled, particularly in Blocks 1 and 4. Vertical imagery was often the only source of imagery for mapping surviving earthworks. Oblique photography was extremely limited on the whole, largely limited to industrial sites out of NMP scope (including standing mills, factory complexes and hospitals) and with little recent imagery focussed on archaeological sites. This increases the likelihood that potential archaeological cropmark sites which may survive were not mapped by the project due to a lack of any imagery covering them. Extra details for earthwork and structural sites mapped from other sources may also have not been identified.

● Photography from a single flight of HE digital oblique photography dating to 2015 was provided for Block 1 and was used in the mapping of an earthwork site in the south of that area, proving useful in the mapping of a Scheduled deer pound enclosure. There was no further recent imagery - a limitation for the project with regard to examining the current level of survival of cropmark and earthwork features.

● A search of the Cambridge University Collection of Aerial Photography (CUCAP) online catalogue identified an additional 54 oblique photographs. This number excludes duplicate CUCAP photography held within the HE Archive. This specialist photography ranged in date from 1948 to 1984 and was largely focused on wider panoramas and flooding of the Dee Valley in Block 4, and landscape parks in Block 2. Though some additional features were mapped from this imagery, the main gain was in contextualisation of sites within their wider landscape. Though the CUCAP library closed during the lifetime of this project, the results of the project were not affected as the imagery for all four mapping blocks had been examined and scanned prior to the closure of the archive.

● The Cheshire HER aerial photography collection was accessed. The small number of oblique photographs held within the HER was largely equivalent to those held in the HE Archive. However, the vertical photography held by the Cheshire West & Chester Council was provided and consulted, comprising extensive digital mosaics which could be inserted in AutoCAD with only limited adjustment needed. This ranged from one run of Luftwaffe WWII imagery to full vertical coverage of some of the project areas dating to the 1960s, 70s, 80s and 90s, and also including some of the earlier 2000s imagery no longer available on Google Earth™. These mosaics provided some additional detail to the mapping, including a limited number of new cropmark features. They were also useful for examining landscape change over the last half century, including extensions and infillings of sand and gravel extraction in Block 2.

● Orthophotography was supplied to HE by Next Perspectives™ through Aerial Photography for Great Britain (APGB), ranging in date from 2009 to 2013, and was used not only for mapping, but also for the latest evidence statement for earthwork and structural sites (with the exception of those areas with good resolution and more recent lidar coverage in Blocks 1 and 2). The orthophotography was sometimes the only usable source for mapping some earthwork and cropmark features and was therefore an invaluable resource for the project.

● Google Earth™ imagery and Bing Map™ imagery was also consulted to provide additional data, with various dated runs of imagery from 2001 to 2013 (and a mosaic of 1945 imagery of limited use and largely lower resolution than contemporary HE Archive imagery). The coverage across the blocks was largely equal but the gains on the whole minimal. Google Earth imagery is often useful with regard to identifying additional cropmarks but cropmark development across all four areas was extremely limited, hindering its usefulness. Bing Maps largely comprised the same runs of vertical orthophotography as Google Earth and, where this was the case, the better resolution of the two sources was utilised.

● 1 and 2 metre resolution lidar data was accessed from the Environment Agency. This was supplied in the form of 1km² ASCII files which were processed in Relief Visualisation Toolbox 1.1 to produce 16-direction hill-shaded images. The lidar data did not cover the project area in full, with 38km² of Block 1, only 11km^2 of Block 2, 20km^2 of Block 3 and 57km² of Block 4 available, equating to approximately 61% of the project area. Where 1m resolution data was available, this was often the primary source for mapping (though in consultation with aerial photography), whilst 2m resolution was only consulted where 1m was unavailable. It was especially effective when mapping and interpreting extant medieval field systems in Block 4. The lack of lidar coverage had the greatest negative impact for Blocks 1 and 2, where the moorland and rough pasture would have benefitted greatly from a digital terrain model picking up slight earthworks and removing vegetation cover.

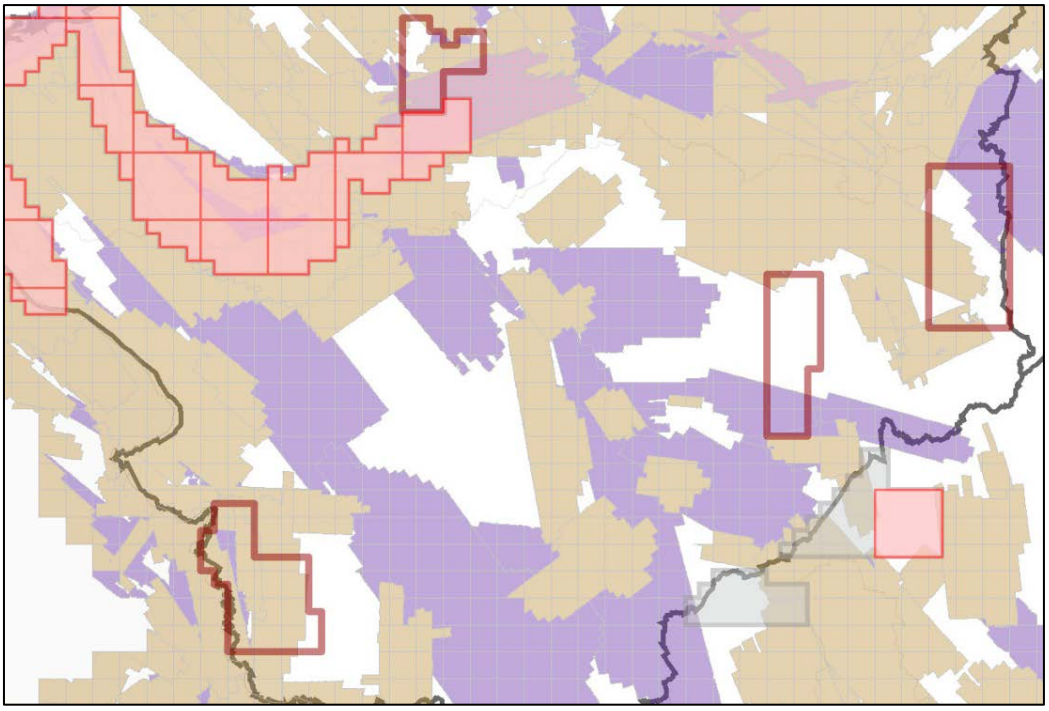

Figure 6. Environment Agency lidar coverage for Cheshire NMP (project areas outlined in dark red, previous NMP in bright red or grey; purple for 2m resolution lidar, pink and brown for 1m resolution).

5.4 Monument Data and Other Sources

The National Record for the Historic Environment (NRHE, formerly the National Monuments Record or NMR) database, AMIE, together with HER monument records and Scheduled Monument data, were consulted regularly during the interpretation, mapping and recording programme. The data, supplied as shape files (.shp), were entered in AutoCAD to assist with mapping and interpretation and were extremely useful in both identifying mapped sites and providing broader context to landscape use and development.

Historic and modern Ordnance Survey mapping was also consulted to aid the interpretation and dating of features, accessed via HE's internal Geographical Information System (GIS). The nature of bedrock and surface drift geology, soil types, and location of mineral and coal deposits was also used to inform interpretation, available online from the British Geological Survey's 'Geology of Britain viewer' and 'The Coal Authority Interactive Map viewer', and the Cranfield Soil and Agrifood Institute (NRSI) 'Soilscapes Viewer'. These assisted in the interpretation of potential land-use associated with visible archaeological features (such as the nature of extractive industry where visible as with early coal mining sites in Block 1, or the potential for arable agriculture in an area as with the rural parts of Blocks 2 and 3).

6 METHODOLOGY AND RECORDING

6.1 Mapping Methods

The mapping and recording methodology was carried out to NMP guidelines (Winton 2015). All hard-copy photography was analysed under magnification and stereoscopically, where possible. The photographs were scanned at a resolution of between 400-600dpi for rectification using AERIAL 5.36 software. Ordnance Survey MasterMap® 1:2,500 scale digital maps or 25cm resolution APGB orthophotography provided control for rectification. 5m interval contour data was used to improve the accuracy of the photo rectification; this was provided by HE (Licensed to HE for APGB through Next Perspectives™). Accuracy for the OS MasterMap® map is approximately ±2.5m or higher and rectification of photographs is normally within ±2m. The rectification accuracy will be lower in areas of large topographical variation and in areas where significant urbanisation or other change has occurred.

The Environment Agency lidar ACSII data was downloaded from their online geostore and was processed in a toolbox extension to ArcGIS (to produce associated world files) and then Relief Visualisation Toolbox (RVT) software to produce 16-direction hill-shaded images. RVT was written by Ziga Kokalj and colleagues at the Institute of Anthropological and Spatial Studies at the Research Centre of the Slovenian Academy of Sciences and Arts. This process produced geo-referenced tiff files which were then imported into AutoCAD Map 3D in the same manner as the rectified air photographs.

The identified archaeological features were mapped from the rectified air photographs and lidar using AutoCAD Map 3D. The mapping conventions and layer structure used in the drawing files are summarised in Appendix 2. The attached data table for each feature recorded the corresponding NRHE record number and interpretation, along with other data within the drawing file (see Appendix 3 for an example attached data table).

In addition, the corresponding HER number (where existing) was included in the attached mapping data to aid concordance (see Appendix 3 for mapping data).

6.2 Recording Practice

The mapped archaeological features were recorded in the HE NRHE database. New records were created for previously unrecorded sites and those with existing records were updated. A list of the monument types used for this project is compiled in Appendix 5.

The APGB orthophotography was generally used to record the latest monument condition for earthworks and structural elements, unless more recent lidar imagery or photography was available, for example the 2015 HE photography in Block 1. No latest evidence source was recorded for cropmark sites.

Where possible, concordance between HER datasets and NRHE records was made through the mapping attached data table (see Appendix 3).

6.3 Data Archive and Dissemination

Copyright of the aerial survey mapping and associated NRHE records produced by the project resides with HE. Licence to use the data has been extended to ARS Ltd and Cheshire Archaeology Planning Advisory Service (CAPAS).

6.4 Project Archive

The mapping has been deposited with the HE Archive in Swindon under a single parent collection number: EHC01/239.

The newly-created and enhanced monument records form part of the NRHE database, which are downloaded into the HE webGIS and ArcGIS. The records are also available to view online through the PastScape website (www.pastscape.org.uk).

6.5 Project Dissemination

A copy of the AutoCAD Map drawing file has been supplied to ARS Ltd and is held by HE. CAPAS received the mapping data in shape-file format for incorporation into the HER.

All NRHE records have been supplied to ARS Ltd and CAPAS in Portable Document Format (.pdf) and Extensible Markup Language (.xml) formats for incorporation into the HER.

A copy of this aerial survey mapping report will be deposited with the HE Archive in Swindon, and will be available for download on the HE website.

7 SUMMARY OF PROJECT RESULTS

The following is a brief overview of the aerial survey mapping results for Blocks 1-4, comprising approximately 8.6% of the county of Cheshire. The results are discussed for each mapping block in turn and specific sites are referenced in brackets to the relevant NRHE database Unique Identifier Number (UID). Where HER records are specifically discussed, these are similarly referenced in brackets with the additional preface of MCH.

As discussed in Section 5, the coverage of the different sources of aerial imagery was variable and this will have impacted upon the results of the mapping. The historic vertical imagery was relatively consistent in overall coverage, with the greatest concentration over the urban area of Warrington in Block 3, documenting the growth of the urban area (and thus less useful for identifying archaeological earthworks). However, the quality of the vertical photography was variable. The best quality runs (found in areas of Block 1 and much of Blocks 3 and 4) dated from the late 1940s / early 1950s, with low sunlight producing excellent shadow definition and thus, enabling improved identification and detailing of earthwork and structural elements. However, the coverage of this excellent quality imagery was more variable in parts of Blocks 1 and 2. The earlier vertical photography was particularly useful for mapping military and industrial features in Block 3 and mapping and monitoring the survival of medieval and post-medieval landscapes in Block 4. It was also useful for overall coverage of the large areas of Blocks 1 and 2 without lidar imagery, though the aforementioned high quality was only available for small parts of this.

Later archive vertical photography and other sources such as the APGB and Google Earth ™ orthophotography were also useful for overall coverage (including for sites with few other sources of imagery) and monitoring condition of archaeological features. However, due to the lack of suitable conditions across much of the four blocks for cropmark and parchmark development, their utility in identifying new sites was relatively limited.

Oblique coverage was extremely limited and what there was largely targeted parklands and military and industrial remains. There was some coverage of Scheduled Monuments for monitoring purposes (including the only recent digital imagery), though even this was sporadic at best. This is potentially due to the lack of cropmark production in the areas in question and low levels of previous archaeological intervention resulting in a low frequency of the area being targeted for aerial reconnaissance, as well as the high impact of the flight paths pertaining to Manchester International Airport making flying over the county more difficult.

As previously identified, lidar was extremely useful for mapping earthworks in those areas where 1m resolution data was available, notably the rural parts of Block 4 and those limited areas of Block 1 with coverage. 2m resolution was slightly less so but still useful where higher quality data was lacking. The main issue with the lidar were the extensive gaps in areas of Block 1 and 2, areas of moorland vegetation or rough pasture which would have benefitted greatly from lidar survey, particularly when high quality 1940s / 1950s photography is lacking.

A total number of 726 new records were created in the NRHE database and a further 55 existing records were enhanced. As a result, 93% of the records produced by the Cheshire NMP comprised new monuments in the NRHE. In addition, 710 records were new to the Historic Environment Record and 71 existing entries were updated (90% of the total therefore being new to the HER).

Potential amendments to the National Heritage List of England (NHLE) were located within Blocks 2 and 4, updating the location and survival status of Bronze Age round barrows and the extent of Scheduled medieval settlement remains. Potential candidates for assessment for designation include the possible Neolithic mortuary enclosure visible as cropmarks and the potential Roman fortlet site and road embankment visible as earthworks on lidar, all in Block 4, which may merit further investigation.

The sites range in date from the aforementioned potential Neolithic enclosure and Bronze Age bowl barrows in three of the areas through to Second World War installations and the airfield at Burtonwood (which continued in use into the Cold War) and also a mid-20th century Royal Observer Corps monitoring post near Aldford. The monument evidence mapped was in the form of earthworks, structures, buildings, parchmarks, soilmarks and cropmarks. These were dated according to morphological characteristics, together with any available existing archaeological or documentary data. The double-indexing of periods was used to indicate where a feature is likely to have been in use across two periods, such as 'medieval/post-medieval' while 'uncertain' was used when no other evidence or comparison could be used to define its origin.

7.1 Block 1 – The Peak Fringe

Block 1, located in the western Pennine foothills and consisting primarily of upland moorland interspersed with rough pasture, was expected to produce some evidence of small scale extraction and features associated with the estate of Lyme Park and earlier royal forest (Sections 3 and 5). Several prehistoric and early medieval monuments (primarily bowl barrows, cairns and standing stones) had previously been identified and some Scheduled. It was therefore hoped that a landscape survey would increase the number of identified early sites and allow study of the wider context for those sites, particularly given the lack of recent intensified agriculture and other development. From the results of the mapping, a number of broad themes can be drawn out, which will hopefully aid in the future understanding and management of the area.

7.1.1 Survival from the early landscape

The project identified and mapped a number of isolated features which are the sole remnant of the pre-medieval landscape of Block 1. These included the bowl barrows and round cairns previously known and dated as Bronze Age in origin, some of which are Scheduled, as at Sponds Hill (78404) and Reed Hill (78163), and a few potential new examples (1598294, 1598295). There

were also a number of standing stones of possible later prehistoric origin and the early medieval stone crosses known as the Bow Stones (78382), all previously known.

Figure 7. The potential prehistoric / Roman curvilinear enclosure (1599721) at Rainow, visible on historic aerial photography.

RAF/58/1784 F22 0004 10-JUN-1955. Historic England RAF Photography.

Three new enclosures were also identified which appear to stand out in form from the medieval / post-medieval field system and are therefore potentially earlier in date. A curvilinear enclosure (1599721 – Figure 7) terraced into a steep slope in the village of Rainow was visible on 1955 vertical photography and may be a stock enclosure (ground reconnaissance during the field observation visit confirmed that the slope was too steep for settlement and no internal features were observed). A second, much more circular enclosure (1600899 – Figure 8) near Lower Windyway Farm in the south of the project area consists of a low bank and internal ditch and is also terraced into the slope. As there are no comparable examples anywhere else within the project area, this may also predate the later field system. Finally, an irregularly shaped, embanked enclosure (1598292 – Figure 10) with an external ditch on its northern side, traceable on the ground and previously recorded in the HER (MCH 22510) is also of unknown origin and may relate to earlier stock management predating Lyme Park.

These results have shown that isolated sites and features do indeed seem to be the lone surviving monuments of the earlier landscape, divorced from their context and surviving due to the lack of later landscape development. There may be features that were not visible on the aerial imagery (particularly in areas without lidar or high quality vertical imagery) or concealed by the

upland vegetation, that are still awaiting discovery, though widespread survival of the later prehistoric / Roman landscape has been shown to be unlikely.

Figure 8. Circular enclosure of possible early date (1600899), visible on historic aerial photography.

RAF/58/1784 F21 0028 10-JUN-1955. Historic England RAF Photography.

7.1.2 Medieval and post-medieval landscapes

Aside from the larger estate parks (Section 7.1.3), the majority of the medieval and later archaeological features mapped as part of the project comprise isolated or small groups of fields of improvement ridge and furrow, much of it steam-ploughed post-medieval narrow rig. Individual field boundaries or small systems of banks and ditches also survive in places, representing either out-of-use fragments within the current field system or limited remains of a different, earlier phase of land division, surviving as earthworks and occasional cropmarks. The mapping from the higher moorland areas on the eastern fringe of the area is restricted to isolated field boundaries, small scale extraction (see Section 7.1.4) and networks of braided trackways connecting lower-lying roads and settlements. One site (1600813) is the only indication of small-scale peat cutting on the edge of the high moors.

Thus, in terms of adding to the existing knowledge base and informing management of heritage assets, these do not form a cohesive landscape history and provide only limited additional detail for understanding the development of the current pastoral and moorland landscape. Additional settlement remains are also minimal for Block 1, with only a small number of potential building platforms or enclosures.

7.1.3 Parkland estates

The landscape in the northern part of the project area is dominated by the estate of Lyme Park (78401), which occupies a large area of upland moor and the surrounding cloughs. Parkland features already recorded on first edition and later Ordnance Survey mapping include structures like the Grade II* Listed deer park watch tower named Lyme Cage (78396), the ruined deer house (1598159) and belvedere (1598177). In addition, possible stretches of the original park pale (1598234, 1598254) and numerous long linear boundaries (1598245) dividing areas of the estate are also visible on aerial imagery, newly identified. Other features survive within the parkland, including earthwork hollow ways and trackways and several fragments of leats (1598180, 1598186) carrying water through the estate.

Figure 9. A complex of possible medieval / post-medieval rectilinear enclosures (1598213) in the north of Lyme Park, visible on historic aerial photography.

RAF/543/2750 1F21 0062 11-MAR-1964. Historic England RAF Photography.

There are two complexes of probable medieval / post-medieval enclosures within the area of the park, the northernmost (1598213 – Figure 9) comprising a linear arrangement of banked and ditched divisions running along a natural scarp edge and centred on a more substantial multi-vallated enclosure. Another newly-identified complex of rectilinear enclosures (1598296 – Figure 10) survives as earthworks to either side of the park's current eastern boundary wall. These

enclosure systems may represent activity associated with either the medieval deer park or later landscape park, or predate them entirely. However, no definitive pre-park landscape or substantial earlier phase of the park's history was visible from aerial imagery, potentially exacerbated by the lack of lidar coverage over much of the park. The previously identified and Scheduled round barrows within Knightslow Wood to the south of Lyme Hall were not confirmable from aerial photography due to tree cover.

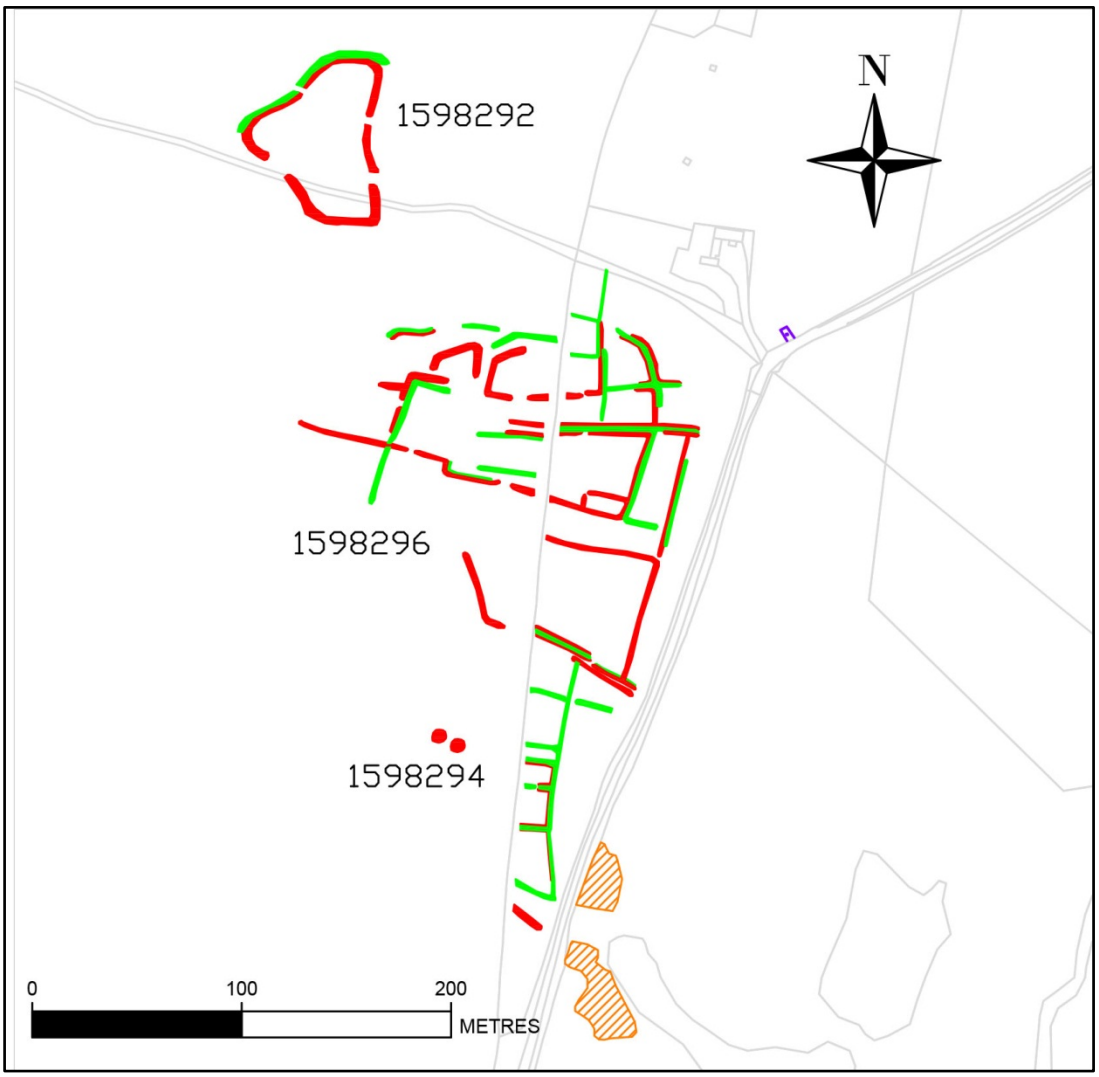

Figure 10. Project mapping depicting the complex of medieval / post-medieval rectilinear enclosures (1598296) lying along the eastern boundary of Lyme Park, together with the potential earlier irregular enclosure (1598292, top) and two potential round barrows (1598294, to south-west of complex).See Appendix 2 for NMP colour conventions.

A large area in the south of Block 1 was also designated parkland during the medieval period, having been part of the Royal Forest of Macclesfield. However, the only substantial remaining element of this is the Scheduled deer pound or enclosure (78231 – Figure 11) on Toot Hill, cut through by later trackways and incorporated into later land division boundaries. As a result, it is

clear that even in the large parkland areas, survival of archaeological remains is limited to isolated features.

Figure 11. The Scheduled deer pound enclosure (78231) at Toot Hill, part of the Royal Forest of Macclesfield, visible on recent Historic England oblique photography.

NMR 28660_020 17-FEB-2015 © Historic England

7.1.4 The industrial and military landscape

The steep valleys and fast-flowing rivers and streams along the edge of the Pennine foothills on the western edge of Block 1 were highly suited to textile mills and there are a number present, particularly around Bollington. However, though these form a crucial component when assessing the past utilisation of the landscape, the complexes either remain extant or are already depicted by first edition or later Ordnance Survey and thus were not mapped by the project, with the exception of a small number of earlier mill dams higher up the valley, which likely pre-date the larger mills.

The results did add considerably to the knowledge of post-medieval and later industrial exploitation of this otherwise marginal landscape. Small scale stone quarrying is prevalent across much of the upland areas, likely for construction of local buildings, field walls and estate features. Large clusters of these small quarries can be found in Lyme Park. Only the clusters of pits amounting to over 0.5ha in total area were mapped, as per NMP scope. Small areas of localised sand and gravel extraction are also present in some isolated valley areas. Larger scale, commercial stone quarries (which continue in use through to the present) dominate the south-western edge of Block 1, notably at Kerridge (1465908) and Tegg's Nose (1465934, 1600901).

The other main industrial activity within NMP scope seems to have been coal extraction, with many early coal mining sites visible as extant earthworks on both lidar imagery (where available), and also often clear on aerial photography. These tend to comprise groups (of varying number) of

small circular pits surrounded by irregular spoil heaps, the larger complexes (1598145, 1598441, 1599754, 1600965 and 1600985 – Figure 12), interconnected with networks of trackways and hollow ways or tramways. Extensive braided trackways (e.g. 1598455) also provide access from coal mining sites on higher slopes to more major route ways. A small number of mining adits (e.g. 1599246) and associated 'finger dump' spoil heaps have also been identified.

Figure 12. A group of probable early coal mining shafts and associated spoil heaps and trackways (1598145), visible on the latest APGB vertical orthophotography.

Next Perspectives APGB Imagery SJ9680 08-OCT-2011. Image supplied to Historic England through the APGB agreement by Next Perspectives. © Bluesky International/Getmapping PLC.

The later, more intensive and larger scale coal extraction is focussed on Poynton in the north-western corner of the project area. The collieries here of Anson Pit (1597972), Nelson Pit (1598011) and Canal Pit (1598019) form the southernmost extent of the Lancashire coal field and are linked in to both the local railway network, with extensive sidings visible on 1940s and 50s photography and Ordnance Survey mapping, and the Macclesfield Canal (1340294).

A military depot of probable Second World War date (1598002) is visible on 1946 aerial photographs, adjacent to the Anson Pit colliery and the nearby railway sidings. This is consequently likely associated with wartime coal distribution. The only other military site within Block 1 is a searchlight battery (1600993 – Figure 13) potentially associated with the network of

anti-aircraft defences around Macclesfield and the Greater Manchester area and re-using some of the upstanding earthworks from earlier coal mining pits.

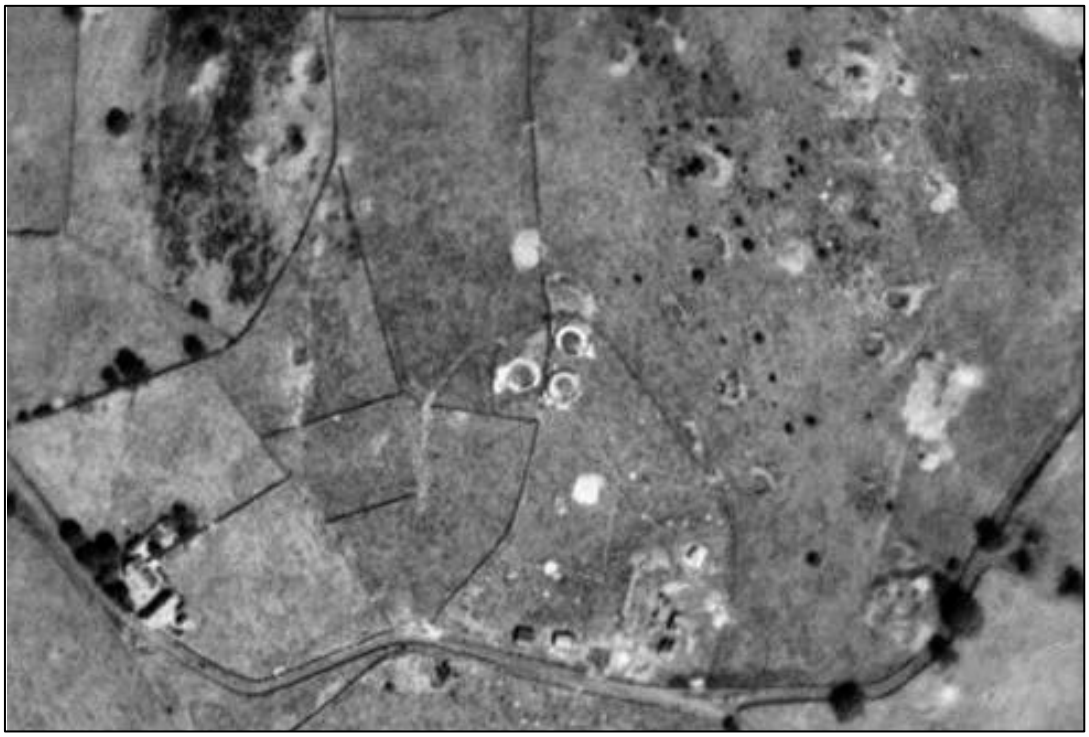

Figure 13. WWII Searchlight Battery (1600993) within a group of early coal mining pits to the east of Macclesfield, visible on historic aerial photography.

RAF/106G/UK/645 RP 3120 11-AUG-1945. Historic England RAF Photography.

7.1.5 Block 1 Summary

Therefore, the mapping from Block 1 has contributed to understanding of the archaeological landscape for the Peak District fringe area of the county. Though it has confirmed that evidence for earlier features and use of the landscape is relatively limited, with only isolated sites surviving, the pastoral marginal landscape (including a number of large parklands) appears largely unchanged since the medieval period. Little has been added to the understanding of settlement in this marginal landscape from the mapping. However, the main increase in archaeological knowledge for management of the landscape has been in mapping of the extent and nature of industrial sites, predominantly small-scale early stone and coal extraction. The Block has also proven that lidar is effective for identifying sites in this particular upland environment but that 100% coverage is needed for further site identification and management, given the limitations of aerial photography in areas of continuous woodland plantation or bracken cover.

7.2 Block 2 – The Eastern Lowlands (Chelford-Congleton)

Block 2 comprises a much more lowland environment than that of Block 1, located in the easternmost rural part of the Cheshire Plain and currently largely under pasture (with only limited arable). The only major topographic features are the broad valley of the River Dane in the south and the relatively common meres and lakes dotted around the area. Aside from the number of smaller parklands at Alderley, Capesthorne and Somerford and the military depot at Sandle Heath, few archaeological sites have previously been identified in this landscape and this project area was chosen to ascertain whether this lack of record was due to an actual absence of sites, poor level of survival or a lack of previous study. Only three bowl barrows and a possible medieval settlement in Capesthorne Park are Scheduled. Consequently, any new sites identified by the project would have a large impact on the existing knowledge and management of the historic landscape, with implications as to levels of survival for similar parts of rural eastern Cheshire. Though cropmark development was suspected to be limited due to land-use, earthwork survival in parkland and rougher pasture was hoped for. The main threat to this archaeological landscape is sand and gravel extraction in large areas in the west of the area.

7.2.1 Early landscape features

In terms of archaeological sites relating to the pre-medieval landscape identified from aerial imagery during the project, the survival of features appears to be extremely limited, with only one additional potential later prehistoric round barrow (1603397) to add to the three previously known examples visible on aerial photography (76436, 76466, 1043579). One of the aforementioned Scheduled barrows (76413) was not visible on any of the sources consulted and may have been levelled or denuded sufficiently so as not to be visible on the imagery available.

As with Block 1, the medieval / post-medieval landscape is represented by isolated or small clusters of fields of ridge and furrow ploughing. Though much of this consists of post-medieval land improvement, fragments of broader ploughing may represent surviving remnants of medieval origin. Much of this ridge and furrow is visible on 1940s and 50s photography and has since been levelled with the improvement of pasture or recent development. A small number of areas of ridge and furrow were visible only as cropmarks. Though limited in providing new insight into the past landscape, this does nonetheless show the impact of modern land use on preservation of the landscape and may account for the lack of medieval and earlier remains overall in this area.

Other than ridge and furrow, the majority of features surviving from the medieval / post-medieval consist of isolated field boundary banks and ditches which largely fit into the broader extant field pattern, many now levelled. There are a few small areas of more coherent field system (e.g. 1603355, 1603359, 1603361 and 1603366), some containing blocks of ridge and furrow and potentially pre-dating the larger fields and enclosures of the modern pastoral system. A notable example of this (1602171) is a small area of narrow, rectilinear fields very different in form and size to the current system of fields in the area.

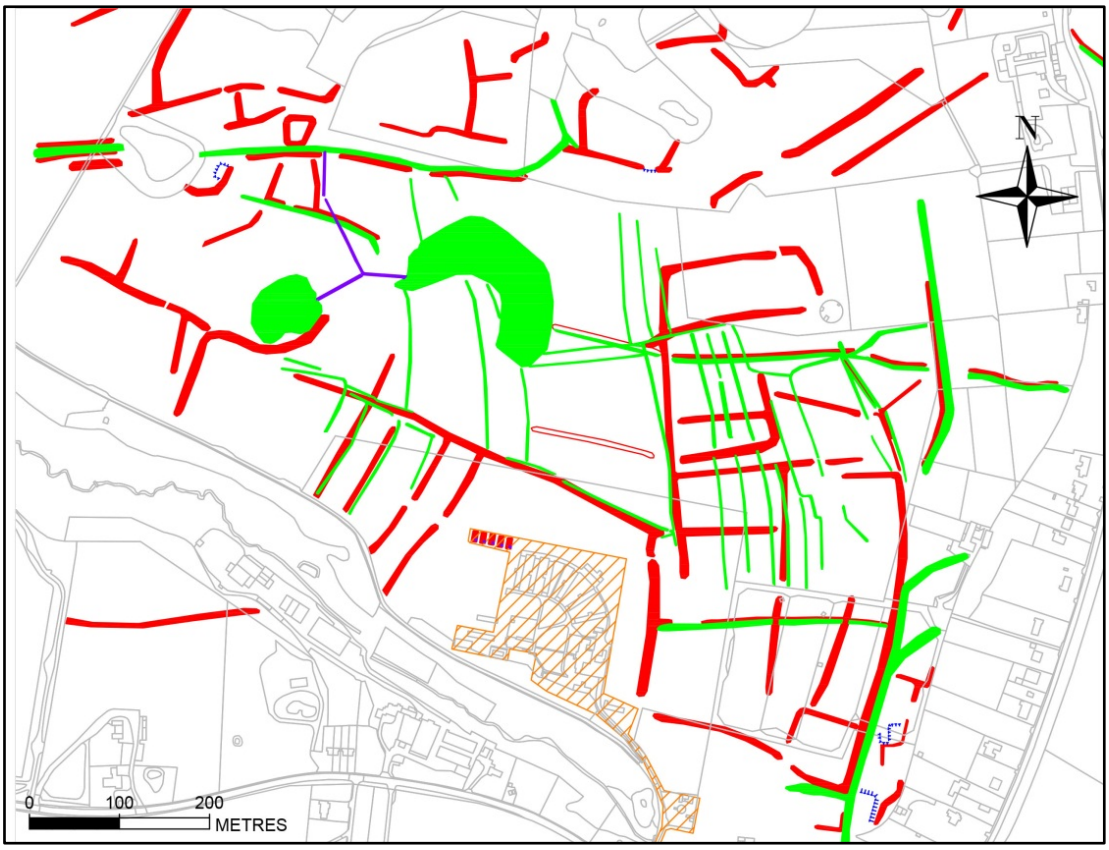

Figure 14. Project mapping depicting the relict medieval / post-medieval field system (1603418), ornamental lakes and connecting drains (1603583) and WWII evacuation camp (1603415) within Somerford Park. The Second World War Somerford Hall Camp School (1603415) is hatched in orange. See Appendix 2 for NMP colour conventions.

However, the most complete fragment of earlier landscape division is located in the south-western corner of the project area in Somerford Park (Figure 14 above). Within the later parkland associated with Somerford Hall is a complete area of relict field system (1603418) consisting of multiple phases. Embanked boundaries and enclosures survive as low, spread earthworks, while ditched boundaries, enclosures and trackways (sometimes on differing alignments) are visible only as cropmarks. The earthwork remains of a pair of post-medieval ornamental lakes (1603583), connected by underground drainage channels showing as parchmarks, overlie the earlier field system. This is possibly one of the most important archaeological discoveries for Block 2, showing that in certain areas at least, there was a completely different landscape pre-dating the current system and hinting at the potential for the rest of the area.

In terms of archaeological settlement remains, the Scheduled settlement at Capesthorne (76472) was mapped as a branching hollow way with only three visible rectilinear platforms. Further trackways (1602661), field boundaries and enclosures (1602663) to the immediate south, beyond the estate's lakes, may suggest an extension to the pre-parkland settlement. Though visible on earlier imagery, the features within and outside the Scheduled area appear to have been levelled

(or are no longer visible due to tree cover). Other small-scale settlement remains are found across Block 2, ranging from a couple of isolated platforms (1602044 and 1603400) which may be building remains or garden features, to larger complexes of hollow ways, enclosures, pits and platforms (1602136, 1602139, 1602140 and 1602165) surviving as earthworks on the edge of modern settlements on aerial photography. Two cropmark ditched enclosures (1603398 and 1603453) may also represent settlement within the earlier field system. Fragmentary hollow ways are present across the landscape, some associated with field boundaries or settlements, evidence of past systems for movement beyond that of the current roads and lanes.

As with the estates in Block 1, few parkland features both fitted NMP scope and were not previously depicted by Ordnance Survey. The only such features in Block 2 are therefore a small deer house structure (1602053) and ornamental ponds (1602686) relating to Alderley Park, and the aforementioned lakes at Somerford.

Consequently, though the results suggest that prehistoric archaeology in Block 2 is limited to isolated sites, the remains from medieval and post-medieval settlement and agricultural landscape, whilst not extensive, do give insights into how the landscape has developed into the current pastoral environment, particularly from features such as the field system at Somerford.

7.2.2 Industrial and military trajectories

The remains from other past exploitation of resources also survive, giving insight into the wider understanding of the historic landscape. Several small mill complexes depicted on OS are present along the small valleys, with earthwork elements of the post-medieval Siddington Mill (1602116) mapped by the project. Two brickworks and associated brickfields (1602050 and 1602725) were visible as earthworks and mapped, as were several small stone quarries and groups of extractive pits (1602067, 1602114 and 1602660), focussed on the slightly more upland eastern side of the block.

Sand and gravel extraction dominates the western edge of the project area, with smaller, earlier pits having developed into large aggregates quarries (1602024, 1602667). These quarries have removed large tracts of land, including two earlier mounds (76467) visible on historical aerial photography as soilmarks, along with a number of fields of ridge and furrow, and much of the military complex on Sandle Heath (see below). Though this is only a small amount of archaeological features from those mapped by the project, it shows that there is potential for sub-surface archaeology to be at risk in this area, an important outcome for managing this landscape.

In terms of military features, the major Second World War ammunition depot and associated railway sidings on Sandle Heath (1074600 – Figure 15), together with its branch line connecting it to the main railway to the north, dominates the north-western corner of Block 2, obscuring any potential earlier features. A second searchlight battery (1603365) which may be part of the network surrounding Macclesfield (see Section 7.1.4) is also present on the eastern edge of the mapping block. Finally, the Somerford Hall Camp School evacuee centre (1603415 – orange

hatched area in Figure 14) is visible on historic aerial photography as a compound with huts (many reused and extant on the latest 2010) and air raid shelters (now levelled), established as part of the 1939 National Camp evacuation scheme (Dobinson 2000, 82-83).

Figure 15. WWII ammunition depot with associated railway lines and sidings (1074600) located on Sandle Heath, visible on historic aerial photography.

RAF/106G/UK/645 RP 3076 11-AUG-1945. Historic England RAF Photography.

7.2.3 Block 2 Summary

Therefore, it is clear from the results of the project that though there is relatively limited archaeology visible on aerial imagery, the methods used to examine Block 2 suggest there is some potential for improving understanding of this long-standing pastoral landscape. Though cropmarks and soilmarks are unsurprisingly rare, the limited survival of earthwork remains also suggests that either the landscape has changed substantially since the medieval period, or few medieval or earlier sites existed. Though this interpretation may be biased due to the dearth of lidar imagery and specialist oblique photography for the bulk of the block, earthworks do appear to be restricted to small areas of survival, the exception being Somerford Park. Despite this, the results show a good general picture of how this lowland landscape has been managed and exploited over time, with the growth of aggregates extraction to the point where any archaeology

that there is may now be considered under some level of threat. This has implications for future heritage management within the block and for similar areas of the Cheshire Plain. Also, in light of the study, re-evaluation of some of the Schedulings (the barrow not seen on aerial imagery and the Capesthorne medieval settlement extents) may be required.

7.3 Block 3 – Warrington and the Mersey Valley

Block 3 was both the smallest sample area selected for the project and also covered a very different landscape – the flat, lowland Mersey valley and southern edge of the Lancashire coal measures (Sections 3 and 5). The threats too were different, with extraction being less of an impact on the landscape than urban expansion from nearby Warrington and St Helens and related infrastructure development (notably the M62 motorway's construction in the 1960s / 70s). Extremely little in the way of earlier earthwork and cropmark features had been recorded, with Scheduled monuments in the area restricted to three moated sites and a Second World War Pickett-Hamilton fort pillbox. Industrial remains (e.g. Bold colliery and power station - 533848) and military features (predominantly associated with the air force base at Burtonwood - 1390446) were therefore expected to dominate the mapping for the area. As a result, any new information provided for earlier landscapes would have a great impact on understanding and managing the landscape.

7.3.1 The pre-urban landscape

Only a single potential later prehistoric or Roman site has been identified by the mapping for Block 3, comprising a group of three curvilinear enclosures (1605220 – Figure 16), visible as cropmark ditches, located in the north-easternmost part of Block 3 and previously recorded in the HER (MCH8899). The three irregular enclosures are overlain by a later field boundary, also visible as a cropmark, and further medieval / post-medieval field boundaries are visible as both cropmark ditches and earthwork banks in nearby fields.

The modern field system is made up of mainly post-medieval arable or improved pasture and very few boundaries pre-dating this system or no longer in use were identified from aerial features. Many of the ditches that were visible were discounted as elements in the extensive modern drainage systems covering much of the area. Ridge and furrow was limited to small, isolated areas of medieval / post-medieval ploughing, much of it narrow in width and likely later land improvement as opposed to part of an extensive earlier arable field system. The greatest survival of this was in the north-western and central part of the project area, unsurprising given the urbanisation of Warrington to the south-east. The majority of the ridge and furrow identified was only visible as cropmarks and what earthworks that did survive on earlier photography have largely since been levelled. One group of interesting landscape features were the omnipresent small marl or gravel pits exploiting the glacial till, almost one per field (Figure 17). The majority of these measure less than 0.5 hectares and so only a limited number were mapped by the project

as per NMP scope. They do however represent a key feature when understanding the archaeological landscape for this project area.

Figure 16. Possible later prehistoric / Roman enclosure, with hints of further divisions (1605220), visible as cropmark ditches on specialist oblique photography.

NMR 2167-1132 13-JUL-1984 © Crown Copyright. Historic England

The only other main features from the earlier landscape that were mapped were the three previously known and Scheduled medieval moated sites (71694, 71853, 71862). These all consisted of a single rectilinear moat ditch, with only the northernmost (71862) also including an adjacent rectilinear fishpond. Though all appear to survive on the latest aerial photography, extensive tree and vegetation cover precludes assessment of the exact form and level of survival that the remains take, with only partial features visible on a combination of historic aerial imagery and lidar. Further ground-based assessment would be needed to ascertain the level of survival and identify any smaller internal or external features. The southernmost of the moats (71694) is now entirely surrounded by urban expansion from Warrington while the other two are located adjacent to modern farms.

Figure 17. Landscape view across north-western part of Block 3, towards Bold and Collins Green Collieries (top – 533848, 1605056), showing the modern field system and large number of small extractive marl or gravel pits covering the area.

EAW012290 26-NOV-1947 © Historic England

7.3.2 Modern industry, urbanisation and military remains

Alongside the smaller marl pits, larger scale extraction within this lowland landscape consists of some small post-medieval quarries (1605087, 1605208) in the north of the area and the southern edge of the Lancashire coal measures (Section 5.1), represented by the post-medieval / 20th century Collins Green colliery (1605056) and the larger Bold Colliery and power station (533848), continuing in use through to the late 20th century, both adjacent to the Liverpool and Manchester Railway (44232).

The large psychiatric hospital complex at Winwick (1075201 – Figure 18), replacing a smaller 19th century complex, was visible on historic aerial photography but has since been demolished and built over. It served as a military hospital during both world wars (McKendrick 2009) and also included its own railway branch line and sidings. Though not mapped by this project (apart from its WWII air raid shelters – 1605212) due to its depiction on OS, it forms a major part of the

landscape to the north of Warrington and should be included in any archaeological synthesis. The Burtonwood brewery (1539231) too, adjacent to Bold Colliery, forms part of the industrial landscape though was not mapped.

Figure 18. Oblique photograph of Winwick psychiatric hospital complex (1075201) located to the north of Warrington, within mapping block 3.

EPR000545 11-MAY-1935 © Historic England

As expected however, military remains dominate Block 3, with the largest Second World War airfield in Europe located at RAF / USAAF Burtonwood (1390446 – Figure 19), together with its auxiliary installations, taking up much of the central and southern parts of the project area and covering any potential earlier archaeological features visible on aerial photography. The airfield was mapped as a single outline including the entirety of the area within the perimeter fence at its maximum extents in the 1960s. Major structures such as runways, taxiways, hangars and aircraft dispersal areas were also depicted. The original runways of the 1940s wartime air base were mapped as one outline, with the later Cold War eastern extension to the runways added as a separate feature. The large military depot (1605262) to the south, which continued in use into the post-war period was mapped in a similar fashion but recorded as a separate site.

A number of the Second World War military camps affiliated with the airfield were included within the extent of feature and airfield record if they were located within the site's perimeter, and were not schematically depicted due to time constraints. A further two associated but separate camps to south (1462595) and north (1605126) were also visible on aerial photographs, the former having been mapped already by the North-West Rapid Coastal Zone Assessment and the latter mapped as seen. A heavy anti-aircraft battery (1605133) consisting of four gun positions and associated military buildings and structures located to the rear of the industrial works in the village of Burtonwood is likely associated with the protection of both the airfield and the surrounding urbanised areas. Another military compound (1605190) contained a building and two potential gunposts, to the immediate north-west of RAF Burtonwood. Finally, civilian air raid shelters

(1605067, 1605070, 1605125, 1605188, 1605189, 1605207, 1605211, 1605212, 1605213, 1605216, 1605270) located within the suburbs of Warrington and local villages were identified and mapped (when not already recorded by the NWRCZA), largely uniform concrete structures capable of serving an entire street, though with smaller earthen shelters associated with Penketh High School (1605189) and two houses in Burtonwood village (1605270).

Figure 19.The military airfield of RAF Burtonwood (1390446), north-east of Warrington, showing the main runways, hangars and building complexes, along with the adjoining camps to the south.

EAW012280 26-NOV-1947 © Historic England.

7.3.3 Block 3 Summary

Therefore, the mapping for Block 3 was largely as expected, with a low level of surviving features dating to the later prehistoric through to medieval periods and a high focus on later industrial and military activity. The enclosures in the north-east of the project area show that some areas have potential for preserving earlier sub-surface archaeology, as does the visibility of ridge and furrow as cropmarks across much of the area. Despite lidar coverage for over two thirds of the mapping block, earthwork survival was extremely limited, unsurprising given the high levels of land improvement, the large areas covered by military structures on even the earliest photography, and increasing urbanisation. Of note is the levelling of many of the few earthwork features remaining in the time since the earliest 1940s aerial imagery, showing that any archaeology surviving is under threat from modern land-use in this area. The three Scheduled moats are the only remaining earthwork sites from the pre-industrial landscape and sit as isolated fragments given the lack of preservation of their setting. Industrial and military sites dominate the survey

results, but even they are under threat, with many structures and buildings demolished and their sites built over. The expansion of the urban fringe of Warrington has already overtaken much of the former RAF Burtonwood, with its main runway now overlain by the M62 motorway. As a result, this landscape has shown that in parts of Cheshire, modern development is of serious threat to archaeological survival – monitoring and preservation by record is essential for the future management of this area.

7.4 Block 4 – West Cheshire Plain and the Dee Valley

The final mapping block was a lowland area of the western Cheshire Plain, defined by the River Dee (and national boundary with Wales) to the west and the mid-Cheshire Ridge to the east (Sections 3 and 5). This area was previously better known for its earthwork survival than the other project areas, with greater archaeological survival hoped for due to the lack of urban, industrial or modern development and its preponderance of largely little-improved pasture. It was also deemed to be under threat from recent mega-dairying practice and maize cultivation (Holgate 2015). The diversity of the known surviving archaeology is reflected in the Scheduled monuments, which range from the Bronze Age round barrows in Carden Park (1043363) and at Meadows Farm (68705) to the medieval moated site at Leahall Farm (68815), bridge at Farndon (68906), Shocklach Castle (68887) and settlement remains at Grafton (68913), Castletown (68914) and Overton (68710). It was decided during the course of the project to extend the mapping beyond the official designated linear edge of the project area to take the mapping up to the River Dee in the west and ensure no future gaps remained in the mapping for this part of Cheshire. Inclusion of the land within the meanders therefore added about 1km^2 in area to the mapping block.

7.4.1 Fragments of earlier landscapes

Block 4, like the previous mapping blocks, has a limited number of visible cropmarks dating to the pre-medieval landscape (Figure 20). These are all concentrated in the north-western part of the project area, on the flood plain of the River Dee (and also beyond the edge of the extensive surviving earthworks of medieval open field system, see Section 7.4.2 below). A rectilinear later prehistoric or Roman ditched enclosure (68832 – Figure 20) is one of these isolated cropmarks. Measuring approximately 35m in length, with rounded corners and an opening at one end and situated on a slight break of slope overlooking the river, it matches the morphology and dimensions of mortuary enclosures dating to the Neolithic found elsewhere in the country. If this is the case, it may be the earliest feature mapped by the entire project, though further work (including excavation) would likely be required to ascertain this, given the lack of comparable examples in the county. The remaining cropmarks consist of three ditched curvilinear enclosures or ring ditches (1606879, 1606888, and 1606889 – the latter two depicted in Figure 20) potentially representing later prehistoric / Roman enclosure or settlement remains, and a number of small enclosures further south and east (1606950, 1607142) of uncertain date. The fact that these cropmarks show up in fields devoid of extant earthwork ridge and furrow may indicate that further

subterranean survival of earlier remains is present across the area and is merely hidden beneath the surviving medieval landscape elsewhere.

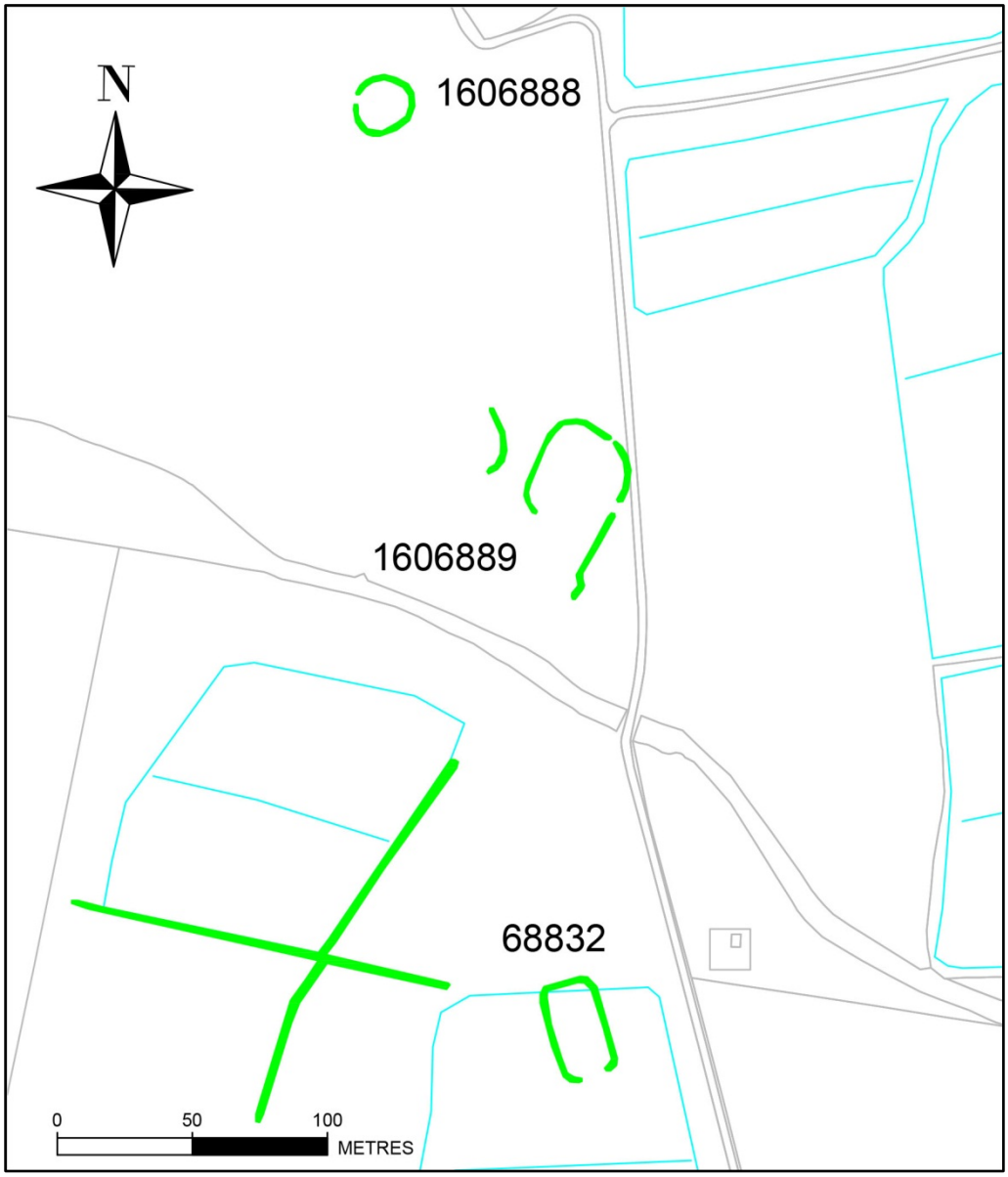

Figure 20. Project mapping depicting archaeological remains visible as cropmarks to the north-west of Farndon. Three potential later prehistoric sites are visible as fragmentary ditched features (green), including the rectilinear cropmark ditch (68832) which may represent a Neolithic mortuary enclosure. See Appendix 2 for NMP conventions.

Some isolated features surviving as earthworks may also give some insight into the features from the later prehistoric landscape. The aforementioned Scheduled bowl barrows in Carden Park (1043363) and south of Meadows Farm (68705) give insight into monumental funerary practice pre-dating the current landscape, located on the slightly higher ground to the east of the Dee flood plain. A further group of earthwork mounds of uncertain date or function (1607028) within

Mill Coppice to the west of Carden Park may relate to this period, or alternatively could be later features associated with parkland or industrial activities, as could a mound further south (1608108). A curvilinear enclosure of uncertain date (1585032), consisting of a low but extant earthwork bank and with an external ditch for its southernmost half is located on the western end of the village of Clutton. It is cut through by a ditch or trackway of probable medieval / post-medieval date (1607079) leading from the later manor house and may represent a feature from an earlier period or alternatively be part of the manorial compound.

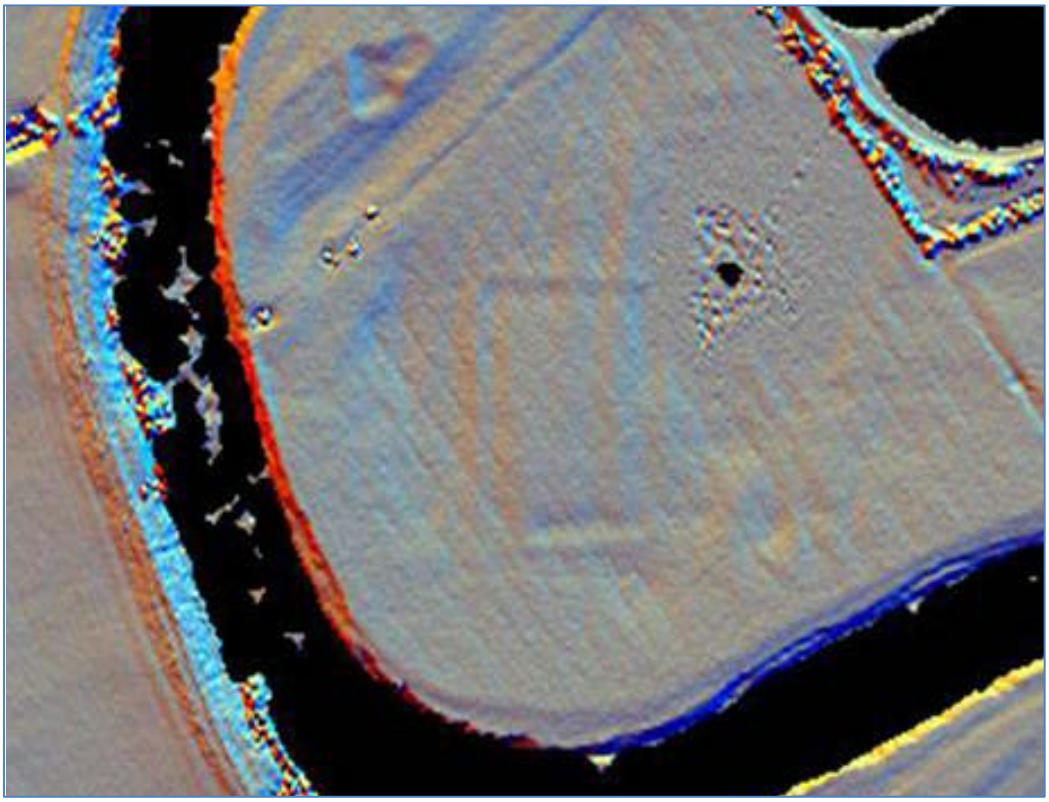

Figure 21. Lidar image showing the potential Roman fortlet enclosure (873449) overlain by medieval ridge and furrow (1606642) in a meander of the River Dee to the north-west of Farndon.

LIDAR SJ3955 Environment Agency FIRST RETURN 13-JUN-2006 © Historic England; source Environment Agency Geostore Survey Open Data.

Finally, Block 4 also contains possible features from the Roman period, the record for which has been negligible for the other three mapping areas in the project. A long, straight linear bank of uncertain date (1608040) running approximately south-east to north-west for over 1.2km is visible on lidar imagery and appears to align with the projected Roman road between Farndon and Tilston (1327385) and terminate close to the previously recorded Roman settlement site (873469) suggested as being 'Bovium' (though no remains pertaining to the latter were identified by the project). Another, shorter potential fragment of road agger (1608178) further south-east may represent a continuation of this route, which appears to have been reused in other parts by the modern road between Malpas and Farndon and also forms the edge of many later fields and land divisions. These potential road embankments would benefit greatly from further investigative work

and if confirmed, targets for statutory protection. In contrast, other roughly linear earthwork banks previously identified as potential roads or routeways were shown by the lidar to be parts of an alignment of fluvial or glacial deposits running approximately north-south through the middle part of the area.

A rectilinear enclosure (873449, MCH18023 – Figure 21) comprises a perimeter interior bank and external ditch, sited in a meander of the River Dee to the north-west of Farndon. It was mapped from historic aerial photography and lidar imagery by the project. Previously alternative interpretations include a medieval / post medieval enclosure or even a small Roman fort, though this was unsubstantiated. The enclosure has internal dimensions of approximately 78 x 50 metres. Features such as the external bank and ditch arrangement, rounded corners and opposing equidistant entrances would support the hypothesis of it being a Roman fortlet, though this would require substantiating with further investigative survey and possibly excavation. Nonetheless, the mapping has provided additional detail to the site's archaeological record. If confirmed, this site would be an important addition to the HER and is a candidate for designation.

7.4.2 Agricultural landscapes

The most extensive archaeological remains pertaining to past land-use for Block 4, and the entirety of the Cheshire NMP, belong to the medieval open field system which survives across the bulk of the mapping block (Figures 22 and 23). The majority of the ridge and furrow in Block 4, unlike for the other project areas, has its origins in the medieval period as broad and sinuous ploughing, in places narrowed and straightened in the post-medieval period. Only an extremely limited amount of the ploughing originates as post-medieval narrow improvement ridge and furrow. The ridge and furrow forms a coherent system of large open fields across around 90% of the project area, in places defining the later field system. The only substantial gaps within the ridge and furrow are along the edge of the floodplain of the River Dee to the north of Farndon, within parkland associated with Carden Hall in the eastern part of the project area and along the north-south line of Carden Brook, where there are areas of seasonal pasture (in places more recognisably water meadows e.g. 1608058). The ridge and furrow survives alongside substantial embanked plough headlands in places. Large numbers of medieval / post-medieval field boundaries are also visible as a mixture of earthwork and cropmark banks and ditches across the project area, many forming different phases of land division post-dating the earlier open fields, and others elements of the current field system which are no longer in use. One interesting feature (1606871) consists of a pair of parallel banks (and external ditches) running north-west to south-east which bifurcate to enclose a wider area. The features appear to be boundaries or divisions of some kind and look to be enhanced elements of the natural topography. This may represent an early phase of enclosure or specialised land use.

The current overwhelming land use across Block 4 is mildly improved pasture and only limited arable (Sections 3 and 5), and this has allowed the preservation of the earlier field system. The vast majority of the ridge and furrow therefore survives as extant earthworks on 1940s aerial photography, with the remainder in only isolated pockets visible as cropmarks. Approximately 70-

80% of the earthworks remain extant on the latest lidar imagery and aerial photography. The decision was made for the project to record ridge and furrow by creating a single monument record in the NRHE for each parish, appropriate for Block 4 give the lack of notable divisions between the areas covered by ploughing. Ridge and furrow directly associated with other remains such as notable field systems or settlements were recorded within those separate monuments.

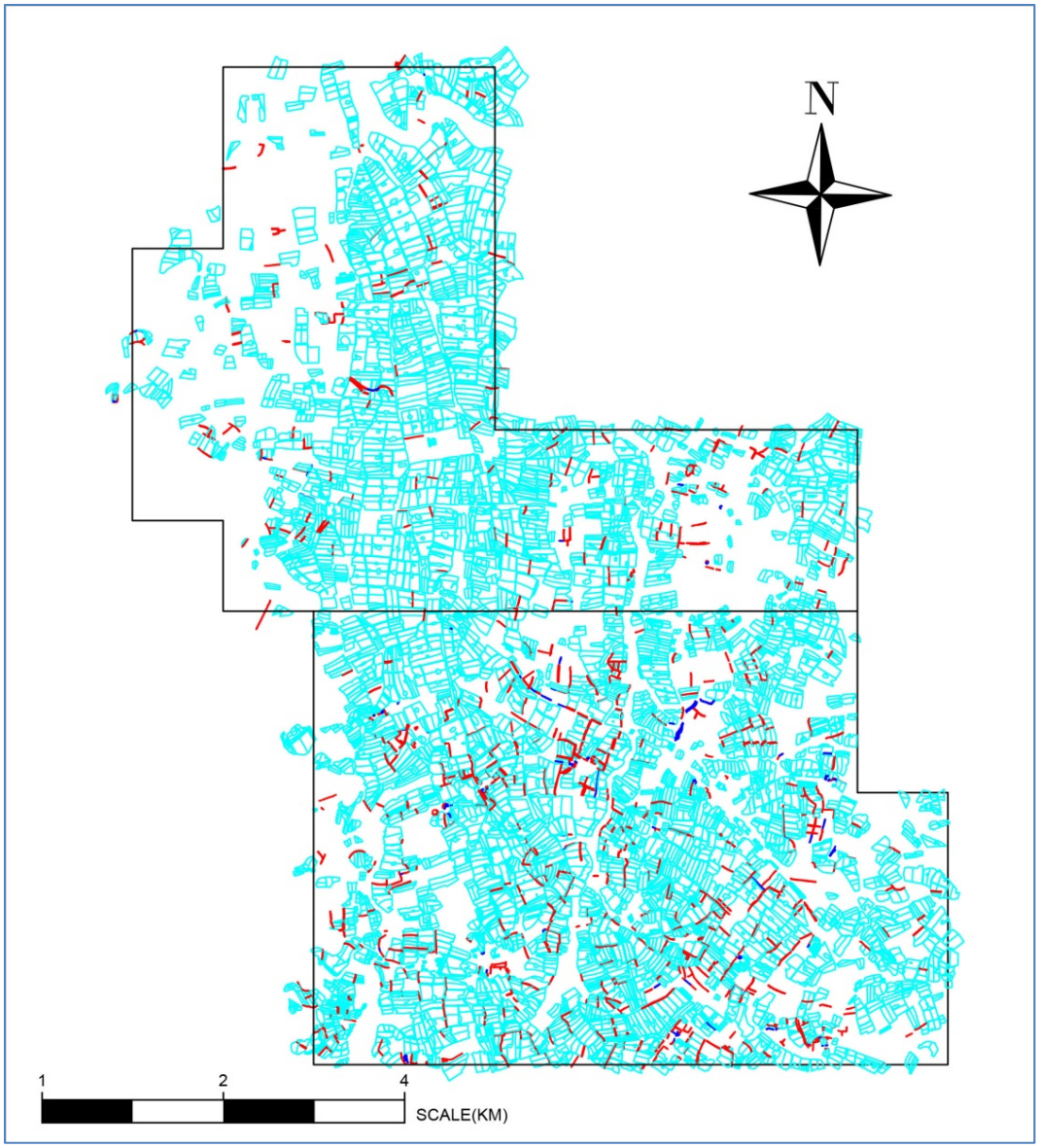

Figure 22. Project mapping of Block 4 showing the distribution of ridge and furrow ploughing (cyan) and associated banks including plough headlands and field boundaries (red and dark blue).

Project mapping © Historic England

Alongside the medieval field system, another major feature present across the entire landscape of Block 4 are small marl pits, many now ponds (Figure 23). As with Block 3 (Section 7.3.1), the majority of these measure less than 0.5 ha and were not mapped by the project. The sheer

number of the pits however, suggests that they were an important part of the earlier landscape, likely a method of improving soil fertility and drainage for agricultural purposes.

Figure 23. An area of medieval open field system and ridge and furrow in the north of Block 4, surviving as earthworks on 1940s photography, and also the small marl pits present in almost every field.

RAF-CPE-UK-1935 FS 2322 17-JAN-1947. Historic England RAF Photography.

Other subsidiary land-uses in Block 4 include a number of domestic mills with associated leat systems feeding off the natural drainage pattern (largely unmapped) and at least one post-medieval kiln with associated extractive clay pits (1608245). Small stone quarries in the hillier area in the east of the project area are present where the Cheshire Plain meets the lower slopes of the Mid-Cheshire Ridge (1607084 and 1608149). The groups of quarries also appear to correlate with the areas of landscaped parkland surrounding Carden Hall in the north-east and Edge Hall in the south-east, in which are notable absences of medieval ridge and furrow. A number of features associated with these small parklands have survived, despite subsequent extensive landscaping for the creation of golf courses. Alongside the aforementioned surviving Bronze Age barrow (1043363) in Carden Park are a number of circular platforms (1607083) which may be viewing platforms or other terraced garden features. Substantial boundaries comprising banks and ditches (1608153) survive in Edge Park, along with the garden terrace (1608155) constructed atop a low crag and providing views across the parkland. Finally, other potential land management features are large rectilinear mounds surrounded by shallow ditches (1585028, 1606790) and located in areas of woodland, possibly rabbit warrens or pillow mounds.

7.4.3 Settlement and high status sites

Alongside its extensive medieval / post-medieval landscape survival, Block 4 also has some of the best preserved earthwork settlement sites within the project. Three of these are already Scheduled (Castletown, Grafton and Overton), though the areas covered by the designations required modern assessment.

No remains directly associated with the major medieval township of Farndon, other than the Scheduled medieval bridge across the Dee (68906) and a number of the surrounding field boundaries and enclosures, were visible on aerial imagery. The bridge connects Farndon to the village of Holt, now in Wales, with the well-preserved stone footings of its castle guarding the river crossing from the west. This dual settlement was a key focus of the landscape in this border region during the medieval period, key to understanding the features mapped for Block 4 by the project.

Earthworks recently attributed to an abandoned medieval settlement from lidar imagery (1585020), to the south-east of Farndon have been shown through comparison with earlier aerial photography in the project to be more likely to be a surviving ditched field system alongside natural hollows. This shows the need for different datasets to be compared in order to properly interpret archaeological earthworks.

A large but dispersed complex of earthworks associated with medieval and post-medieval settlement and associated field system is centred on the modern hamlets of Caldecott Green and Castletown. Earthwork platforms and enclosures in a linear arrangement (68910) to the west of the present day Caldecott, a platform and enclosures around Caldecott Hall (1608014) and field boundary banks and ditches between them (1608019) show a complex of more intensive land division within the broader field system mentioned above. The earthworks of a number of platforms, tofts, hollow ways and enclosures (68914) to the east of Castletown were previously Scheduled as a shrunken medieval settlement. However, through aerial mapping, it is clear that the settlement remains themselves are far smaller than the Scheduled area, which includes parts of the surrounding field and trackway system (1607985, 1608025 and 1608027) and are therefore part of a wider landscape of medieval activity.

This activity extends to the nearby Shocklach Castle (68887 – Figure 24), also Scheduled, which undoubtedly influenced the location of the nearby settlement. Lidar imagery and aerial photography have shown that the motte and bailey, divided by the modern road, are more complex than previously recorded in the NRHE. The large mound, surrounded by a ditch and counterscarp bank, to the west of the road, may either be the motte associated with the detached bailey to the east or alternatively a different phase of activity or even a separate castle. This is reinforced by the fact that the ‘bailey’ is divided into a roughly circular mound and crescent-shaped area by a shallow ditch, and may be a castle in its own right. This change of interpretation would affect the nature of the Scheduling.

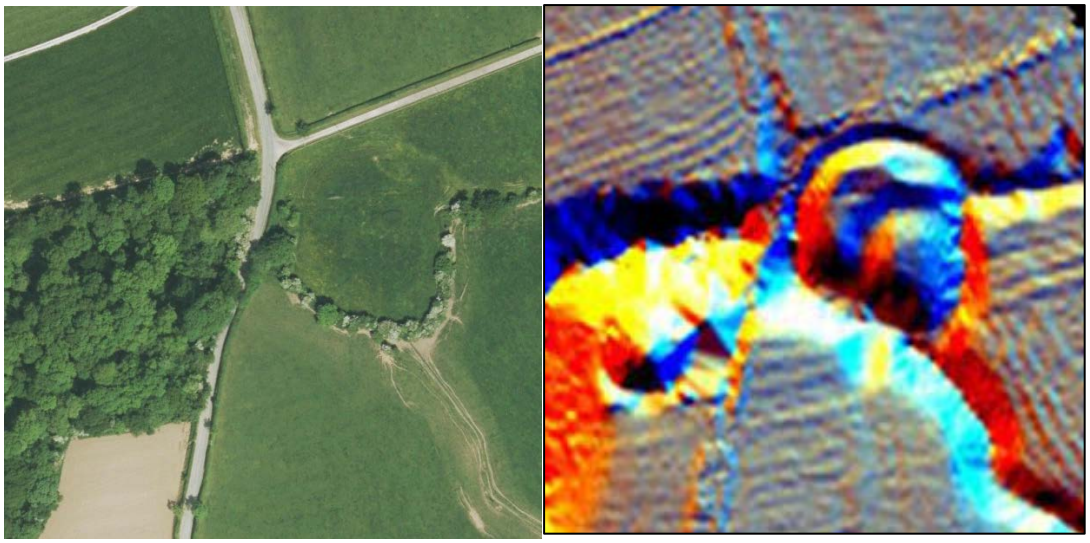

Figure 24. Orthorectified photograph showing 'bailey' of Shocklach Castle, with motte under tree cover (68887) [left]; lidar image showing the two parts of the castle ('motte' next to ravine on left, 'bailey' on right) [right].

Next Perspectives APGB Imagery SJ4350 09-JUN-2013. Image supplied to Historic England through the APGB agreement by Next Perspectives. © Bluesky International/Getmapping PLC; LIDAR SJ4350 Environment Agency LAST RETURN 13-JUN-2006 © Historic England; source Environment Agency Geostore Survey Open Data.

The complex of earthworks around Grafton Old Hall Farm (68913) to the east of Castletown appears to comprise a multi-phased settlement, with probable medieval enclosures and platforms to the west of the modern farm overlain by a later garden moat and associated drainage features (all including in the existing Scheduling). However, further platforms to the immediate north-east of the farm and more extensive boundaries and hollow ways to north-west and south-east are also part of the complex. This additional evidence suggests that the existing Scheduling requires some reappraisal. A similar situation with earthwork platforms and enclosures seemingly overlain by a later moated site (1608477) is found on the southern border of the project area, to the west of Shocklach Hall.

Other settlement remains include the number of platforms and adjacent hollow ways and pits (1585043) to the immediate north of Edge Grange, and the earthwork enclosures and platforms (1608450) to the south of the modern village of Shocklach, evidence of settlement shift. The aforementioned Scheduled medieval settlement at Overton (68710) was also visible on aerial photography and some limited lidar coverage, comprising a branching hollow way and an irregular arrangement of tofts, crofts, enclosures and small trackways, surrounded by a system of field boundaries and ridge and furrow (Figure 25). However, the aerial survey has shown that the earthwork complex extends further to the north and west, virtually encompassing the present day Overton Hall (though some has been removed by post-medieval quarrying), meriting substantial reconsideration and amendment of the Scheduled area.

In terms of further high status sites, the medieval moated complex at Leahall Farm (68815) comprises a well-preserved rectilinear moat with a further ditched appendix to the north, possibly

associated fishponds. The Scheduled area for this site remains accurate. The shallower rectilinear moat at Wetreins Green (68898) is less well-preserved and has been incorporated into later drainage networks, as has a potential moat (1608301) adjacent to (and partly overlain by) Horton Hall further south in Block 4. Finally, the complex of moats and associated drainage features and boundaries (68697) to the north-east of Chorlton Old Hall on the southern edge of Block 4 have previously been recorded as a medieval moat, parkland features and even a Roman temporary camp. Using aerial imagery, it is probable that the moat may originate in the medieval period but was subsequently adapted into features for the hall's landscape park, potentially water gardens.

Figure 25.Google Earth orthophotography showing the Scheduled part of the medieval settlement earthworks of Overton (68710), including the branching hollow ways, tofts and crofts.

EARTH.GOOGLE.COM 01-JAN-2005 ACCESSED 29-NOV-2016 © Getmapping PLC.

7.4.4 Military features

The final additional archaeological site mapped by the Cheshire NMP for Block 4 is a Royal Observation Corps underground monitoring post (1412979), dating to the Cold War and thus the most recent feature in the project area. It is located in the far northern part of the Block and was visible only as the concrete surface structures associated with the underground monitoring post, the perimeter enclosure, and an earlier raised 'orlop post', all now demolished. A second ROC monitoring post (1412963) is recorded in the south-eastern corner of the project area, to the north of Malpas but was not seen on aerial photography.

7.4.5 Block 4 Summary

It is therefore clear that this lowland pastoral landscape has high potential for preserving archaeological remains, as evidenced by the extensive and extant medieval field system and well-preserved settlement sites within this. However, this may be under threat from modern activities such as maize cultivation or the establishment of mega-dairies (Holgate 2015) and requires extensive management, which will hopefully be assisted by the mapping produced by the project. The project area includes some of the earliest archaeological sites, showing as cropmarks and revealing that earlier features can survive below the medieval landscape, adding to the importance of the area. It also contains some important potential Roman remains, still extant earthworks, which require further work and in the case of the fortlet, with potential for Scheduling outcomes.

Alongside the favourable topography, geology and modern land-use, mapping of this extensive archaeological landscape has been greatly assisted by the broad coverage of well-lit 1940s photography and large amount of 1m resolution lidar data, producing the most detailed and complex archaeological mapping for the entire project. This also has great potential for calculating the level of loss of archaeological remains over the latter half of the 20th century, and ascertaining the modern threats posed to archaeology in the project area.

8 OUTCOMES AND DISCUSSION

8.1 Discussion of Project Results

The project has revealed the diverse nature of archaeological remains (Appendix 5) and variety of landscapes, current and past, surviving across Cheshire, ranging from the uplands of Block 1 to the lowland pastures and rolling topography of Blocks 2 and 4, and the wide estuarine river valley in Block 3.

All four mapping blocks have revealed little in the way of later prehistoric or Roman sites, with isolated bowl barrows and a handful of potential enclosures visible as earthworks or cropmarks. The potential Roman road and fortlet in Block 4 are the only major features from this period for the entire project, their survival likely being due to the overall better survival of archaeological remains in that mapping block (and possibly also due to proximity to the major Roman centre at Chester). The lack of survival of early archaeological sites thus appears consistent across the various landscapes in Blocks 1-3, irrespective of modern land-use, geology or topography. The dearth of later prehistoric and Roman sites appears consistent with what was previously known for the rest of Cheshire (Rob Edwards, pers.comm) and so would seem to confirm this trend.

Given that a small number of funerary monuments and potential later prehistoric / Roman enclosures do survive as upstanding earthworks in Blocks 1 and 2 and that there is also a lack in intensive medieval or later agricultural improvement across these areas, the overall paucity of extant remains is possibly at least partly the result of a lack of intensive activity in these periods. Block 1 is within a marginal upland landscape and this is perhaps not surprising. However, Blocks 2, 3 and 4 have much more potential for past exploitation given their geology and topography, which are more favourable for agricultural activity. It may be that the combination of geology, soil and the damper prevalent climate caused by Cheshire's position is not conducive to formation of good cropmark or parchmark development and that such remains survive beneath the surface. The lack of Roman remains, particularly for Blocks 3 and 4, is interesting given the importance of Chester as a Roman fortress and town. Whether this lack of contemporary settlement is related to military control of the landscape is a hypothesis that would need further research. Certainly, the settlement postulated as 'Bovium' (873469) identified from finds evidence and excavation to the immediate north-west of Tilston in Block 4, suggests that further settlement activity was present in this landscape, though nothing was visible on aerial imagery.

Medieval and post-medieval landscapes vary greatly between the different project areas, largely due to the different natural characteristics of those regions, and reflected in the modern landscape uses for Blocks 1-3. Block 1 is therefore a primarily moorland and rough pastoral landscape with large fields (where present) and extractive industries (stone and coal), the limited remains surviving primarily as earthworks. Blocks 2 and 3 are lowland environments, the former dominated by pasture and the latter by arable. Ridge and furrow in all three of these blocks survives mainly only as isolated fields of medieval / post-medieval land improvement. Block 4 contrasts significantly from the broader pattern, with its extensive broad medieval ridge and

furrow open field system covering the majority of the block and greatly influencing the present field system of fields, despite the reversion to pasture. Block 4 unsurprisingly also has the greatest survival of earthwork settlements and field systems.

Marl or gravel pits are another important land use across the river valley environments around the Mersey and Dee (Blocks 3 and 4 respectively), whilst stone quarrying is present in Blocks 1 and 4, and sand and gravel extraction is a major threat to archaeology in Block 2. Early coal mining is present in Block 1, with the fringe of more intensive later coal extraction (the Lancashire coal measures) in the north-west of Block 1 and also present and an important activity in the north of Block 3.

Later features are present across all of the blocks, with parkland features (when in NMP scope) associated with the larger upland estates of Block 1 and smaller parklands present in Blocks 2 and 4. Military features are also present in all four project areas, with searchlight and anti-aircraft batteries and a Cold War ROC monitoring post, alongside the larger sites of the Sandle Heath ammunition depot in Block 2 and RAF Burtonwood and its affiliated sites in Block 3. The only Second World War civilian air raid shelters are unsurprisingly only located around the more urbanised and industrial Warrington mapping block.

The amount and quality of different sources of aerial imagery across the four areas did vary, notably the coverage of lidar. The areas with less lidar (Blocks 2 and 3) unsurprisingly had less earthwork archaeology recorded, though whether this dearth can be entirely blamed upon lack of lidar as opposed to modern land use and earthwork survival is unlikely. Lack of lidar in Block 1 for much of the moorland environment may have resulted in the lack of new sites being identified, whilst the wide coverage in Block 4 was extremely useful for the large-scale earthwork survival. Vertical aerial photography was generally consistent, with the highest quantity for Block 3 (though less useful due to dominance of urban areas) and with good quality, well-lit runs from 1946 or the early 1950s being extremely useful for those areas covered. Past flying for specialist oblique photography has been limited across much of Cheshire, at least partly due to the impact of Manchester Airport's flight paths. This potentially has impacted upon the amount of archaeological cropmarks photographed, though the lack of arable landscapes (other than Block 3) suitable for cropmark development is likely the predominant reason for this.

On the whole, the landscapes for all four blocks have developed as a result of a slow process of exploitation, resulting in predominantly pastoral (or in the case of Block 3, arable) fields. Levels of intensification or land improvement between the earliest 1940s photography and the latest 2008-2013 orthophotography have increased, resulting in the levelling of some unprotected features and sites, most noticeably in Blocks 2 and 3. There has been some levelling in parts of the wide medieval earthwork landscape in Block 4 and this archaeology is therefore deemed to be at risk. Though continuing stone quarrying and small-scale urban expansion in Block 1 will impact upon the landscape, the results of the survey show that archaeological features, predominantly in more upland environments or parkland, are unlikely to be at immediate risk. Conversely, modern sand and gravel extraction in the western part of Block 2 has removed archaeological remains already

and the scale of the industry means that any archaeology that survives is under threat. Block 3 is undoubtedly the landscape at most risk from development, primarily urban expansion and infrastructure construction, with the increase in the areas of the suburbs of Warrington markedly noticeable between the 1940s and 1990s and further projects underway. The military remains of RAF / USAAF Burtonwood have already been largely demolished and parts subsumed into the greater urban area. Agricultural intensification is also most marked in this area, levelling what little earthworks had still remained in the mid-20th century. Some of the more extensive archaeological remains of Block 4 have been levelled by land improvement since the earliest imagery, though lidar has shown that a very large proportion still remains extant to varying degrees. There is further risk to this landscape however from the aforementioned threats of mega-dairy establishment and maize cultivation.

8.2 Scheduling Outcomes

In terms of sites deemed to be of national significance, the project provided mapping of 24 Scheduled monuments and 1 Listed building. List Entry numbers are enclosed in square brackets below. Of these, the majority were Bronze Age round barrows or cairns or medieval moated sites, none of which require amendments to the designation in the National Heritage List of England. Though earthworks were shown to extend beyond the Scheduled areas for the medieval settlements at Grafton Old Hall [1011031] and Overton [1016589] by the mapping, the current List Entries explain the reasoning for their exclusion.

Four bowl barrows [List Entries 1007380, 1007381, 1007382, 1007383] in Knightslow Wood in Lyme Park (Block 1) were not seen due to tree cover and so not mapped, whilst another bowl barrow [1007400] south-west of Birtles Hall (Block 2) was not seen on any aerial imagery and may require reassessment.

The Scheduled medieval settlement remains [List entry 1016590] in the park of Capesthorne Hall in Block 2 has potential for reassessment. The project has added mapping to the site identified in the List Entry, though only the hollow ways and three potential platforms were visible from aerial imagery. There is also mapping for further earthworks extending beyond the estate's lakes to the south-west which may be a medieval continuation of the settlement and its field system and may inform the interpretation of the site.

Similarly, the Scheduling for the medieval settlement at Castletown [1016588] in Block 4 possibly needs a reassessment. The current designated area extends beyond the earthworks identified by this project as pertaining directly to settlement, to include an area of the field system to the north. However, it does not take into account equally associated and well preserved remains to south and west. The List Entry does not refer to any existing earthwork survey so the project mapping may be a useful resource in any potential re-evaluation.

Finally, the Scheduled area of Shocklach Castle [1012620] appears correct and the mapping produced by the project will add little additional detail to what is already known, but the List Entry may need updating and further researched to include the possibility that the site is made up of two separate castles rather than one motte and bailey.

8.3 Significance of the Project Results

Sites of regional significance without current statutory protection include the potential Neolithic mortuary enclosure (68832) and possible Roman road embankment (1608040) near Tilston and fortlet (873449) beside the River Dee in Block 4, which have a need for further research and potential for assessment for designation.

The funerary monuments identified by the project primarily comprise round / bowl barrows or cairns. Though the most common form of prehistoric funerary monument in England (Historic England 2012a) and with no examples identified by the project showing a high level of morphological complexity, the general lack of later prehistoric remains identified by the project makes any surviving extant examples an important part of the archaeological landscape. Unsurprisingly, given its topography granting high levels of visibility and a marginal landscape unsuited to arable agriculture, the greatest number survive in Block 1 on the high moors within, and south-east of, Lyme Park. Examples elsewhere in Blocks 2 and 4 are almost exclusively preserved in parkland estates such as Capesthorne and Carden Parks. If the aforementioned cropmark enclosure (68832) north-west of Farndon is indeed proven to be a Neolithic mortuary enclosure, this type of early funerary monument is extremely rare in Cheshire and is thus highly significant.

The discovery of a number of small later prehistoric and / or Roman settlements or enclosures provided by the project is also significant to Cheshire, given the dearth of such features within the county. The examples in Block 1 at Rainow, Lower Windyway farm and on the high ground above Lyme Park do not form a coherent morphology, with differing dimensions and perimeter bank and ditch arrangements, seemingly more influenced by the local topography than any particular function. There are also no coherent wider field systems to contextualise the enclosures, though they do appear distinct from the present system of medieval / post medieval landscape division. Similarly, the group of larger ditched enclosures surviving as cropmarks to the north-west of Winwick (1605220) is of a different phase to the modern field system though no comparable regional examples hinder interpretation beyond a similarity to later prehistoric / Roman examples found further south in the country. The cropmarks to the north-west of Farndon in Block 4 are similarly isolated survivals, though their location beyond the edge of the widespread surviving earthwork ridge and furrow hint at the potential for features surviving beneath the medieval landscape. Though the later prehistoric settlement or agricultural remains are therefore not particularly informative about wider landscape trajectories during this period and do not necessarily fit easily into Historic England's relevant selection criteria for designation (Historic

England 2012b; 2013b), they are extremely important foci for future research into the pre-medieval landscape of Cheshire.

The extant medieval field system covering much of Block 4 is of great significance to the region, given the relative scarcity of medieval ridge and furrow across the rest of Cheshire. The use of an open field system similar that to found elsewhere in England appears confined to the south-western part of the Cheshire Plain, with no evidence for extensive medieval ridge and furrow visible in any of the other project areas, extant or levelled. Indeed, Block 2 is similar in topography and modern land-use but has very little medieval survival. This may therefore indicate a different in land use, ownership or management in the Farndon-Tilston area during the medieval period than in the remainder of the county. The surviving settlement remains, moated sites and motte and bailey at Shocklach add focal points in the wider landscape, offering a glimpse into a rare, well-preserved and relatively complete medieval landscape. Given the fragmentary nature of earlier field divisions in Blocks 1-3, the relict field system boundaries (1603418) in Somerford Park in Block 2 are of significance, hinting at the potential nature of the earlier landscape in eastern lowland Cheshire.

Though not particularly unusual for upland areas nationally (Historic England 2013a), the small early pits and spoil heaps associated with coal mining on the higher moorland of Block 1 is an important part of the historic landscape of eastern Cheshire and is of significance to this edge of the Peak District. It shows the early stages of an industry which later shaped much of the northern part of the county, as shown by the large collieries in the northern parts of Blocks 1 and 3. Finally, the military site of RAF Burtonwood and its associated satellite installations such as the anti-aircraft battery and temporary camp to the north of the airfield form an integral part of the history of the Warrington area and any remaining features must be considered locally significant to the town and its environs. As the largest wartime airfield in Europe, the site can also be considered nationally important. This importance continues into the Cold War, with the airfield playing an important role in the Cold War military strategy for the United States Air Force.

The project has sampled four different landscapes within Cheshire – the upland fringe of the Pennines in the east, two parts of the lowland Cheshire Plain (east and west) and the lowland valley of the Mersey and southern edge of the Lancashire coal field in the north of Cheshire. Block 1 is the largest of the four mapping blocks and is largely comparable across its extent in terms of features visible. It is therefore likely that its findings are largely representative of the types of archaeological sites and features visible on the edge of the uplands and the south-western foothills of the Pennines which dominate this eastern part of the county.

In contrast, Blocks 2 and 4 are both landscapes of low rolling topography and pasture at opposite ends of the vast Cheshire Plain which dominates the central and southern parts of the county. However, though the natural topography, modern day landscapes and settlement pattern appear similar, archaeological survival varies significantly between the two blocks. The extensive medieval field systems and small number of earlier sites surviving in Block 4 varies significantly with the relative paucity of earlier remains visible to the east in Block 2. Whether this is evidence

of a difference in archaeological survival or in past activity from west to east across the Cheshire Plain is an important question raised by the project. Further work would therefore be required in order to understand the wider use and exploitation of the Cheshire Plain as a whole and understand the archaeology of those areas not covered by the project. Additional large-scale survey may be able to identify the point at which this substantial change in archaeological survival occurs and whether the extensive extant earthwork remains in Block 4 are limited to the part of lowland Cheshire dominated by the Dee Valley, or extend to the Mid Cheshire Ridge and beyond.

The lack of visible earlier archaeology and dominance of industrial and military remains in the mapping block around Warrington is not surprising given the higher levels of arable agriculture and more recent industrialisation and urbanisation in this northern part of Cheshire. Similar modern landscapes and natural topography can be found along the northern part of the county, extending towards Greater Manchester in the east and Ellesmere Port and Liverpool in the west, and it is probable that similar levels of archaeological survival and types of archaeological site will be found in this band of development dominating northern Cheshire.

Consequently, though the project's results provide insight into the wider trends of archaeological survival and variation in past landscapes across Cheshire, it also raises important questions regarding the remainder of the county and the need for further work to understand the broader trajectories pertaining to the archaeology of the region.

8.4 Broader Project Outcomes and Future Research

The number and diversity of monuments recorded by the project was extremely varied between mapping blocks, with Blocks 1 and 4 having much more in the way of archaeological features visible on aerial imagery than Blocks 2 and 3. However, on the whole, each block has provided a good overview of the surviving evidence for past activities and features in their varied environments, giving an important assessment of some of the main types of archaeological landscape within Cheshire. The mapping and associated records have also produced a tool which is intended to be useful as a baseline for future archaeological work and in monitoring development, and thus will be important for heritage management. This is important for Blocks 1 and 2, where the distribution and nature of archaeological survival was previously little known, Block 3 due to the pressures of development and is especially notable for Block 4, where the extent and level of earthwork survival can now be more easily quantified.

Block 1 created 306 new records and amended 23 in the NRHE database, with 296 of those new to the HER, while Block 2 created 113 new and 11 amended NRHE entries with 110 of those not previously recorded. Block 3 was the smallest area but also had a relatively low number of created records (39 new and 6 amended in NRHE, with 40 new to HER) whilst Block 4 had a large number of records (268 new entries / 21 amendments, or which 268 were new to the HER). Alongside the Cheshire HER maintained by CAPAS, the project did liaise with the Peak District

National Park due to much of Block 1 also falling within their purview. Due to time and cost implications for the National Park Authority however, though they were informed of the progress of the project and the results of the mapping block, they were unable to formally take the data created by the project and CAPAS is therefore the sole local authority holder of the results of the project for management purposes.

In terms of further work, research and reassessment for some of the already Scheduled monuments and the potential for assessment for addition to the NHLE of sites such as the Roman fortlet in Block 4 are discussed above. Further site-based work on key sites, notably in Blocks 1 and 4 could better investigate the nature of sites and assess their function and history, tying in with the wider landscape context mapped by the NMP.

Some key research questions or themes have been raised by the results of the project:

- Why are the remains of the later prehistoric and Roman landscapes so fragmentary? Is it a result of an absence of past activity, lack of visibility due to the environmental conditions of Cheshire hindering aerial survey, or lack of archaeological survival due to later land use? The fact that some isolated features have been mapped, including sites identified through excavation but not visible on aerial imagery, suggests that earlier sites do survive. Further research and other forms of ground-based investigation such as geophysical survey or excavation may assist with this.

- What is the reason for the extensive medieval open field system around Farndon and Tilston? How far does this landscape extend and why is it not found in other parts of Cheshire? Documentary research or more in-depth investigation into environmental data or the settlement and high status sites within the area may shed some light on this.

- As with later prehistoric and Roman remains, why is there an absence of medieval sites or landscape features in Blocks 1-3? Is this primarily due to continuity of land use, division and settlement into the present or is it due to extensive removal of earlier features? Ground-based investigation may assist with this, as would excavation and dating of extant field boundaries to ascertain their age.

- How do the findings of the sample landscapes covered by this project apply to the rest of Cheshire (see Section 8.3)? The mapping blocks were chosen as a representative sample of the different topographies and landscape types within the county but how far can the results be applied to wider Cheshire? Where does the difference in archaeological survival across the Cheshire Plain shown by Blocks 2 and 4 occur, and does the landscape vary significantly in other parts of lowland Cheshire or across the Mid Cheshire Ridge?

Engagement with local interest groups or academics at the University of Chester could bring in other forms of expertise and local experience, resulting in in-depth local studies using map

regression and documentary analysis, particularly for the many parkland areas across the blocks where archives may be more extensive. Field-walking, data collected from metal detectorists by the Portable Antiquities Scheme, and geophysical survey have previously picked up sites (e.g. the Roman site postulated as Bovium (873469) in Block 4) which were not visible on aerial sources and may be useful for the areas of the Cheshire Plain where extensive medieval or post medieval landscapes survival may conceal subterranean later prehistoric and Roman activity.

Finally, a second phase of NMP aerial mapping for Cheshire has been discussed as part of the management of this project, taking in the landscapes around Chester itself (with both a higher potential for Roman activity and the possibility of continuation of the impressive remains from the final mapping block of this project) and other different topographic environments important to understanding Cheshire's archaeological past, such as the Mid Cheshire Ridge itself. This survey may also assist with answering some of the research themes raised during the current project.

8.5 Concluding Remarks

Although the results of the project have been variable between the different mapping areas and have not produced the same quantity of new sites and features as in some of the other NMP projects in the north of England, they have been extremely useful in terms of understanding the nature and distribution of archaeological remains visible from aerial sources in the very diverse environments which make up Cheshire. This has significantly improved the archaeological record and understanding of past landscapes for the region and produced mapping which will be a useful heritage management tool in future for both CAPAS and people in Historic England. This also impacts on the understanding of the wider North-West / West Midlands regions, complementing existing comparable datasets in neighbouring counties for an area with little previous work of this type and providing a number of research themes for further research.

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APPENDIX 1 1:10,000 MAP SHEETS

MAP	BLOCK	AUTHOR	Km Squares	Collection Numbers:
SJ 35 NE	4	IH	1	
SJ 44 NW	4	IH	6	
SJ 44 NE	4	IH	8	
SJ 45 SW	4	IH	18	NRHE Parent Collection: EHC01/239
SJ 45 SE	4	IH	16	
SJ 45 NW	4	IH	14	NRHE Event: 1596452
SJ 58 NE	3	IH	6	
SJ 59 SE	3	IH	19	
SJ 69 SW	3	IH	3	
SJ 86 SW	2	IH	3	
SJ 86 NW	2	IH	15	
SJ 86 NE	2	IH	1	
SJ 87 SW	2	IH	15	
SJ 87 SE	2	IH	5	
SJ 87 NW	2	IH	3	
SJ 87 NE	2	IH	1	
SJ 97 SW	1	IH	3	
SJ 97 SE	1	IH	15	
SJ 97 NW	1	IH	5	
SJ 97 NE	1	IH	25	
SJ 98 SW	1	IH	4	
SJ 98 SE	1	IH	20	

Though 1:10,000 scale Ordnance Survey quarter sheets are no longer used as part of the mapping process or during selection of project areas, as they had been with previous NMP projects, the figures for numbers of records created per annual quarter and submitted to Historic England were divided by quarter sheet. Hence, the inclusion of this appendix. In total, 1 full and 21 partial quarter sheets were covered by the project.

APPENDIX 2 AUTODESK MAP LAYERS AND DRAWING CONVENTIONS

Layer Name	Layer content	Attached data tables	Layer colour	Line type
0	None (AutoCAD Map 3D 2015 requirement)	none	7 (white)	CONTINUOUS
BANK	Closed polygons for features such as banks, platforms, mounds and spoil heaps	MONUMENT	1 (red)	CONTINUOUS
DITCH	Closed polygons for cut features such as ditches, ponds, pits or hollow-ways	MONUMENT	3 (green)	CONTINUOUS
EXTENT_OF_FEATURE	Closed polygons outlining complex or extensive remains such as mining or military installations	MONUMENT	30 (orange)	CONTINUOUS
MONUMENT_ POLYGON	Closed polygons encircling all the features recorded within a single NRHE record	MONUMENT	7 (white)	CONTINUOUS
RIDGE_AND_FURROW_ALIGNMENT	Polyline showing the direction of ploughing of ridge and furrow	MONUMENT	4 (cyan)	CONTINUOUS
RIDGE_AND_FURROW_AREA	Closed polygon defining the furlongs or extent of area of ridge and furrow	MONUMENT	4 (cyan)	CONTINUOUS
STRUCTURE	Closed polygons for built features including concrete, metal and timber constructions such as military installations	MONUMENT	190 (purple)	CONTINUOUS
THACHURE	Polyline T-hachure convention to schematize sloped features indicating the top of slope and direction of slope	MONUMENT	5 (blue)	CONTINUOUS

APPENDIX 3 AUTODESK MAP DATA TABLES

MONUMENT DATA TABLE

The Monument Data table consists of nine fields that were input directly through AutoCAD Map 3D 2015. The content of these fields follows those that are entered in the NRHE database.

FIELD NAME	FIELD CONTENT	Sample data
MONARCH	NRHE Unique Identifier (UID)	68887
PERIOD	Date of features (HE Thesaurus)	MEDIEVAL
NARROW_TYPE	Monument type (HE Thesaurus)	MOTTE
BROAD_TYPE	Monument type (HE Thesaurus)	CASTLE
EVIDENCE_1	Form of remains (HE Thesaurus) as mapped	EARTHWORK
PHOTO_1	Reference for the photograph / image from which the feature was mapped and the date of the source	LIDAR SJ4350 Environment Agency LAST RETURN 16-FEB-2001
EVIDENCE_2	Form of latest evidence (HE Thesaurus) as mapped	LEVELLED EARTHWORK
PHOTO_2	Reference for the photograph / image from which the latest evidence was taken	Next Perspectives APGB Imagery SJ4350 09-JUN-2013
HER_NO	Cheshire HER record number where applicable.	MCH1397

APPENDIX 4 PROJECT SCOPE

The scope of the project, derived from the standards laid out by the National Mapping Programme (Winton 2015), is as follows:

Earthwork archaeology

All earthworks identified as archaeological in origin were mapped, including those since levelled or buried. Where the quality of the photography was insufficient to trace individual earthwork features with certainty or post-medieval sites were deemed too complex to be fully mapped within the time constraints of the project, these were mapped as an extent of area. These include complex braided trackways thought to be primarily of post-medieval date.

Levelled archaeology

All cropmarks, soilmarks and parchmarks identified as archaeological in origin were mapped and recorded.

Post-medieval and modern field boundaries

Identified post-medieval and modern field boundaries (upstanding or levelled) that are depicted on first edition Ordnance Survey or later edition maps were generally not mapped, except to provide a wider context for field systems not mapped, or where found to truncate archaeological features.

Medieval and post-medieval ridge and furrow

All ridge and furrow was mapped: this was depicted as an outline of the extent of area and the direction of ploughing indicated by a single line. Ridge and furrow of probable medieval date was indicated by wide, curving, usually s-shaped ridge and furrow earthworks and headland banks, whilst post-medieval ridge and furrow is usually indicated by narrow, straight ridge and furrow earthworks. Where medieval ridge and furrow appeared to have been reused, as indicated by split ridges visible as narrower, curving ridge and furrow earthworks, or where the date of the earthworks was uncertain, these were dual indexed as medieval/post-medieval date.

Industrial features and extraction

Small-scale extractive pits of less than 0.5ha were not mapped unless the extraction impinged on existing archaeological features, or was visibly associated with other elements, such as limekilns. Many of these unmapped small extractive gravel or marl pits were visible in Blocks 3 and 4, blanketing large parts of the project areas. Small early coal extraction in Block 1 was mapped as seen. Larger extraction sites such as quarries and collieries greater than 0.5ha were mapped and recorded only as an extent of area, irrespective of if they were depicted on any Ordnance Survey map. Earthwork and structural features within these complexes were only mapped if considered

to be of archaeological significance. Urban industrial sites and mills depicted on Ordnance Survey were not mapped.

Buildings

The foundations of buildings visible as cropmarks, soilmarks, parchmarks, earthworks or ruined stonework were mapped and recorded, except when they were depicted on first edition Ordnance Survey or later edition maps. No medieval buildings, ruined or extant, were located within the project area. Roofed or unroofed standing buildings or structures were generally not recorded unless they fell within the sphere of NMP interest, usually associated with parkland or military remains.

Parkland, landscaped parks, gardens and country houses

Post-medieval landscape and garden features visible as earthworks, cropmarks, parchmarks and structures were only mapped if previously unrecorded by first edition Ordnance Survey or later edition maps.

Geological features

In line with NMP practice, geological features were not mapped. These may be described within monument records, for example where close proximity potentially affects the accuracy of the interpretation.

APPENDIX 5 MONUMENT TYPES USED IN THE PROJECT

ADIT
AIR RAID SHELTER
AMMUNITION DEPOT
ANTI AIRCRAFT BATTERY
ANTI AIRCRAFT BATTERY COMMAND POST
ANTI AIRCRAFT GUN EMPLACEMENT
BAILEY
BANK (EARTHWORK)
BARBED WIRE OBSTRUCTION
BELL PIT
BELVEDERE
BOUNDARY
BOUNDARY BANK
BOUNDARY DITCH
BOWL BARROW
BRICK KILN
BRICKFIELD
BRICKWORKS
BUILDING
BUILDING PLATFORM
CASTLE
CIRCULAR ENCLOSURE
CLAY PIT
COAL MINING SITE
COLLIERY
CROFT
CURVILINEAR ENCLOSURE
DAM
DEER HOUSE
DEER PARK
DEER POUND
DITCH
DRAIN
DRIVE
EMERGENCY WATER SUPPLY
ENCLOSURE
EVACUEE CENTRE
EXTRACTIVE PIT
FIELD BOUNDARY
FIELD SYSTEM
FISHPOND
GARDEN FEATURE
GAZEBO
GRAVEL PIT
GUNPOST
HANGAR
HOLLOW WAY
KILN
LANDSCAPE PARK
LEAT
LODGE
LYNCHET
MILITARY AIRFIELD
MILITARY BUILDING
MILITARY CAMP
MILITARY DEPOT
MILITARY ROAD
MILL
MILL POND
MOAT
MOTTE
MOUND
NARROW RIDGE AND FURROW
ORNAMENTAL LAKE
PEAT CUTTING
PILLBOX
PIT
PLATFORM
PLOUGH HEADLAND
POND
QUARRY
RAILWAY
RAILWAY SIDING
RECTILINEAR ENCLOSURE
RIDGE AND FURROW
RING DITCH
ROAD
ROUND BARROW
ROUND CAIRN
ROUND HOUSE (DOMESTIC)
ROYAL OBSERVER CORPS SITE
RUNWAY
SAND AND GRAVEL EXTRACTION SITE
SEARCHLIGHT BATTERY
SEARCHLIGHT EMPLACEMENT
SETTLEMENT
SHAFT
SHAFT MOUND
SPOIL HEAP

STANDING STONE

STRUCTURE

TAXIWAY

TEMPORARY CAMP

TOFT

TRACKWAY

TRAMWAY

TRENCH

UNDERGROUND MONITORING POST

WATCH TOWER

WATER CHANNEL

WATER DISPOSAL SITE