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Haldon Ridge to Dart Valley, Devon: Aerial Investigation and Mapping Survey

Cain Hegarty, Stephanie Knight & Richard Sims

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SUMMARY

The area of South Devon between the coast and Dartmoor National Park is a landscape of high archaeological potential, demonstrated by the good visibility of archaeological cropmarks and survival of nationally significant earthworks. It faces demands from agriculture, industry, forestry and increasingly, development pressures.

This report synthesises the results of an aerial investigation and mapping survey (formerly called National Mapping Programme [NMP]) for an area of 290.5 square kilometres from near Haldon Ridge in the east to the Dart Valley in the west, the easternmost of three survey areas proposed for the area between the South Devon coast and Dartmoor National Park.

The survey assessed aerial photographs dating from the 1930s to 2018, supplied by the Historic England Archive and Devon County Council Historic Environment Record, as well as imagery derived from Environment Agency and Tellus lidar data, to identify, interpret, transcribe and record almost 1700 archaeological sites and landscapes dating potentially from the Neolithic period to the 20th century.

The most significant themes to emerge from the survey relate to later-prehistoric field systems on the limestone plateaux south of Newton Abbot and medieval to post-medieval tin-mining in the Bovey Basin, between Newton Abbot and Bovey Tracey. Both are the most extensive examples of their kind in lowland Devon and these topics form the focus of two further thematic chapters.

Survey information was input to the Devon County Council (including Torbay) and Dartmoor Historic Environment Records. Nearly 1260 monuments were newly recorded and information added to over 400 existing monuments records. This increased the historic environment data by over 20% and represented a 78% increase in terms of monument types typically recorded from aerial sources. This is a significant contribution to historic environment data for this area, which is very diverse geologically, topographically and in terms of historic land use. This enhanced resource will inform further research, planning consultations and archaeological mitigation.

The survey transcriptions and summary monument records can be viewed on the Devon County Council Environment Viewer, from where more detailed monument records are accessible via Heritage Gateway. Further enquiries regarding the survey results can be directed to Devon or Dartmoor Historic Environment record.

CONTRIBUTORS

The survey, research and report were undertaken by Cain Hegarty, Stephanie Knight & Richard Sims of AC archaeology, on behalf of Devon County Council Historic Environment Team.

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This survey was funded by Historic England, the public body that looks after England's historic environment. This includes the statutory protection of historic buildings and archaeological sites, development and promotion of national frameworks, policies and best practice in heritage protection.

Helen Winton, Historic England Aerial Investigation and Mapping Manager acted as Project Assurance Officer and oversaw Quality Assurance.

Devon County Council Historic Environment Record (DCCHER) support and quality assurance was provided by Stephanie Knight.

The project was overseen by Bill Horner, County Archaeologist for Devon County Council, who also provided advice on interpretation and invaluable local detail. AC archaeology are grateful to Devon County Council Historic Environment Team for continuing to host the survey team within the Historic Environment Record. Bill Horner and John Valentin, Director of AC archaeology, kindly provided comment on early drafts of the report. The survey team are particularly grateful to Phil Newman who provided expert advice and comments on the subject of tin mining in Devon.

The project was primarily carried out using aerial photographs loaned by the Historic England (HE) Archive. The HE Archive aerial photographic loans and digital geographical data for aerial photographic coverage were ably administered and supplied by Luke Griffin. This material included specialist photography taken by Damian Grady during the exceptionally dry conditions of the summer of 2018.

Recent vertical aerial photograph coverage was supplied to the survey in digital format via Aerial Photography for Great Britain, supplied by Next Perspectives. Other sources, including Devon Aerial Photographs (DAPs) were made available by DCCHET. DAPs are copyright Devon County Council and not to be reproduced in any way without the prior written consent of DCCHET. Most archaeological sites in Devon are on private land. Depiction of a site on an aerial photograph, or its inclusion in the Historic Environment Record, does not imply any right of public access.

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The views and recommendations expressed in this report are those of the authors based on professional judgement and information currently available and are

presented in good faith on the understanding that interpretations can and should evolve.

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ARCHIVE LOCATION

The Historic England Archive, Swindon.

DATE OF SURVEY
April 2018 to March 2019

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Cover: Looking south west from Chudleigh across Castle Dyke Camp. Historic England Archive 29478_20 30-JUL-2015.

INTRODUCTION

The survey extends from near Haldon Ridge in the east to Plymouth in the west, over an area of 290.5 square kilometres (Fig 1). Much of the survey falls within the Teignbridge District administrative area but overlaps the north-eastern boundary of the South Hams District administrative area. Due to Historic England requirements to survey full Ordnance Survey kilometre squares, the proposed area also takes in a small area of Torbay Unitary Authority and Dartmoor National Park Authority (DNPA).

In common with much of rural Devon, the historic environment of the survey area faces potential impacts from landscape management arising from Countryside Stewardship (CS) and threats remain ongoing from capital works and subsoiling, supported by Catchment Sensitive Farming (CSF) initiatives to improve water quality, biodiversity and to reduce flood risk.

Woodland, including forestry plantations and unenclosed lowland heath form an important component of the survey area landscape. Prior to the aerial investigation and mapping (AI&M) survey, non-designated heritage asset data supplied to Forestry Commission holdings was last updated in the 1990s. Extensive plantations at Haldon Ridge and Little Haldon face increasing pressure from recreational use. It was hoped the survey would provide enhanced historic environment data to inform future iterations of Green Infrastructure strategies (see Conclusions).

Perhaps most significantly, the project area contains the second most extensive growth point in the county after Exeter, identified by the proposed Greater Exeter Strategic Plan. It is also one of the areas in Devon with the highest proportion of monuments identified from cropmarks on aerial photographs. The co-location of infrastructure and development pressures with good cropmark visibility presents threats to and opportunities for the management of the historic environment.

The survey began in April 2018 and was completed in March 2019. Over the course of the survey almost 5000 hard copy aerial photographs, numerous digital sources (such as Google Earth, APGB or Historic England Archive images) and multiple lidar visualisations were analysed by the survey team. From these sources nearly 1700 monuments were recorded; nearly 1260 were newly recorded and over 400 previously existing monuments were amended. All survey data was recorded directly onto the Devon County Council Historic Environment Record (DCCHER).

This represents an increase of 21% over the pre-AI&M survey HER monument levels, or a 78% increase in terms of monument types typically seen on aerial sources (Hegarty 2018, 31).

This is a significant contribution to historic environment data for this area, which is very diverse geologically, topographically and in terms of historic land use. By recording directly into the DCCHER the monument records are immediately accessible, to researchers, for consideration in planning and environmental management matters and accessible online by the public via Heritage Gateway. For completed projects, AI&M transcriptions can be viewed on Devon County Council's Environment Viewer, providing a further route to access the records via Heritage Gateway.

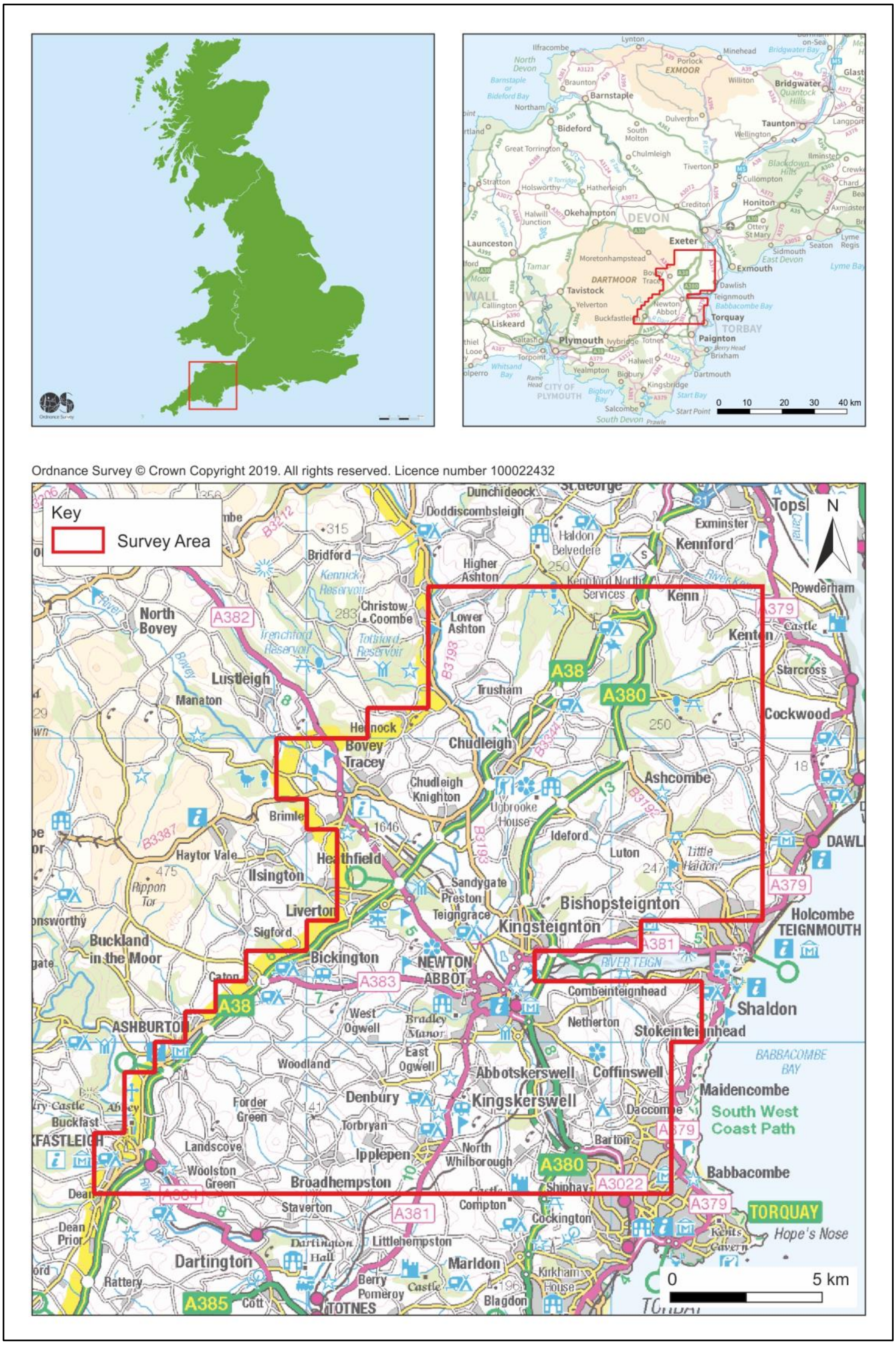


Figure 1: The Haldon Ridge to Dart Valley aerial investigation and mapping survey area.

Aims and objectives of the survey

Aims

The broad aims of the project can be summarised as:

- To identify, and thereby contribute to the improved management of historic environment assets in areas threatened by development, particularly in those areas of high archaeological potential for aerial survey;
- To identify, and thereby contribute to the improved management of historic environment assets in areas potentially affected by forestry management works, including in areas of forestry land subject to increased recreational use, particularly in areas of high archaeological potential not yet assessed using systematic aerial survey and modern remote sensing techniques
- To identify, and thereby contribute to the improved management of historic environment assets in areas of historic or active extractive industries;
- To identify, and thereby and improve the management of historic environment assets under the Countryside Stewardship scheme.

Objectives

The survey attempted to achieve these aims through meeting the following objectives:

- Digital transcription of archaeological landscape features visible on aerial photographs and remote sensing data into the DCCHES HER Geographic Information System (GIS), to Historic England standards.
- The direct recording of monument interpretations into the DCC and DNPA HERs to inform future strategic, agri-environment and development management decisions.
- The analysis and dissemination of the survey results in this summary project report and the signposting and dissemination of project results via other appropriate media (HE and DCC websites, newsletters, presentations etc).
- Provision of the project archive to Historic England for integration of project data into the Historic England Archive.

Format of the report

The variety of sites recorded by the survey reflects the variability of the terrain, geology and landuse within the survey area. This variety will be demonstrated in a brief chronological summary, with noteworthy themes, sites or highlights signposted or illustrated.

Several broad themes have been identified as common to most recent AI&M surveys in Devon, to varying degrees. These include the importance of small-scale extractive activity (such as marl, limestone, sand and gravel pits) in shaping the modern landscape, and the ubiquity of certain medieval and post-medieval

agricultural 'improvements' such as orchard banks and water meadows. These themes were well represented in this survey and are not been discussed in this report in any detail.

Two themes of significance emerged from the project and are covered in more detail. These are:

- Extended remains of earthwork boundaries and field systems on the limestone plateaux in the south of the survey area, interpreted as possibly of Bronze Age to Iron Age or Romano-British date.
- Expanded evidence of lowland tin-mining, probably hydraulic mining or a type of 'streaming' within and around the sand, silt and clay fluvial deposits of the Bovey Basin, between Bovey Tracey and Newton Abbot.

Each thematic section includes an introduction, an overview of previous work and a summary of the survey results, including assessments of survival and significance. Each thematic discussion, and the wider report, concludes with suggestions for further work and heritage protection considerations. When viewed digitally all monument numbers referred to in the text incorporate links to the relevant Heritage Gateway record.

THE CHARACTER OF THE SURVEY AREA

Topography, geology and land-use

The project area is largely rural in character, dominated by isolated farmsteads, hamlets and villages, many with medieval or earlier origins. Farming is mixed across the survey area, with pasture becoming more dominant towards the fringes of Dartmoor. Fields tend to be small and irregular, particularly on the valley sides, with patterns of larger, more open fields on the higher plateaux.

The largest settlements are situated on the estuaries and towards the coast. The Torquay and Paignton conurbation straddles the east of the survey area. Those areas of Teignmouth not examined as part of the South Devon Coast RCZAS also fall within the project area. At the head of the Teign Estuary, Newton Abbot and neighbouring Kingsteignton and Kingskerswell form the largest settlements to fall entirely within the survey area, extending to the south and east towards the Torbay conurbation. 'Gateway' towns to the Dartmoor uplands are located off the A38 to the north-west and west of the survey extent at Bovey Tracey and Buckfastleigh.

Post-war expansion, particularly from the historic cores at Torquay and Newton Abbot, had arguably one of the most significant impacts on the survey area, a consequence for survey methodology being the loss of historic field patterns, and consequently fewer control points available for the rectification of historic aerial photographs (see Methodology).

Associated infrastructure works have had more localised but still substantial landscape impact. South from Exeter the major trunk roads of the A38 and A380 bifurcate and cut through the landscape, the former following the southern edge of Dartmoor towards Plymouth and Cornwall beyond, and the latter to Torbay via Newton Abbot. More localised disruption to the historic field pattern arose from work along the route of the Kingskerswell bypass.

The mainline rail network, which to the north-east follows the Exe estuary and the coast, crosses the project area from Newton Abbot to Plymouth via Totnes and Ivybridge.

Geologically the survey area is very diverse (Fig 15). The Haldon Hills are defined by Cretaceous Upper Greensand and topped by gravels. These border south Devon's very complex geology, formed largely of Devonian slates and shales but with significant limestone outcrops from Newton Abbot to Torbay. Sandstone formations similar to the distinctive deposits of the Devon Redlands NCA can also be found in South Devon.

The Bovey Basin, north and west of Newton Abbot, is one of the most distinctive geological features of the survey area. Formed during the Tertiary period (65-60 million years ago) the basin filled with river clays, sand and lignite. A high tin content washed from Dartmoor had one of the most profound, if previously unappreciated impacts on the landscape; the recognition of the remains of medieval hydraulic tin mining in this area was probably hindered by 20th and 21st century industrial sand and clay quarrying. After urban expansion, 19th and 20th century industrial clay extraction probably had the most significant, if localised impact on

the historic landscape within the survey area. This is clearly visible in the environs of Newton Abbot and Kingsteignton, where 19th and early 20th century maps combine with aerial photography to catalogue the wholesale remodelling of a landscape, from agricultural, to industrial and often, finally to 'natural' in the form of nature reserves.

The soils of South Devon are mainly freely draining, slightly acid loamy soils, with small pockets of seasonally wet and poorly draining clayey soils, largely around the Bovey Basin. Soil fertility is low over much of the survey area, with discrete zones of high fertility on base-rich loams. Nearly 80% is classified as Grade 3 and 4 agricultural land, reflected in the mixed farming regimes practiced over the survey area.

Cropmarks are visible differences in the growth of vegetation caused by buried archaeological remains, altering the levels of moisture and nutrients available to an overlying crop. In Britain cereal crops often show the clearest cropmarks but in more extreme conditions they can also be seen in pasture. Taller growth, or *positive* cropmarks typically form over *negative* archaeological features, such as ditches or pits. Conversely lower or retarded crop growth, or *negative* cropmarks, are typically visible over features that inhibit root penetration, such as buried structures or compressed or metalled surfaces (Wilson 2000, 67-87). The different rates of growth can affect the speed that the crop ripens, causing different colours and patterning within the same field.

Many factors are involved in the formation of cropmarks over buried archaeological remains, but the character of the soils is an important one. Freely draining soils tend to create conditions where cropmarks are more likely to form, especially in dry periods, whereas heavier, poorly drained soils retain greater moisture levels, requiring more extreme conditions for visible cropmarks to form.

Natural subsurface features of geological or topographical origin can also cause variations in the colour and height of a crop that can mimic, or mask cropmarks caused by buried archaeological features, complicating interpretation from aerial photography. Whilst the freely draining soils deriving from the sandstone geologies in the survey area were anticipated to have good potential for archaeological cropmark formation, cropmarks on soils derived from the slate and shale geologies were more numerous than anticipated. However, distinguishing cropmarks of archaeological origin from those forming over natural sub-surface features on these geologies proved challenging, as illustrated on specialist oblique aerial photographs taken by Historic England during the heatwave of 2018 (Fig 2, Fig 6 & Fig 7).

Figure 2: Cropmark of prehistoric enclosure MDV37201, surrounded by numerous geological marks. HEA 33541_2 22-JUL-2018. ©Historic England Archive.

Rivers rising on Dartmoor and flowing southwards give the area its distinctive character of rolling hills and steep north-south incised valleys. The broad Bovey valley is an exception. The highest points in the survey area, reaching an elevation of about 250 metres, are found where Dartmoor's granite outcrops merge with the South Devon plateau at the south-eastern edges of the National Park, and at the Haldon Ridge which defines the north-east limit of the survey area and the boundary between the Devon Redlands and South Devon NCA.

Topography and geology combine to influence land-use on steeper slopes, with approximately 10% of the survey area wooded including ancient woodland sites on valley and ria slopes and extensive areas of managed forestry plantation, as at Haldon Hill. The wooded valleys, large plantations and unenclosed lowland heath towards the east have good potential for earthwork survival, but partial lidar coverage, particularly over the Haldon ridge, means much of this potential remains unrealised.

Topographical features have also challenged interpretation. At Milber Down hillfort (MDV8649), cropmarks interpreted as evidence for a continuation of the hillfort's outer enclosure ditches were identified on aerial photographs of 1946; aerial photographs of 1978 support the more likely interpretation that these features arose from topography and natural drainage (Fig 3).

This summary is derived from sources including Natural England National Character Area profiles (Natural England 2013 and 2014), British Geological Survey data viewed via WMS (British Geological Survey materials copyright NERC2018) and Cranfield University's Soilscapes viewer (http://www.landis.org.uk/soilscapes/index.cfm).

Figure 3: Top: Bottom centre of image, the possible continuation of Milber Down hillfort's outer enclosure ditch is visible as parallel cropmark ditches. Bottom: The cropmarks are revealed as probable natural topographic and drainage features. RAF/3G/TUD/UK/223 VP1 5010 12-JUL-1946 Historic England Archive (RAF Photography); OS/78037 V 132 10-MAY-1978 © Crown copyright. Ordnance Survey.

Previous work

Arguably the earliest significant archaeological discoveries to have been made in the survey area correspond with the expansion of ball clay extraction in the late 19th century. In 1866 or 1867 a carved oak male figurine (MDV41995) was recovered from a clay pit at the Zitherixon works of Watts Blake Bearne at Kingsteignton, associated with preserved oak trees roughly 8m below the ground surface. Found a short distance from a bronze spearhead (MDV41997) the figure, now known as the Kingsteignton figure or Kingsteignton Idol, has been dated to the Early Iron Age. It is one of only six similar wooden figures known in Britain, some of which have Scandinavian associations (Coles 1990a). The Kingsteignton figure is held by the Royal Albert Memorial Museum in Exeter (Accession Loan No. L94).

In 1881 a 3m long dugout canoe, presumed to be of prehistoric date, was excavated by clay workers at a pit at Heathfield, Bovey Tracey, from deposits roughly 9m deep (Peckham 1990, 23, 30: MDV41988). By 1883 the retained sections had perished. A more substantial clinker-built vessel recovered from nearby deposits in 1898 has been radiocarbon dated to the medieval period (Dudley et al 2001). Parts of this craft are displayed in Torquay Museum. Location information for these accidental finds is somewhat vague and both the depths of clay deposit recorded and subsequent industrial landscaping in this area limited any likelihood of the AI&M survey making associations between them and landscape features.

The wider historic landscape of the South West has been the subject of significant studies that have confirmed that the character of the peninsula appears to be somewhat distinct from that of the rest of England to the north and east of the Blackdown Hills, from at least the later-prehistoric period (Rippon et al 2006; Rippon et al 2013; Rippon 2012; Rippon 2014). As will be seen below, this may be reflected in the survey results.

The survey area has seen little systematic archaeological survey or landscape study, despite being rich in archaeological remains. Some are of national importance, including the prehistoric field systems on the limestone plateaux of the South Hams and Torbay; previous research pertinent to this topic is summarised in more detail in the relevant thematic chapter below. Most investigations have been small scale, development led and site specific, and have seen little publication despite some being potentially of national significance.

An important exception is the landscape approach taken by the Devon Aerial Photograph (DAP) programme, which from 1983 pioneered systematic aerial survey throughout Devon, recording significant evidence of buried prehistoric settlement visible as cropmarks, with many sites visited during the subsequent Post-Reconnaissance Fieldwork Project (Devon Archaeological Society 2009).

The survey area is closely surrounded by previous aerial investigation and mapping surveys (formerly called National Mapping Programme [NMP]); to the south by the coastal and estuarine zones previously assessed by the South Coast: Devon RCZAS NMP survey (Project Number 6046); to the north-east by the North Devon NMP (Project Number 3899) and East and Mid-Devon River Catchments NMP (Project Number 6634) projects; to the west by the Cornwall NMP survey area (Project Number 2710), which also surveyed much of the Tamar Valley AONB. To the

north, Dartmoor National Park was the subject of a pre-NMP, pre-digital photogrammetric survey; this landscape would greatly benefit from reassessment following the completion of national Environment Agency 1m resolution lidar coverage in 2020.

A desk-based survey of circa 170 square km of Haldon Ridge was commissioned in 1995 to provide enhanced data for a management plan of the area (Dyer 1996). The survey included a 'core zone' of 50 square km which was identified as under most significant land-use pressures, such as Forestry Commission management of plantation and recreational land, and as having the greatest potential for above ground survival of archaeological remains, particularly monument types not usually identified by desk-based survey. This core was targeted for rapid field survey.

This work provides an excellent summary of historical land-use in probably the most marginal part of the survey area, the near-unimprovable ridges of Great and Little Haldon. It highlights the relationship this area probably had with the wider survey area, by providing furze to fuel the lime kilns, potteries and brick kilns elsewhere, particularly Bovey at Tracey (Dyer 1996, 4-5).

Despite encountering access issues in some plantations due to dense planting, gorse and heather hindering identification and interpretation on heathland areas, the field element identified nearly 100 new monuments now recorded on the DCCHER, although many previously recorded monuments were not identified. Undertaken prior to the wide availability of handheld Global Navigation Satellite System (GNSS, more commonly referred to as GPS) survey equipment, the accuracy of spatial data derived from this survey may be questioned. The Haldon survey also registered the very destructive nature of recent plantation ploughing, with some areas described as archaeologically 'sterilised'. This makes the partial nature of the lidar coverage particularly unfortunate in limiting the effectiveness of the AI&M survey in this area, as very few monuments, previously recorded or not, were identified by the AI&M survey on Little or Great Haldon. A rapid reassessment of this area should be considered following completion of 1m resolution national lidar coverage by the Environment Agency in 2020.

As stated above, much previous work in this area has been small scale, development led and/or site specific. This is not to say it has not been significant.

At the western extent of the survey area within Dartmoor National Park, the present Buckfast Abbey (MDV7808) is largely a 19th and early-20th century construction, but is built on the site of a medieval, possibly pre-conquest monastic house and incorporates some fabric from the earlier house. It therefore remains of national importance and has seen considerable work to identify and record remains of the earlier conventual range and precinct (Brown 1986; 1988; 2018; Stewart Brown Associates 2003; 2007-2008; 2010; 2011; 2013a; 2013b). Aerial photographs contemporary with the early 20th century redevelopment of the monastery capture fascinating insights into monastic life (Fig 4).

Little correlation was noted between archaeological features recorded by the AI&M survey and excavation. This might in part be due to deep clay deposits masking many features. However, the relationship between the two techniques is

complementary, the landscape-scale survey providing context for site-based investigation, which in turn can inform analysis of the landscape survey results.

Figure 4: Buckfast Abbey in 1930. The works compound and partially completed roof of St Mary's Abbey Church (centre-left), tennis courts (top-top left) and what appear to be monks enjoying a cricket match near the river (top right). Part of AFL EPW033240 01-JUL-1930 © Historic England Archive (Aerofilms Collection).

Larger scale field intervention in the survey area has been largely infrastructure or industry-led. For instance, evaluations in advance of the A380 Kingskerswell Bypass and South Devon Link Road (Wessex Archaeology 2003; 2004; Hughes 2015), or related to quarrying, either in mitigation of potential expansion of minerals extraction (Adam et al 2001; Bayer 1998; Exeter Archaeology 2001; Farnell 2015) or arising from the redevelopment of former quarry sites (Exeter Archaeology 2007; Rainbird 2014).

Most commercial work has been smaller in scale, although concentrations of interventions may reflect areas of increased development pressure, as at the town of Ipplepen in Teignbridge. Excavations at Ipplepen in 1995 in advance of the construction of a doctor's surgery recovered possible evidence of both a 12th century priory, an alien cell of the Augustinian order, as well as evidence for Roman settlement in an area where none had previously been recorded (Exeter Archaeology 1995; Reed and Turton 2006). Between 2007 and 2010, a significant number of Roman coins were recovered through metal detecting across several fields at Dainton Elms Cross, immediately to the south-east of Ipplepen. Subsequent geophysical survey (Dean 2010) and excavation (Steinmetzer 2011; 2012; Oltean et al forthcoming) commissioned by Devon County Council and the Portable Antiquities Scheme (PAS) set out to place these finds in context, and identified an extensive and enduring Iron Age, Romano-British and early-medieval settlement (MDV81301; Fig 29). To date, little of this work has been published but research is continuing at this significant and possibly atypical rural site, under the umbrella of the University of Exeter's Understanding Landscapes project. The AI&M survey is collaborating with the Understanding Landscapes project by proposing sites recorded by the survey that can be taken forward for follow-on geophysical survey.

Methodology

The project followed Historic England standards and methods, with minor variations to mapping conventions arising from transcription in a GIS rather than AutoCAD environment (Winton 2019; Hegarty 2018). The main strand of work involves examination of aerial photographs and lidar (also known as Airborne Laser Scanning or ALS), to interpret and synthesise all archaeological information identifiable on these resources and to present them as an archaeological map with accompanying textual descriptions for each site.

Whilst some aerial photographic transcription had previously been undertaken, most notably by the Devon Aerial Photograph (DAP) programme (see Previous Work), this project was the first systematic examination of all readily available aerial sources, the earliest dating to the 1930s or 1940s (for instance Fig 4 above). This permitted a record to be made of all visible monuments, previously identified and new to the HER, including an indication of survival and condition.

The assessment of non-specialist aerial photography, i.e. aerial photographs taken for non-archaeological purposes, is an important component of the survey methodology, as is the reassessment of specialist archaeological photographs from which monuments had previously been recorded, allowing new features to be recognised and existing interpretations to be reappraised.

As with any technique, there are limitations to these methods; both aerial and field survey techniques can be limited in areas of dense woodland. The systematic assessment of available lidar data can overcome the latter constraint to some extent. Unfortunately, as noted above the available DTM lidar data was either partial, of low resolution or limited by a high a density of vegetation, in all wooded areas.

Survey data was recorded directly into the Devon Historic Environment Record (DCCHER). Interpretations of date, function and summaries of survival and condition were recorded as text-based monument records in the DCC HBSMR database. Detailed transcriptions of all visible features and monument polygons defining the extent of the recorded features were created in a linked GIS. This recording method ensured that monument records were immediately available to researchers, for consideration in planning and environmental management matters and accessible online by the public via Heritage Gateway and Devon County Council's Environment Viewer. All monument record numbers referred to throughout this report are linked to the relevant Heritage Gateway record or can be found on the Environment Viewer by searching using the DCCHER monument number.

The archaeological and chronological sphere of interest of Historic England aerial investigation and mapping surveys includes archaeological sites and landscapes visible as cropmarks, earthwork banks and ditches and buildings or structures, interpreted as dating from the Neolithic period onwards, up to and including the 20th century (Winton 2019). Historic England standards also include relatively recent sites or landscapes such as those associated with the major conflicts of the 20th century, including the Cold War.

This project provides historic environment data on which additional research or follow-up field investigations can be based. A list of monuments for which further

field-based investigations would be particularly beneficial, and suggestions for further work is included in Appendix C.

Further background on planning an aerial investigation and mapping project is available in the Management of Research in the Historic Environment (MoRPHE) Project Planning Note 7: interpretation and mapping from aerial photographs and other aerial remote sensed data (Historic England 2012). Contact Historic England for a copy guidance@HistoricEngland.org.uk.

A recent technical review provides a history and appraisal of Historic England aerial investigation and mapping standards and methods (Evans 2019).

THE SURVEY RESULTS: OVERVIEW

Quantification

In total 1678 monument records were altered or created by the project equating to just under 6 monument records per square kilometre. This is comparable to recent surveys in the neighbouring Blackdown Hills and East and Mid Devon River catchment AI&M survey areas, demonstrating an effective survey method across different landscape character areas. Three quarters of the total were newly created and 416 substantially amended (that is, excluding minor changes such as new monument relationships).

This means that over a quarter of the total number of monument records in the project area have been newly created by AI&M (26%) and a further 8% have been amended. This represents an increase of 21% over the pre-AI&M survey monument numbers, or a 78% increase on the 'relevant' monument types as defined in the project design, i.e. classes of monument potentially identifiable by the AI&M methodology, such as cropmarks, earthworks and structures (Hegarty 2018, 31). Compared to pre-AI&M survey NRHE figures (796 monuments), the increase is 159%.

Monument categories

Analysis of AI&M survey results in Devon typically begins by organising the survey dataset by monument class, as recorded in the HER. The HER monument thesaurus is defined by the Forum on Information Standards in Heritage (FISH). This states that by grouping terms by class the thesaurus, and by extension the HER, links monument types that are thematically related. For example, all places of worship, burial grounds, and funerary monuments are grouped under RELIGIOUS, RITUAL AND FUNERARY (Historic England).

For previous surveys assessing the survey dataset in this way has been a useful starting point for analysis, indicating the relative proportions of different categories of monument and thereby thematically characterising the survey results in a quantifiable, and repeatable manner.

For this survey this approach has revealed that a higher than usual proportion (40%) are categorised under the generic type 'Monument <by form>'. This category includes a range of broad monument types. Some, such as 'enclosure' might reflect the inherent ambiguity of certain monument classes for which a function or narrower interpretation has not been possible. For others such as 'field boundary' it might indicate that a reassessment of the monument class within the thesaurus structure could be useful.

Despite this limitation, this approach remains useful. Table 1 indicates relatively high numbers of agricultural and industrial features, discussed further below (see Survey Highlights). Catchmeadows and field systems comprise a large proportion of the agricultural features, with less frequently observed monument types including pillow mounds and clearance cairns. Orchards are double indexed under both agricultural and parks and garden monument classes, which accounts for the relatively high proportion of this category; fewer parkland features were recorded

than might be expected, considering the number of parks and gardens, registered and unregistered in the project area. Industrial features are varied, and a range of features representative of localised industries are recorded, such as clay pits associated with potteries and brickworks, umber extraction and processing sites as well as the extensive tinworkings discussed below (see Research Theme: Tin Mining in the Bovey Basin).

Barrows account for almost all of monuments categorised as 'religious, ritual and funerary' but at circa 5% of the total represent a minor theme. In contrast to the neighbouring South Devon Coast RCZA project (Hegarty et al 2014), few sites are recorded under the broad defensive and military monument class, most of Iron Age and Second World War date. Second World War Emergency Water Supply reservoirs account for a significant proportion of monuments recorded under the 'water supply and drainage' monument class.

Top Term	% of monuments
MONUMENT <BY FORM>	40
AGRICULTURE AND SUBSISTENCE	17
INDUSTRIAL	15
GARDENS PARKS AND URBAN SPACES	9
RELIGIOUS RITUAL AND FUNERARY	5
TRANSPORT	4
WATER SUPPLY AND DRAINAGE	3
UNASSIGNED (mainly non-antiquity)	2
DEFENCE	1
DOMESTIC	1
MILITARY DEFENCE AND FORTIFICATION	1
MARITIME	<1
CIVIL	<1
COMMUNICATIONS	<1
RECREATIONAL	<1
HEALTH AND WELFARE	<1
EDUCATION	<1

Table 1. Monuments grouped by monument class.

Monument types

Over 180 different monument types were recorded during the survey. Some, such as Neolithic mortuary enclosures are rare and potentially nationally significant, and these are summarised below (see Survey Highlights). For the more commonplace but characteristic feature types, a table listing all monument types recorded with 10 or more incidences is given in Appendix A. Table 2 offers a more helpful representation of the most frequently observed monument types by combining narrow and related monument terms.

The relatively high proportion of non-antiquity and natural features has resulted partly from a reinterpretation of existing records, and partly from the use of double

indexing with an archaeological monument type to reflect uncertainty in interpretation.

Labels	Number of monuments	Percentage of monuments
Field boundary, field system, lynchet, etc	623	29
Extractive pits and industrial complexes	331	16
Enclosure	211	10
Orchard	189	9
Barrow or ring ditch	106	5
Catch meadow	98	5
Routeway	84	4
Non-antiquity and natural features	71	3
Cairn	40	2
Water channel	39	2

Table 2: Top ten monument types, with narrow and related terms combined. Some monuments have been indexed with more than one monument type

Period

In contrast to recent neighbouring AI&M projects, the monuments observed during this survey have an even period distribution (Chart 1). The prehistoric periods are apparently dominated by Bronze Age monuments; this not only reflects the number of barrows recorded but also the use of the period 'from' date to perform the quantification, meaning that enclosures and field systems dating to somewhere between the Bronze Age to Roman period will be included in this category. Rare features such as the possible mortuary enclosures MDV122439 and MDV122489 are tentatively interpreted as Neolithic in date. Combined, features of prehistoric or Roman date comprise nearly a fifth of all recorded monuments.

Nearly a third of monuments are recorded as having a date from the medieval period (1066-1539), reflecting the number of curvilinear field boundaries and field systems or strip lynchets recorded. Less frequently observed monuments of this date include deserted and shrunken settlements, a motte and bailey castle and some industrial features.

Just over a quarter of monuments have been assigned a post-medieval date (1540-1750). Monuments of this period are dominated by orchards, but also include a significant number of extraction or processing sites. Less common features include possible civil war earthworks at Bovey Heath and Hennock.

The remaining monuments, forming approximately a fifth of the total, are likely to have a modern date (1751 onwards). In addition to the 3% defined as Second World War in origin, these are dominated by industrial sites and catchmeadows.

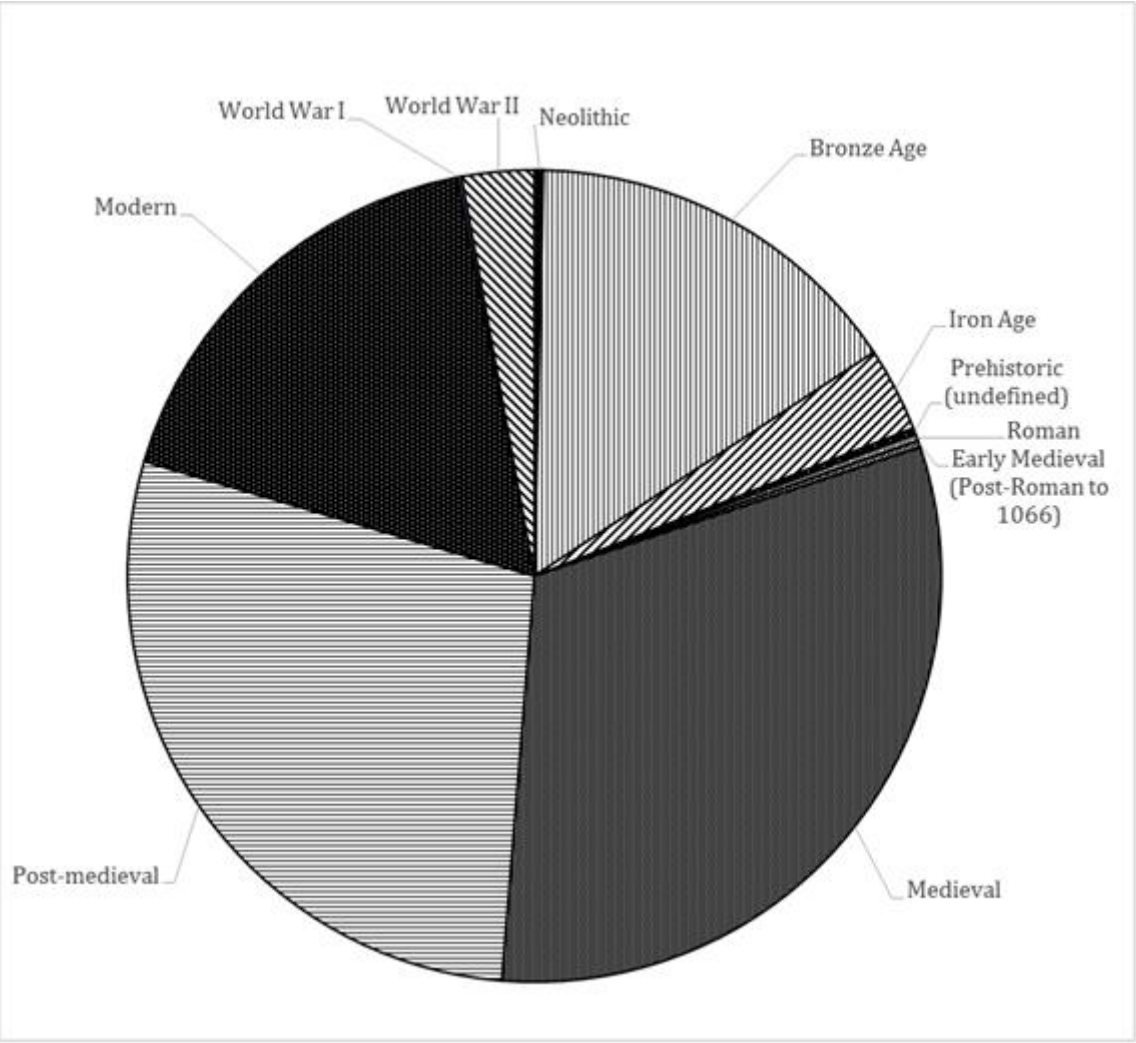


Chart 1. Monuments by date, excluding undated. The 'date from' field was used in quantification. As such, earlier periods may be over-represented. Double indexing means that some monuments have more than one period recorded.

Survival

Nearly two thirds of monuments were recorded as earthworks (Chart 2), of which 8% had been demonstrably levelled since they were first visible on the aerial imagery. This is lower than the recent Blackdown Hills survey (Hegarty et al 2018), where agriculture has been less intensive, but considerably higher than in the East and Mid Devon River Catchments survey (Hegarty et al 2016), an area of higher quality agricultural land and relatively low modern development.

The range and quality of visualisations derived from EA lidar data has contributed to the dominance of monuments visible as earthworks. However, the EA lidar coverage is partial and in areas where only Tellus lidar or APGB elevation data was available earthwork monuments are less well represented.

The lower resolution of the Tellus data renders it unsuitable for archaeological survey in wooded areas, as does the DSM format of visualisations derived from the APBG elevation data. In these areas it was consequently also more difficult to assess

the survival and condition of earthworks visible on earlier aerial imagery, which may have led to under-representation of levelled earthworks.

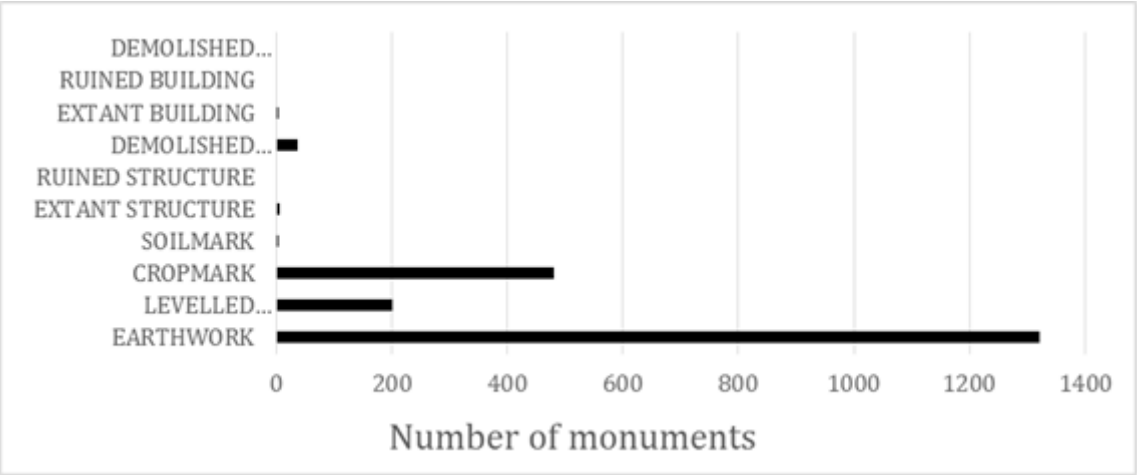


Chart 2. Evidence types, excluding types not used by AI&M such as 'site of', 'placename' or 'conjectural'. Double indexing means that many monuments have more than one evidence term.

It is perhaps unsurprising that the typically substantial features associated with extraction and industry appear to survive as earthworks at a higher rate than other frequently recorded features (Chart 3). Barrows, despite their often substantial form, are less likely to survive as earthworks due to greater exposure to years of ploughing and development. Similarly, former field boundaries are more likely to be seen as cropmarks than more recent features such as disused catchmeadows.

A fifth of monuments have an evidence term of cropmark with the majority of these being later-prehistoric or Romano-British enclosures and medieval field boundaries.

Very few structures and buildings were recorded, reflecting the low numbers of military remains visible in the survey area. Most had been demolished since first visible on aerial imagery, and temporary military features typically did not survive long after the end of the war.

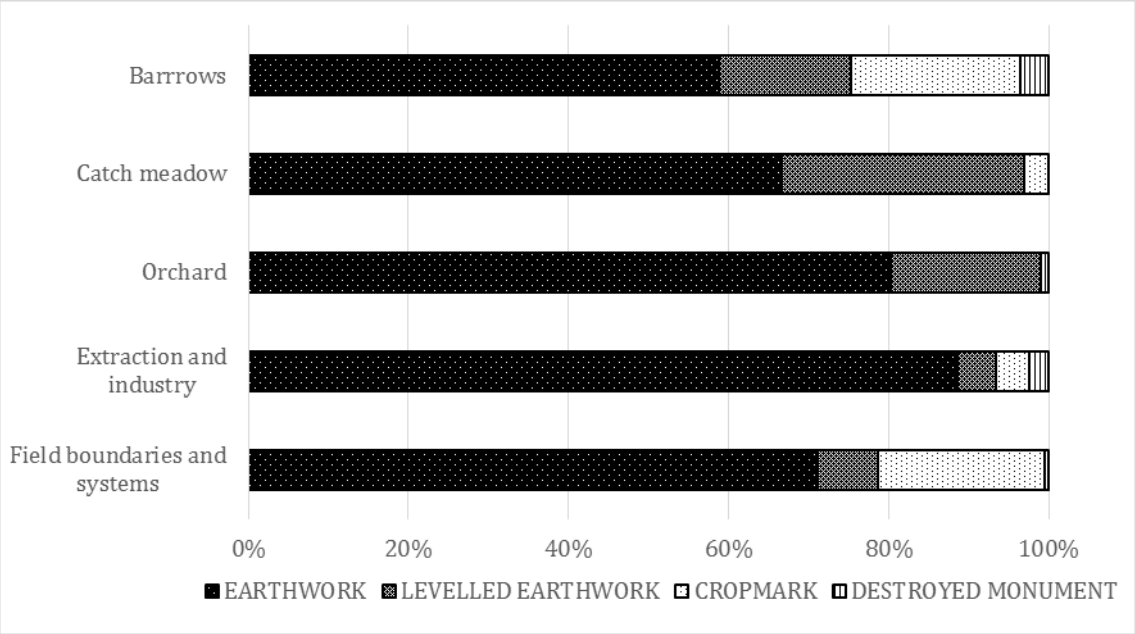


Chart 3. Most frequently recorded monument types by evidence term.

Broad source type	Number of transcriptions	% of transcriptions
Lidar/elevation data	1309	50
HEA Loaned verticals	829	32
HEA Loaned oblique aerial photographs	251	10
Non-DCC digital mosaics	107	4
DCC verticals	38	1
DCC digital mosaics	37	1
DCC oblique aerial photographs	32	1
Total	2603	

Table 3. Proportion of transcription sources, by broad source type.

Sources used for recording

As has been the case for many recent projects in Devon, a large proportion of transcriptions were made from lidar-derived visualisations and to a much lesser extent, visualisations made from elevation data (Table 3). Visualisations derived from Digital Surface Models (DSMs) were not used for transcription as no detail could be seen on these that was not available from the various visualisations derived from the Digital Terrain Model (DTM) or bare earth data.

The lidar derived visualisations proved essential for recording very subtle earthwork features, such as the potentially nationally significant prehistoric field systems discussed below. However, lidar derived visualisations are also well represented in monument records of arguably less significant features, such as post-medieval or 19th century extractive pits and field boundaries. What is not apparent from this assessment, is that whilst undeniably useful, the lidar derived visualisations were often complementary to other sources, providing a readily accessible geo-referenced source from which to transcribe features first identified from, and often only interpretable when viewed in conjunction with, historic aerial photographic sources. As such, this assessment might overrepresent the significance of lidar derived images to the wider survey.

The most commonly used aerial photographic sources are detailed in Table 4. Vertical sorties loaned from the HEA accounted for approximately a third of all transcriptions. Over half of these came from three sorties taken in 1946 when Second World War features were still visible, but more significantly, providing a unique viewpoint before post-war agricultural improvements had resulted in the loss or levelling of earthwork remains, including locally distinctive features, such as orchard banks.

Approximately 10% of transcriptions were made from specialist oblique aerial photographs, many originally submitted to the NMR by the Devon Aerial Photograph Reconnaissance programme in the 1980s and 1990s. Many of these were of buried archaeological remains visible as cropmarks only from these sources, including many prehistoric and potentially nationally significant monuments (Fig 5 & 29). It is also worth noting that the sortie flown by HE during exceptionally dry conditions in July 2018 resulted in several previously unrecorded enclosures visible as cropmarks of buried ditches being added to the HER, and the enhancement of previously recorded cropmark sites. Google Earth imagery from June of the same year also revealed some previously unrecorded sites as cropmark.

Only 3% of transcriptions were made from in-house DCC aerial imagery, but these were often very valuable for assisting in interpretation of features mapped from other sources.

Although this assessment might appear to demonstrate that a small number of sources dominate the transcriptions and monument records generated by the survey, it is important to emphasise that the fullest interpretation and assessment is only possible by viewing all sources in a complementary fashion. The greatest strength of Historic England standards for AI&M projects is they typically cover large areas and use the fullest range of sources thereby making connections and identifying themes at a landscape scale.

Sortie	% of transcriptions
LIDAR Environment Agency DTM 01-JAN-1998 to 31-MAY-2017	45
RAF/CPE/UK/1824 04-NOV-1946	11
LIDAR Tellus DTM 01-JUL-2013 to 31-AUG-2013	5
RAF/106G/UK/1412 13-APR-1946	3
RAF/3G/TUD/UK/223 12-JUL-1946	3
DAPs taken in 1984	3
DAPs taken in 1989	2
FSL/6412 V 07-FEB-1964	2
RAF/541/520 13-MAY-1950	1
OS/84170 04-JUL-1984	1
RAF/CPE/UK/2507 13-MAR-1948	1
Google Earth imagery taken in 2018	1
OS/69296 V 29-JUN-1969	1
DCC RAF/CPE/UK/1890 RS 10-DEC-1946	1
DAPs taken in 1992	1
OS/86246 V 15-OCT-1986	1
DAPs taken in 1985	1
RAF/CPE/UK/1823 04-NOV-1946	1
RAF/540/483 24-APR-1951	1
DCC 2010 mosaic	1
HEA 33541 19-JUL-2018	1

Table 4. Sorties most commonly used for transcription (>1% of transcriptions). Devon Aerial Photographs and Google Earth imagery grouped by year.

Historic Landscape Characterisation

Historically most methods for recording and describing the historic environment used the tools traditionally available to archaeologists, focussing on points, lines or areas defined on maps, whether hard copy or digital, and associated text-based summaries typically held on databases, such as county HERs. Despite the increasing sophistication of such databases, by the early 1990s it was felt by some that the significance of the wider historic landscape was not being represented (Turner 2007, 13).

From the early 1990s English Heritage commissioned a range of studies into alternative ways to understand the development and significance of the historic landscape. These studies evolved into Historic Landscape Characterisation (HLC). Unlike traditional HER monument records, HLC data is not focussed on individual sites or monuments. Instead it interprets the modern landscape via aerial photographs and maps to identify 'historic landscape character types' that are recurrent in a landscape, and which have probably been determined by similar histories (Turner 2007, 16).

Once a range of HLC 'types' have been identified these can be mapped for a given area. The most common Devon HLC types within the AI&M survey area are listed in Chart 4 and Chart 5. Although historic landscapes can be very complex, the use

of locally distinctive landscape types and GIS based mapping linked to a text-based database allows flexibility in how the HLC types are recorded, interrogated and presented, whether the historic character is based on prehistoric, medieval activity or more recent origins (Turner 2007).

The Devon HLC project took place between 2001 and 2005 (Turner 2007, 20). Its HLC methodology allowed a range of maps to be produced. Most useful to the AI&M survey landscape analysis are the HLC maps of the modern landscape, and the late 19th century landscape informed by the 1st Edition Ordnance Survey maps. Where possible HLC interpretations for earlier character types were informed by archaeological sites visible within polygons, such as ridge and furrow within an area that was rough ground moorland in the 19th century, or landscape scale patterns such as curvilinear boundaries indicative of strip fields within the modern farming landscape (Turner 2007, 25).

HLC and NMP

The smallest individual polygons within the Devon HLC were theoretically 1ha in area (100m x100m), with each polygon composed of the same HLC type in the current landscape, and as far as possible the same historic type. Land-use falling below the 1ha threshold was not included in the characterisation which could exclude some significant land-use, such as industrial or extractive activity (Turner 2007, 22). Turner states that such smaller scale land-use evidence could nonetheless be considered alongside HLC in landscape studies if recorded as 'traditional' monuments by other means, such as the HER. This approach aimed to provides a detailed HLC model, with the HLC methodology remaining something of a broad-brush approach.

The HLC data has proved useful in interpreting the landscape setting of features recorded by the AI&M survey, for instance isolated relict field boundaries not recorded on 19th century maps.

However, the AI&M survey has also recorded a significant number of monuments that can inform or have superseded some of the broad-brush HLC interpretations. For instance, relict field systems recorded during the AI&M survey fall within a range of Devon HLC types (Chart 4 and Chart 5).

Those designated a likely prehistoric date mainly cover areas characterised from the late-19th century maps as medieval enclosures, rough ground, non-ancient woodland, parks and gardens and post-medieval enclosures. Landscape changes in the subsequent 100 years mean that some of these areas are characterised from modern mapping as quarries.

In contrast, the field systems thought to be medieval in date are much more frequently found in areas characterised from the late-19th century maps as parkland, orchard and medieval enclosures, and less frequently in rough ground, woodland and post-medieval enclosures. Many of these areas of parkland, medieval enclosures and orchard have been lost to modern development and modern field amalgamation into larger enclosures in the subsequent century, but - unusually - rough ground has increased. Some of these themes are explored in the case study section below.

The notably higher proportion of prehistoric field systems in areas defined by HLC simply as 'Rough ground' rather than 'Rough ground with prehistoric remains' suggests there is a case for updating/redefining these HLC types in areas that have had full AI&M survey. Similarly, medieval strip field systems located in areas other than those characterised as 'Medieval enclosures based on strip fields' could usefully be revisited.

Other landuse types could also usefully inform future refinement of HLC in Devon. For instance, the AI&M transcriptions demonstrate that catchmeadow earthworks extend beyond those areas typically characterised by HLC as Watermeadow, with much of the landscape within the HLC Watermeadow polygons displaying no evidence of irrigation. The area covered by industrial features (all dates) is dominated by post-medieval HLC types of conifer plantation and some other woodland (Table 5), with a substantial area of rough ground and post-medieval/medieval enclosures, as discussed in further detail in the case studies below.

Whilst HLC data has proved very useful in informing AI&M interpretations, there is also scope for the landscape scale of AI&M survey, informed by detailed understanding of locally significant land-use, to be incorporated into and inform future iterations of the HLC methodology.

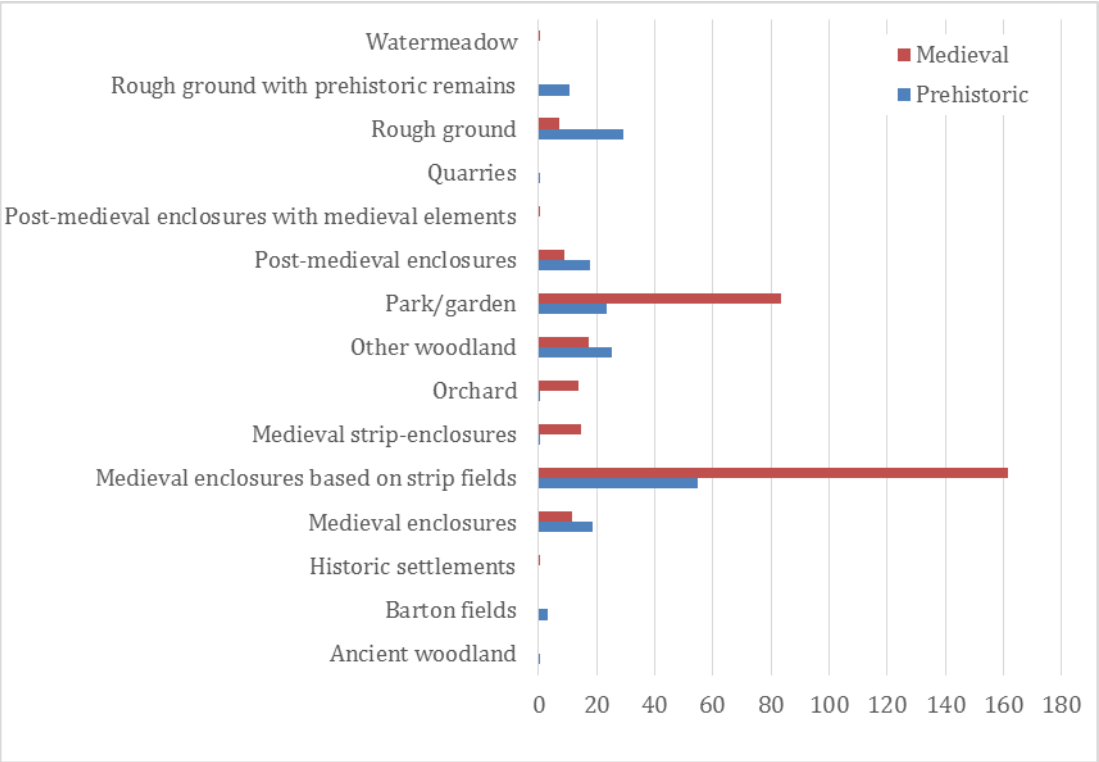


Chart 5. Modern HLC types (hectares) within the area covered by prehistoric and medieval field systems recorded by the survey.

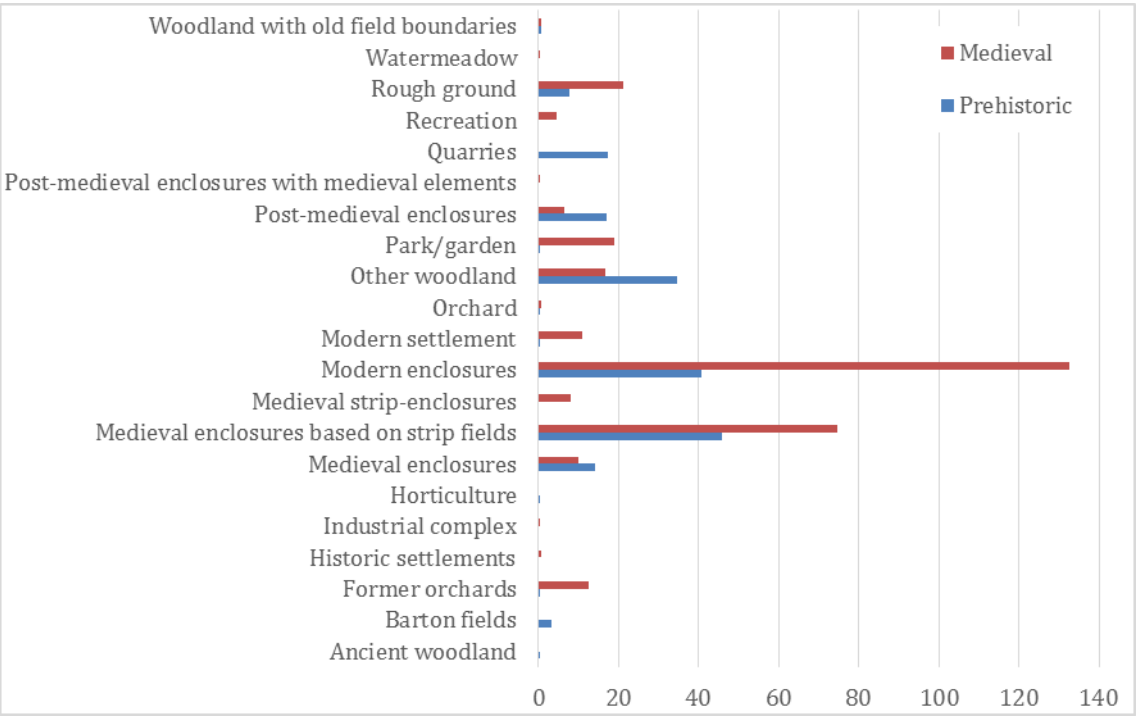


Chart 4. Post-medieval HLC types (hectares) within the area covered by prehistoric and medieval field systems recorded by the survey.

HLC type (post-medieval)	Hectares
Conifers	190
Rough ground	169
Other woodland	137
Post-medieval enclosures	109
Medieval enclosures based on strip fields	104
Medieval enclosures	12
Orchard	8
Ancient woodland	7
Park/garden	4
Uncertain	4
Quarries	2
Industrial complex	2
Barton fields	2
Old watermeadow	1
Mining	1
Watermeadow	1
Historic settlements	1
Post-medieval enclosures with medieval elements	<1
Rough ground with prehistoric remains	<1
Post-medieval watermeadow	<1
Medieval strip-enclosures	<1
Water	<1
Public complex	<1
Grand Total	753

Table 5. Post-medieval HLC types (by area) within the area covered by industrial features recorded by the survey.

Survey Highlights

As demonstrated above, a range of monuments were recorded by the survey reflecting a variety of themes. A period approach is taken here to briefly illustrate several of the themes identified, through examples of both typical and unusual monuments. Two of the most noteworthy themes are presented as more detailed and contextualised case studies below.

Neolithic – Bronze Age

In terms of rarity, two possible Neolithic mortuary enclosures or long barrows are perhaps the most significant feature from this period. Similar in form, size and situation to an example recorded during the neighbouring East and Mid Devon Rivers aerial survey (MDV112719), MDV122439 in what is now the north-eastern part of modern Teignmouth was recorded as an elongated oval cropmark, on a south-west facing slope below the high ground of Holcombe Down (Fig 5). A similar, if slightly longer and broader enclosure was recorded near the village of Kenn (MDV122489), south of Exeter.

However, it is possible that both sites are evidence of a post-medieval pillow mounds; a possible pillow mound, MDV125427, was identified from 1940s-1950s aerial photographs as a linear earthwork mound within a hollow, east of the historic core of Newton Abbot. Both features have been impacted by modern housing development, rendering definitive identification unlikely.

Figure 5: Possible long barrow or mortuary enclosure, visible as a pale elongated oval cropmark in the centre of the image, at Sandy Mount, Teignmouth MDV122439. RAF/541/520 RP 3015 13-MAY-1950 Historic England Archive (RAF Photography).

Although several previously unrecorded possible barrows of Bronze Age date have been recorded by the AI&M survey, including individual mounds, additions to existing groups (e.g. Little Haldon MDV124946 and Ideford Common MDV124510) and new groups such as those at Luscombe Castle MDV124754, these monuments do not form a significant theme and are not explored in further detail here. Some are recommended for assessment (or re-assessment) against criteria for Scheduling on an individual basis (see Appendix B).

Later prehistoric to Romano-British

This survey coincided with an extended period of exceptionally dry summer weather during which Historic England undertook specialist aerial reconnaissance. Priority target areas included the area of Ipplepen where ongoing excavations of a later-prehistoric to Romano-British settlement have been taking place (see Research Theme: Prehistoric and Romano-British field systems on the limestone plateaux).

The 2018 images were made available after the transcription phase of survey was complete but it was clear that these targeted oblique aerial photographs contained significant information. As such, the relevant survey areas were revisited to incorporate these new sources. The sorties proved productive in capturing the extents and confirming survival of enclosures that had been recorded on the HER but had not been observed as archaeological cropmarks for some considerable time (e.g. MDV29079 and MDV37200). More importantly, a number of previously unrecorded enclosures were identified (for example MDV125514 and MDV125486, illustrated in Figs 6 and 7 below).

In addition, a number of simple possible enclosures were identified from the historic aerial imagery, for instance MDV124406. The newly recorded enclosures reinforce the known distribution for such monuments within the survey area, demonstrating a concentration on breccia and slates geologies (Fig 28). This pattern is briefly discussed below in relation to prehistoric enclosure on the limestone plateaux, and several sites are suggested as candidates for further work (see Appendix C).

The availability of lidar and the ability to compare several visualisations of the data, has allowed the earthwork remains of Iron Age hillforts to be recorded in great detail, as at Milber Down MDV8649, Denbury MDV8603, Berry's Wood MDV9145 and Castle Dyke MDV9008. Where the new extent or new elements extend beyond the existing Scheduled Monument area this has been noted to inform reassessment of the Scheduled Monument boundaries (Appendix B). A possible new hillfort or hilltop enclosure recorded from earthworks in Denbury and Torbryan parish (MDV122542) is also recommended for consideration as a designated site.

With the exception of some features confirmed by excavation at Dainton Elms Cross (such as MDV81350; see below; Oltean *et. al.* forthcoming), evidence for Roman features was not frequently encountered. (MDV121566). Exceptions include a double-ditched enclosure north of Dainton Elms Cross, reinterpreted as a possible fort or camp, and a newly recorded cropmark observed at Old Walls Hill (MDV122479), tentatively interpreted as having formed over the ditches of a Roman military fortification similar in form to the Roman signal station at Stoke Hill, Exeter (MDV20078); however its situation is less convincing, at the head of a combe downslope from higher ground. Further work is needed to establish the date and function of this feature (see Appendix C).

The widespread and often well-preserved remains of later-prehistoric field systems on the limestone plateaux are a significant theme arising from the survey and are explored in greater detail as a separate case below.

Figure 6: A newly recorded double-ditched enclosure (MDV125514) of possible prehistoric or Romano-British date. Top: 2018 oblique aerial photograph showing cropmarks, Broadhempston. North is to the bottom of the frame. HEA 33542_09 19-JUL-2018 ©Historic England Archive. Bottom: AI&M Transcription. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

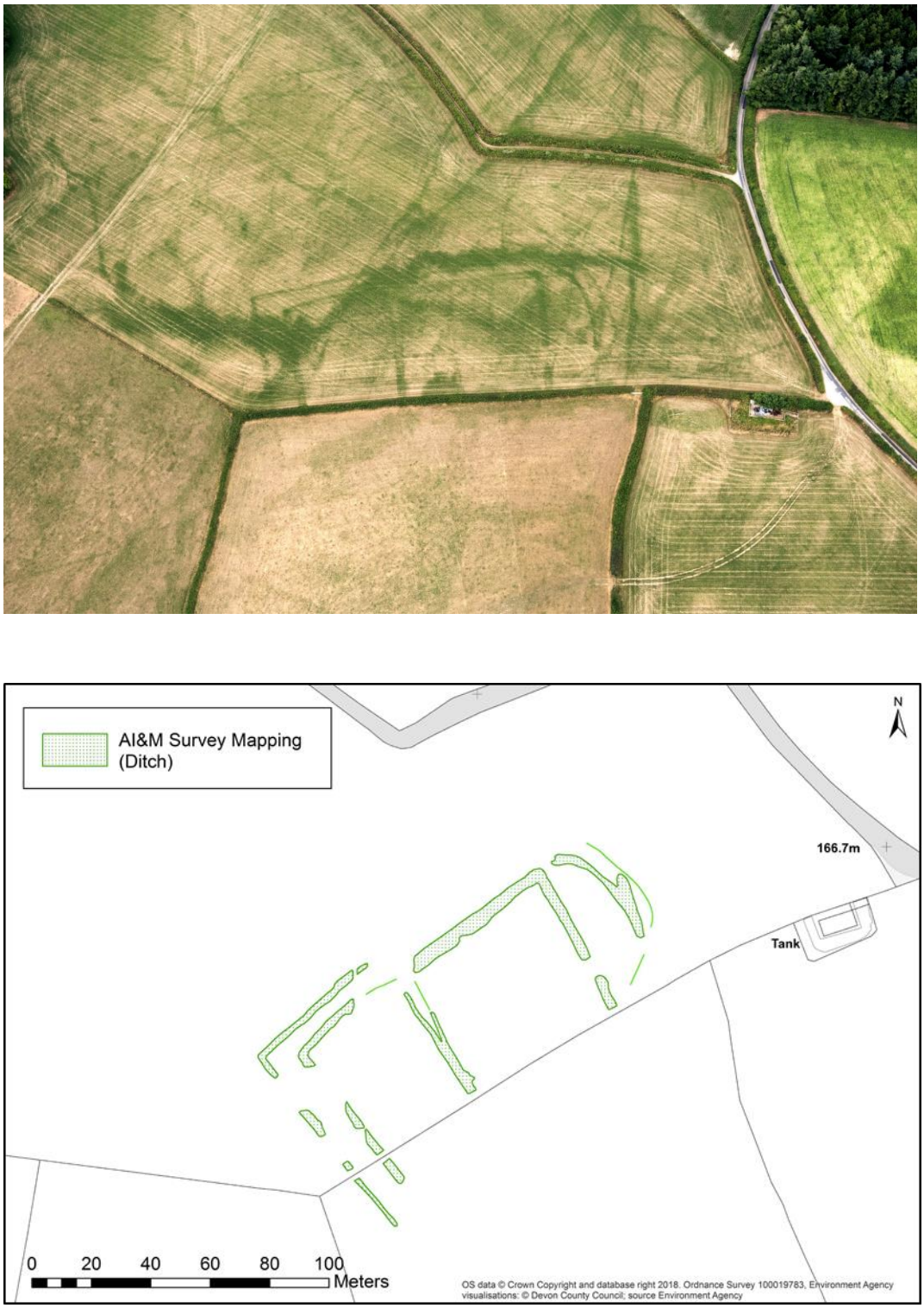


Figure 7: Two newly recorded rectilinear enclosures (MDV125486) of possible prehistoric or Romano-British date. Top: cropmarks visible on 2018 oblique aerial photograph, Staverton. HEA 33542_37 19-JUL-2018 ©Historic England Archive. Bottom: AI&M Transcriptions. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

Medieval

Historic Landscape Characterisation demonstrates that for much of the survey area the medieval farmed landscape is relatively well-preserved in the modern field pattern (see Field Boundary Loss displayed on the Devon Environment Viewer). However, a major contribution of this project is in recording the medieval fieldscape more completely (Appendix A). Field boundaries visible on aerial imagery but not depicted on the available historic mapping were recorded, i.e. those considered to have fallen out of use by the time of the 1830s-1840s tithe surveys.

These very numerous relict field boundaries indicate pronounced field boundary loss before the mid-19th century, particularly in the south of the project area. More strikingly, the survey has defined previously unrecorded and existing strip field systems visible as both cropmarks (MDV125481) and lynchets (MDV8705; MDV125205). These can cover large areas, and although impacts including development and off-road vehicle trails have damaged or levelled some, others survive as substantial earthworks (Figs 8 and 9).

Figure 8: Medieval strip lynchets (MDV8705) on Kerswell Hill, Coffinswell. DAP 6906/06 10-JUL-1990 (SR). © Devon County Council.

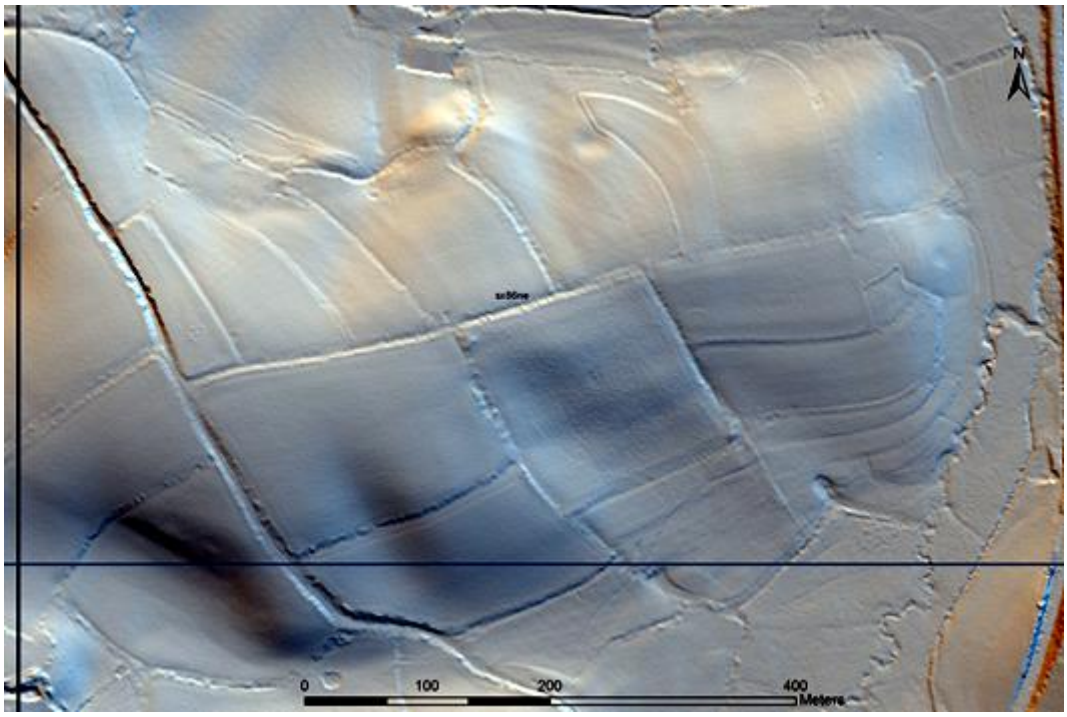


Figure 9: Newly recorded Medieval strip lynchets (MDV125205), east of Greatoak Cross, Abbotskerswell. LIDAR SX8667, SX8668 Environment Agency DTM 01-JAN-1998 to 31-MAY-2017, © Devon County Council, source Environment Agency.

A variety of other 'lost' elements of the medieval landscape have been newly recorded by the survey. Deserted or shrunken settlements (e.g. MDV122204: MDV122500; MDV123390) and re-routed or disused roads and trackways with a possible medieval origin (such as those on Knighton Heath, Chudleigh Knighton, MDV124325) help us to visualise the elements and linkages within these former landscapes. Ridge and furrow is relatively rare in Devon in comparison to other parts of England, so newly recorded examples recorded as earthworks at West Ogwell and Bickington (MDV123168; MDV123197) are worth noting here.

The distinctive tin works which cover large areas within approximately 5km of Bovey Tracey are at least in part thought to have their origin in the medieval period and are discussed in depth in a separate case study.

Post-medieval – 19th century

A wide range of monument categories were interpreted as post-medieval or 19th century in date, and some key locally distinctive types could not be more closely dated than to this date range. In particular, catchmeadows (e.g. MDV123394) and orchards (e.g. MDV123347) can have an uncertain origin, and/or may have spanned a fairly long period of use.

At 5% and 9% respectively, it is notable that there are fewer of both types than in the neighbouring East and Mid Devon River Catchments survey area (where the proportions were 8% and 19%) although they still form a significant proportion of monuments recorded by the survey; this is probably due to the lower proportion of marl and mudstone geology within the current survey area.

Most recorded water meadows were of the 'catchmeadow' type, also known as catchworks (Taylor 2007, 28-29). Such systems used springs or streams to irrigate the combe slopes rather than the valley floor, as with bedwork water meadows, and were very widespread in Devon in the 19th century, often remaining in use into the mid-20th century. A handful of valley bottom water meadows were recorded, including one of possible medieval origin at Dart Bridge, Ashburton (MDV7796) and a bedwork interpreted as of 19th century in date along the River Dart south-east of Buckfastleigh (MDV122353).

In addition to the medieval or post-medieval tin working (discussed in the Research Theme: Tin Mining in the Bovey Basin), a variety of evidence attests to a historic focus of extractive industries within the survey area.

Large 20th century clay workings dominate the modern landscape and have been mapped by the Ordnance Survey, for instance at Heathfield. Although not transcribed by the AI&M survey, greater time-depth has been added to the monument records for such modern industrial complexes.

Unrecorded or only partially mapped historic extractive sites have been transcribed as part of the AI&M survey, such as earthworks associated with Long Burrow Windmill, Kingskerswell (MDV8673); post-medieval lime kiln enclosures at Chudleigh previously interpreted as barrows (MDV65371); a complex of structures comprising 19th century Newton Abbot potteries (MDV52554); substantial earthworks of the 19th century Bovey Pottery leat (MDV21312); unusual and localised 19th century umber extractive pits at Buckfastleigh MDV124337); the interior of a demolished 19th-20th century brick kiln in Torquay (MDV55637).

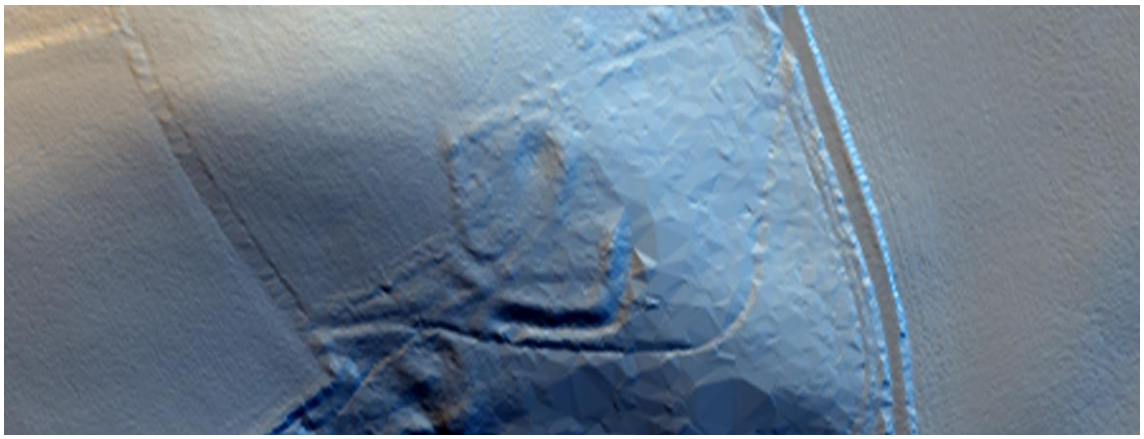


Figure 10: Earthwork remains at Round Covert, Hennock (MDV8998). LIDAR SX8579 Environment Agency DTM 01-JAN-1998 to 31-MAY-2017, © Devon County Council, source Environment Agency.

The intriguing earthwork remains at Round Covert, Hennock (MDV8998) have been subject to various interpretations including a prehistoric earthwork, civil war emplacement and 19th century garden feature (Fig 10). Given the recreational character of many parts of the south Devon landscape from the 19th century, the latter suggestion, based on the name 'Pleasure House Brake' in the tithe apportionment, is plausible. However, reassessment using the AI&M mapping rather supports an interpretation as a temporary civil war emplacement overlooking the river valley road, with possible cannon emplacement and trackways. Part could

perhaps have been later enhanced to form a folly or viewpoint from the grounds of the nearby Huxbear House.

More easily interpreted parkland features have been newly recorded at other designed landscapes. For instance at Stover House, north-west of Newton Abbot, additional features include parkland walks and a possible ornamental bridge (MDV124274). As might be expected, parkland also revealed evidence of the medieval field systems they had previously displaced (e.g. MDV9228; MDV124762). Disappointingly, little was observed at Watcombe Park in Torbay (MDV31966), the landscape designed by Brunel as a setting for the grand house he intended for his retirement, but that was substantially constructed only after his death.

20th century

The unusual, relatively intact Italian garden designed for Great Ambrook near Ipplepen (MDV103639) was created in 1909-1912, and consequently is not depicted on the Ordnance Survey First or Second Edition mapping. However, both structural and earthwork features could be transcribed from the aerial imagery, particularly lidar derived visualisations, and the AI&M mapping can be used to depict these in an easily readable format.

The impact of the First World War can be traced on the landscape at Teignmouth golf course. Here, the remains of practice trenches previously observed on aerial photographs taken in the 1940s could still be seen, albeit as subtle and very damaged earthwork banks and ditches on lidar-derived visualisations (Fig 11: MDV42251).

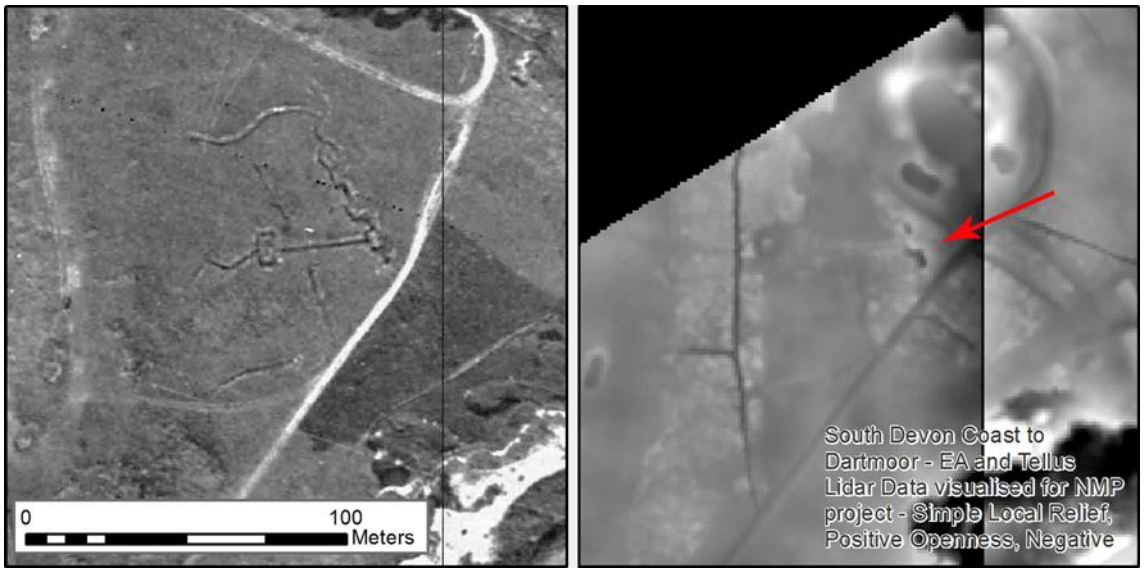


Figure 11: First World War practice trenches on Teignmouth Golf Course (MDV42251). Left: Visible in November 1946. Right: Surviving as very damaged earthworks as visible on simple local relief lidar-derived visualisations. RAF/CPE/UK/1824 RP 3083 04-NOV-1946 Historic England Archive (RAF Photography); LIDAR SX9175 Environment Agency DTM 01-JAN-1998 to 31-MAY-2017, © Devon County Council, source Environment Agency.

More evidence of the Second World War's impact could be seen, although considerably less than noted along the adjacent coastal strip, recorded during the South Devon RCZA project (Hegarty et al 2014). A combination of known and new sites were recorded; additional detail could be added at several sites including Denbury Camp MDV21906 , also known as Rawlinson Barracks (now HM Prison Channing Wood), and US complexes including an army base at Stover Park MDV111667, naval stores depot on Knighton Heath, Chudleigh Knighton MDV21239, and the hospital at Ilford Park, later reused as a Polish resettlement facility MDV55119. Newly recorded sites include camps in the grounds of two Torbay schools, Audley Park MDV125315 and Torquay Girls' Grammar MDV125256; the original occupiers of these have been suggested as Canadian and American troops respectively by local residents. These sites may have potential for further school or community-based projects.

The airborne threat to civilians in Devon during the Second World War is reflected by the numbers of circular Emergency Water Supply (EWS) reservoirs visible on 1940s aerial photographs in Bishopsteignton, Chudleigh, Kingsteignton and especially Torquay. They can be seen squeezed into small plots within town plans (MDV125409) as well as more open areas such as sports grounds (MDV125329) and churchyards (MDV125406). The latter is particularly poignant as St Mary's Church is the site of one of Torbay's wartime tragedies; the church was bombed during a Sunday school service in May 1943 and the resulting collapse killed children and teachers. The damaged and roofless structure can be seen on aerial photographs between 1946 and 1949 (MDV9548). Air raid shelters were visible at Newton Abbot (MDV61531), Teignmouth (MDV122425) and Torquay (MDV125326).

In these relatively built-up areas remains did not persist long after the end of the conflict, although it is notable that some earthworks can still be seen on Knighton Heath, and despite abandonment and demolition, some structures survive at Ilford camp.

Haldon aerodrome (MDV54205) on Little Haldon hill, north-west of Teignmouth, was placed under military control during the Second World War, and although not used into the post-war period, parts of the civilian and wartime airfield survived until at least 2015. This includes an early landing circle and airfield identifier, missing its first letter, visible as 'ALDON' from 1946.

Much information of local, landscape and social history interest can be found in the historic aerial photographic resource but often falls beyond the remit of an AI&M survey and is consequently not recorded in the monument records.

For instance, Buckfast Abbey is an important and nationally protected site which, as described above, has an interesting modern history. This includes the Second World War when "The older German members, who had all become naturalised British subjects, remained at Buckfast, where the Abbey took part in the British war effort, manning the local fire-fighters' force, farming intensively and offering a refuge from the blitz for the staff and 100 pupils of St. Boniface College, Plymouth" (Buckfast Abbey 2019). The Abbey is visible on some of the earliest aerial photographs available during this survey, such as illustrated in Fig 4. These help to understand

the evolving formal landscape around the Abbey (MDV123371; MDV123375) as well as less tangible evidence of the changing recreational and working lives of the monks from the 1930s onwards (MDV7808; MDV20064).

The post-war removal of hedgerow trees is clear on historic aerial photographs. Images of May 1949 capture this process to the north of Bickington (circa SX802731), illustrating the impact of large-scale tree felling on an area that, two years later, was to be included in the Dartmoor National Park designation (Fig 12).

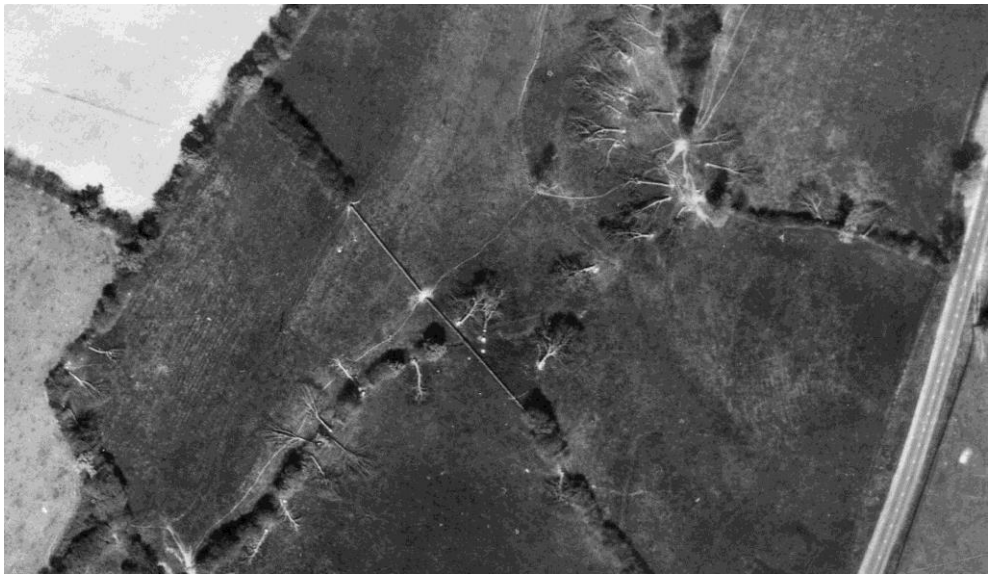


Figure 12: A small section of an aerial photograph capturing very recent or ongoing felling of hedgerow trees across a large area north of Bickington, in 1949. Extract from RAF/58/220 V 5158 02-MAY-1949 Historic England Archive (RAF Photography).

RESEARCH THEME: PREHISTORIC AND ROMANO-BRITISH FIELD SYSTEMS ON THE LIMESTONE PLATEAUX

"Field systems are the largest form of prehistoric monument." (Yates 2007, 13)

Introduction

To the east of the project area, the Blackdown Hills-Quantock Hills line has marked the western limit of many significant cultural markers from at least the Iron Age to the medieval period. These include for instance, the limit of the economic territory of the pre-Roman Durotriges tribal group and 'Wessex' style hillforts and the subsequent Roman *Civitates* of the Durotriges, extensive Romanisation including towns, villas and temples, early Anglo-Saxon settlement evidence and medieval nucleated villages and open fields that either stop or are significantly less well represented west of the Blackdowns-Quantocks Hills line (Rippon et al 2006, 5-6; Rippon 2012, 286-314; Rippon et al 2015, 221, 232).

The absence of extensive Romanisation does not mean, however, that Devon's rural landscape is essentially prehistoric in character; evidence is increasingly pointing to a significant and transformative 'episode of discontinuity or dislocation' in the landscape of the south-west between the 6th-7th and 10th-11th century, from which the later medieval landscape of largely dispersed, unenclosed farms and hamlets emerged (Rippon 2006, 2012, 2015; Turner 2006; Fyfe 2006).

In a predominantly rural county such as Devon, where it has been argued that enclosure was both early and enduring, it is perhaps unsurprising that medieval and post-medieval field boundaries and field systems are a major theme to emerge from a landscape scale survey (see Quantification). It might also be unsurprising that evidence of pre-medieval field boundaries is rare, confined largely to those more agriculturally marginal and unenclosed, or recently enclosed, upland areas. In Cornwall elements of later-prehistoric field systems are known to survive both as relict systems overlain by later enclosure and fossilised within medieval field patterns (Cornwall Council), but regionally, studies of such field systems have been dominated by the uplands evidence, notably the Dartmoor reaves, discussed below.

Most commonly, prehistoric and Romano-British field patterns are identified through 'undated' cropmarks although, as is described below, commercially driven fieldwork is increasingly redressing the balance. In the south and east of England, such field patterns, often described as 'regular', 'brickwork' or coaxial in character are frequently recorded in association with enclosures interpreted as evidence for settlement. In lowland Devon, cropmark evidence for later-prehistoric settlement, often interpreted as Iron Age in date, is typically not associated with any evidence for field systems. The features assessed in this thematic chapter are exceptions to this pattern.

Extant, though often much eroded earthworks, they survive in a lowland context surrounded by good quality farmland, on gentle limestone plateaux; islands of easily tilled but often very shallow, and agriculturally marginal soils. Frequently associated with or abutting enclosures, they are exceptional survivals of field systems interpreted as Bronze Age or Iron Age date.

Previous study

Notable figures such as the 18th and 19th century antiquarians William Stukeley and Richard Colt-Hoare recognised that pre-Roman enclosure patterns could be identified in the landscape. For instance, in *The Ancient History of Wiltshire* Colt-Hoare discussed evidence of 'the habitations of the Britons when alive' in contrast to funerary or ceremonial sites, such as the 'British settlement' at Knook Down (Colt-Hoare 1810, 83-84).

A few years later in the mid-1820s the Devon antiquarian the Reverend J. MacEnery recognised the antiquity of the field system on the common at Walls Hill (MDV104936), just beyond the study area in Torquay (Fig 13 and Fig 15), albeit identifying the earthworks as 'ancient lines of circumvallation' of Roman military character, due to his recovery of a Trajanic coin from a cave in a nearby cove (Gallant et al 1985; Pengelly 1873, 65-66). MacEnery's work remained unpublished until included in Pengelly's review of work on Anstey's Cove (1873). In the early 1830s Blewitt 'commenced digging in several locations' at Walls Hill, and though 'unsuccessful in making any new discoveries' noted the loose limestone construction of the 'camp', and recorded the recovery of the upper section of an 'ancient granite rotary quern' from the combe below the common. He therefore tentatively associated the earthworks with agricultural activity, albeit still in the Roman military sphere (Blewitt 1832, 203-204). By the late 19th century Worth was actively trying to locate the Walls Hill field system in the geography of the ancient world, identifying the site as the settlement of Apaunaris/Apuanaris listed on the Ravenna Cosmography (Gallant et a. 203-4; Worth 1885).

True archaeological research into ancient field systems however, began in earnest in the early 20th century. Local enthusiasts in Sussex pioneered not only the recognition of pre-Roman land division, but also methods for its survey and record (Yates 2007, 4-5). Once recognised, this research spread from Sussex throughout the UK, with members of the Brighton and Hove Archaeological Club, including Cecil Curwen, comparing evidence from Jutland to Cornwall and the Western Isles (ibid). It was Curwen, simultaneously with OGS Crawford, who introduced the somewhat misleading term 'Celtic Fields' to describe extensive prehistoric enclosure (McOmish 2011; Yates 2007, 5), but it was Crawford, with Keiller, who popularised the subject in Wessex from the Air (1928), and further promoted the subject as editor of Antiquity.

Without recognition of the value of aerial photography to landscape archaeology, work such as the current survey would not be possible. However, it is ironic that this recognition coincided with both the development of the technology and a period of agricultural intensification; from the 1940s onward, vast areas of field system earthworks were levelled and from this point the earthworks surviving on the less intensively farmed chalk downs and uplands in the south and south-east dominated the subject throughout the 20th century.

Perhaps most relevant here however, is the rediscovery in the later 20th century of the extensive system of linear stone topped boundaries that divide swathes of Dartmoor upland. Known as reaves, these boundaries can extend over areas as large as 200ha, and it was their identification and subsequent analysis by Fleming that broadened the focus of prehistoric land division studies from the boundaries

themselves, to encompass the social, economic and symbolic structures that underpinned their design and construction (Yates 2007, 6-7; Fleming 1988).

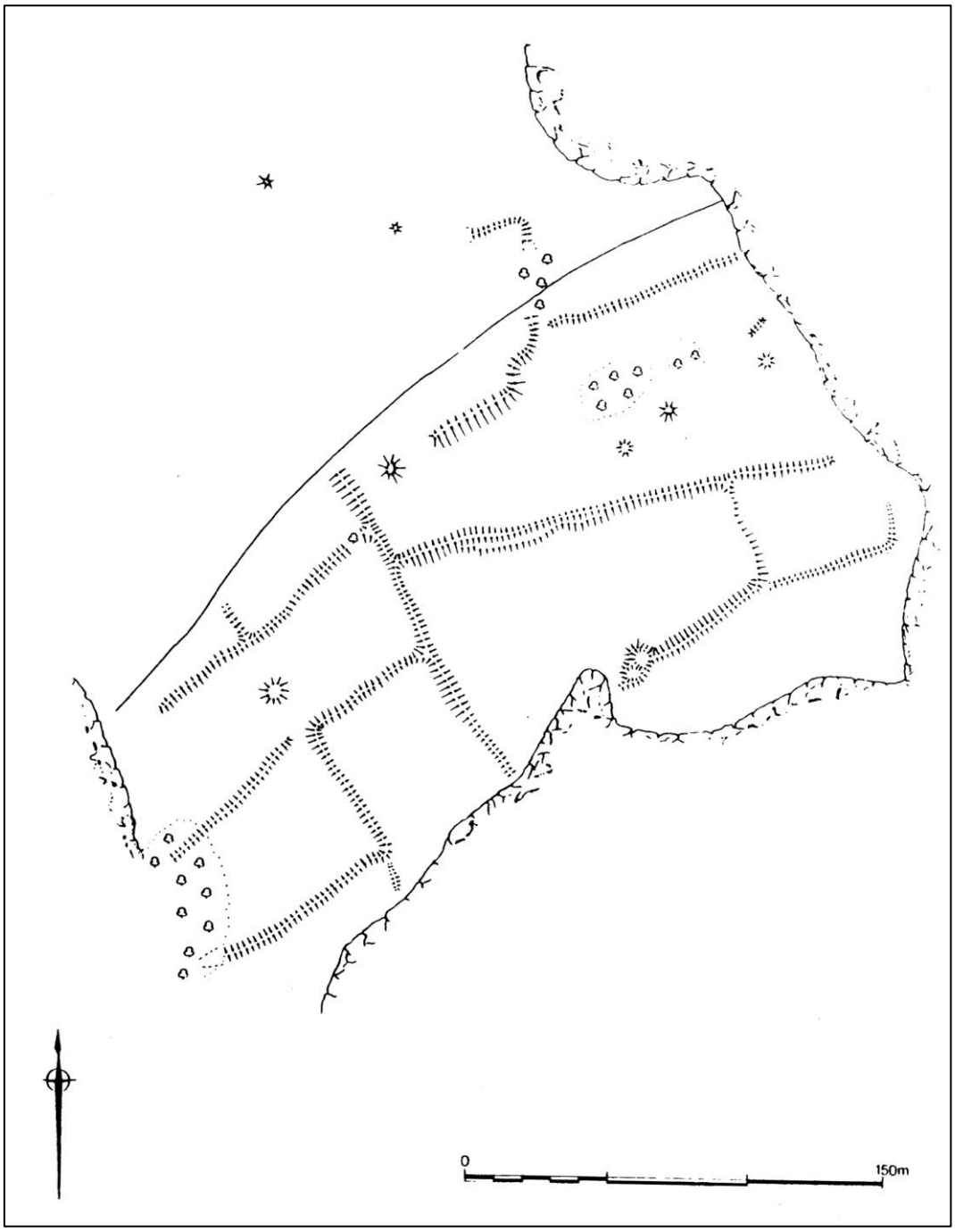


Figure 13: Walls Hill field system reproduced from Gallant et al 1985. © Devon Archaeological Society).

It was during this period that the second significant lowland prehistoric field system in Devon, after Walls Hill, was identified on Miltor Mator Common, Dainton, also situated on a plateau of limestone geology, albeit 6 km inland from the Torbay coast (MDV8713). Although partly obscured by impenetrable vegetation the visible earthworks were interpreted as analogous to Walls Hill, if more comprehensible and regular in plan (Fig 14). Following identification of earthworks and possible Iron

Age pottery by a local scoutmaster, the Devon Archaeological Exploration Society organised excavations in 1939 and 1949 (Willis and Rogers 1951). Although limited in scope this work identified the prehistoric character of the site; some conclusions of this early work such as the interpretation of the numerous stone mounds across the site as possible hut bases do not bear reinterpretation, but others stand up well, such as the identification of occupation deposits sealed below clearance cairns and a 'crescentic bank' as an eroded hut circle of possible Iron Age date, a conclusion borne out by later work (see below).

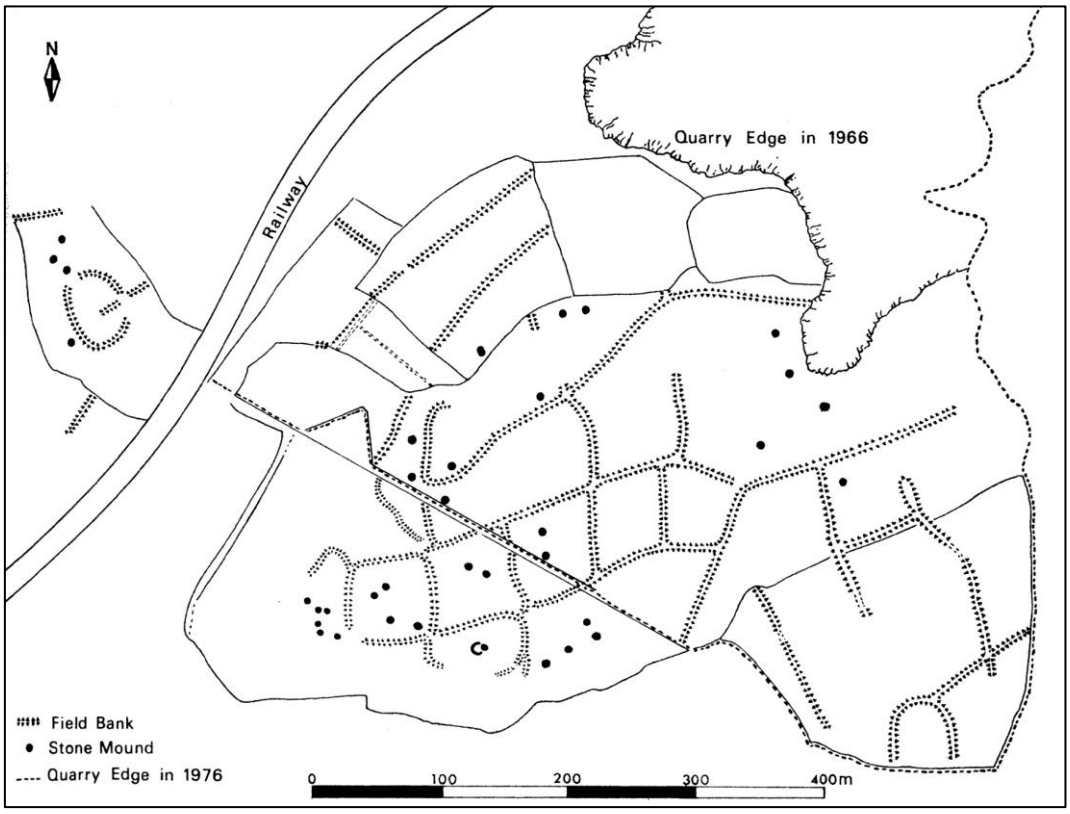


Figure 14: Miltor Mator Common, field system Dainton. This is Gallant Site 12 Dainton, south-east of railway; Gallant Site 13 Dainton Brake to the north-west. Reproduced from Silvester 1980. © Devon Archaeological Society.

Quarrying had destroyed much of the Dainton field system by the 1970s, and excavation in areas adjacent to the earlier work hoped to improve understanding of this site (Silvester 1980). To an extent this was successful; the near absence of stratigraphy and evidence for occupation activity sealed beneath cairns was confirmed, but whether any limestone mounds were former hut circles reused as clearance cairns was unresolved. What was clear was that at least one mound had been used – or possibly reused - for funerary purposes.

Dating of this site remained problematical; due to its fragmentary nature, absence of stratigraphically secure contexts and limited comparative material, dating of the Dainton ceramics from the 1975 excavation must be viewed with some caution. Silvester states that typologically the date of the recovered flint assemblage 'cannot be later than Early Bronze Age' (Silvester 1980, 46).

Arguably the most significant aspect of this work was the recovery from a small pit adjacent to a cairn of a nationally significant assemblage of crucibles and mould fragments indicative of Late Bronze Age metal working, producing swords, spearheads, weapon accoutrements and possible clothing accessories. This assemblage was interpreted as evidence of high-status occupation in the vicinity. Although pottery recovered with the metalworking assemblage was indistinguishable from that recovered from the surrounding area, there was no direct contextual relationship between the pit and the suggested occupation evidence, and the association between metal working and settlement must be considered circumstantial (Silvester 1980, 20, 30-38).

Nonetheless, the metal working evidence supports a later Bronze Age date and the ceramics indicate a lengthy period of use, perhaps several hundred years, post-circa 1100BC. Variations in the ceramic assemblages across the site indicated that the focus of the settlement shifted over the period of occupation and the construction of clearance cairns over former house sites might indicate that settlement contracted as agriculture expanded; the need for additional clearance cairns could be interpreted as a consequence of prolonged erosion of thin soils (Silvester 1980, 44).

Excavation in 1986, in advance of further quarry expansion possibly corroborated this interpretation. Reassessment of the 'crescentic cairn' first assessed by Willis and Rogers confirmed that this was indeed the remains of a stone walled post-built house, its entrance covered, perhaps 'sealed', by the construction of a cairn following abandonment (Bayliss *et al* 2012, 73). Significantly, datable artefactual evidence indicates occupation from c.1100-500BC, perhaps in two phases, whilst radiocarbon dating of charcoal from a posthole at the roundhouse entrance gave a date of 2150 ± 80BP, placing some activity, whether it be occupation, desertion or construction of the cairn, firmly into the Iron Age, although it is suggested that the calibrated date is of limited usefulness (1σ: 360-50 cal BC) (ibid).

Roughly contemporary with Silvester's work at Dainton, a concerted attempt was made to broaden the context of the Walls Hill and Dainton field systems. Having made the association between extant earthworks and outcropping limestone geology and soils, Gallant et al (1985), in conjunction with Silvester, identified geologically and topographically zones comparable to Walls Hill and Dainton throughout south Devon, suggesting potential for similar earthwork survival. Of these, 20 accessible locations near Newton Abbot were selected as foci for field survey building on an earlier aerial photographic assessment by Silvester (Fig 15; after Gallant et al 1985). Of the 20 locales, the site of Berry Down hillfort and a flint scatter at North Whilborough contain no field system elements and as such are not relevant to this discussion, although the latter adds some insight into activity on the limestone plateaux throughout prehistory. Smaller areas of limestone to the south of Torbay were unexamined by Gallant et al but have good potential for further discovery.

The subtlety of earthwork survival or dense vegetation prevented detailed survey at six of the eighteen sites but evidence of land management and enclosure morphologically comparable to Walls Hill and Dainton was identified at all of them, a very significant result. As at Walls Hill and Dainton, banks were a feature common to all, with numerous circular or sub-circular mounds the next most

common; early DAP sorties provided valuable interpretative evidence for several locations (Gallant et al 1985 Plate 1), and this evidence was enhanced by further reconnaissance (Fig 34). No evidence of large scale planned enclosure comparable to the linear Dartmoor reaves or true coaxial field systems were recorded; linear elements were identified at most if not all sites, with some evidence of changes in dominant orientation apparent (Gallant Site 4, Tornewton; Gallant Site 15, Kerswell Down) but the banks were interpreted as defining both regular and irregular accreted field systems, with the latter in the majority. Enclosures too large for house bases were recorded at four locations (Gallant Sites 3, 4, 8 & 10). Interpreted as possible settlement sites or stock enclosures, several were abutted by linear banks, suggesting they formed part of the accreted field patterns.

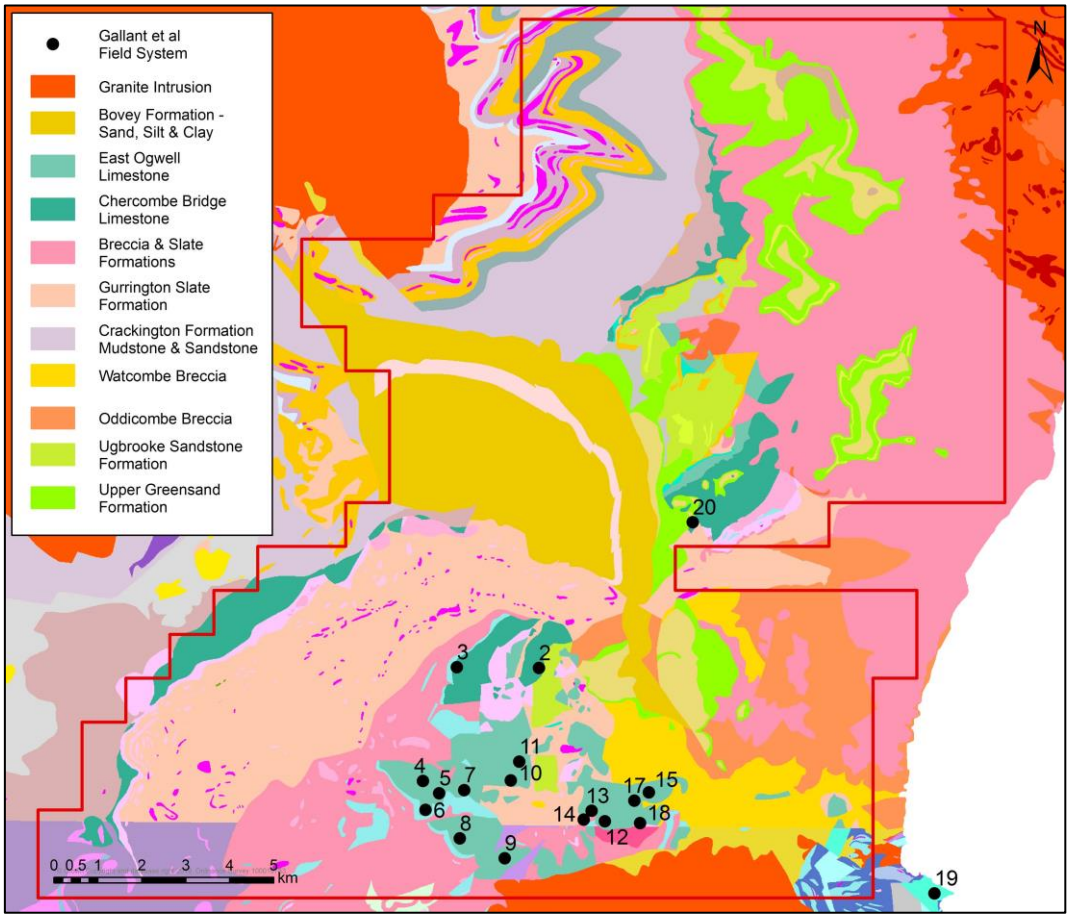


Figure 15: Distribution of prehistoric field systems as identified by Gallant et al, overlain onto BGS bedrock geology mapping (simplified legend). All are located on limestone bedrock. Note Walls Hill (Gallant Site 19) south-east of the survey area. Reproduced with permission of the British Geological Survey © NERC. All rights reserved.

The most significant conclusion of this work is to confirm the survival of fragments of field system on the marginal soils of limestone plateaux in South Devon, interpreted by analogy with Walls Hill and Dainton as evidence of later-prehistoric land management. The proximity of many of these sites was taken as indicative of a previously much more extensive and probably integrated network of communities and land management, extending onto the richer soils away from the limestone outcrops.

Two of the sites not surveyed by Gallant et al, the near contiguous systems at Kerswell Down and Whilborough Common (Gallant Sites 15 & 17: Fig 16) were assessed in 1995 (Quinn 1995). Characterised as similar in construction but more regular in plan than the Dainton system, perhaps a 'regular accreted' system, the most significant outcomes of work at this site could be evidence of phased construction visible in the triangular junction of two boundaries and a suggestion of alignment on extant boundaries to the south and east. This could imply a previously greater extent and influence on the later, predominantly medieval field system.

Despite remaining under pasture, partly in recreational use, an assessment in 1997 found Dainton to be a site in deteriorating condition (Exeter Archaeology 1997). This was the last fieldwork to be carried out on these potentially very significant field systems.

However, the potential of lidar data to build upon the work of Silvester, Gallant et al and Quinn was recognised by the DCCHET. Although the results were somewhat rudimentary, a 2015 pilot study assessment of Environment Agency static jpeg tiles indicated that the known field systems were more extensive than previously appreciated (Bill Horner pers comm).

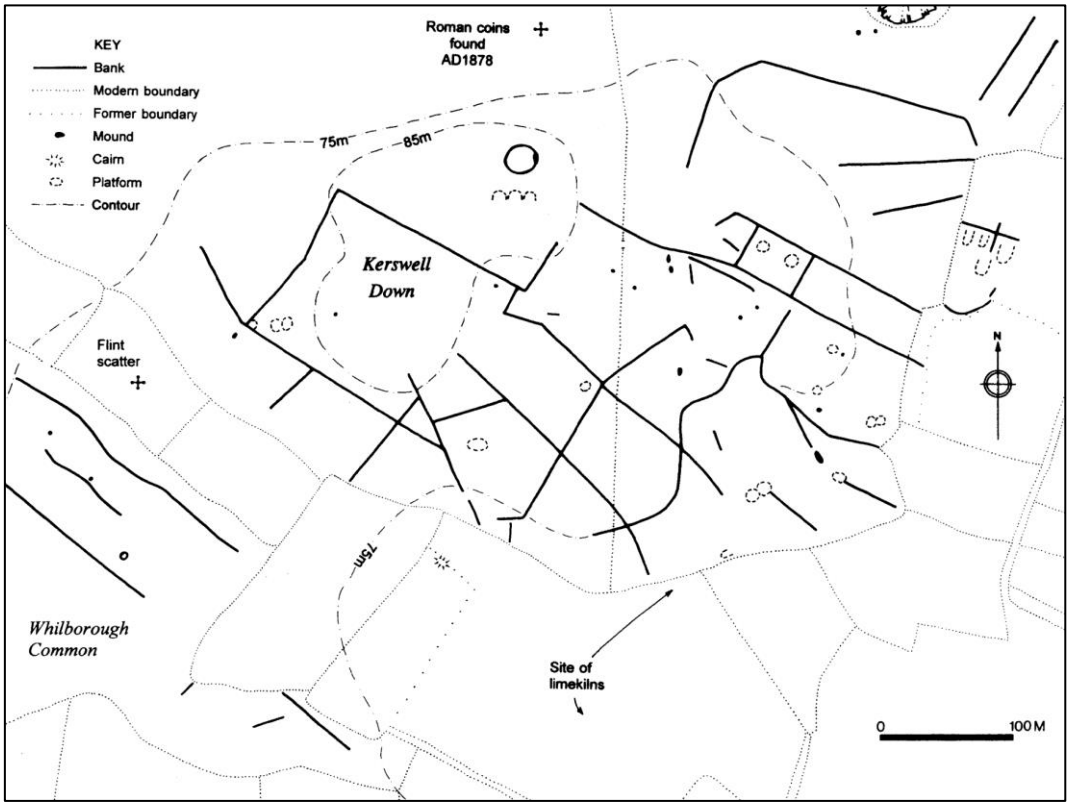


Figure 16: The 1995 survey of the prehistoric field system on Whilborough Common and Kerswell Down, equating to Gallant Sites 15 and 17. Reproduced from Quinn 1995. © Devon Archaeological Society.

The AI&M survey

Although it is stated that aerial photography was consulted prior to earlier fieldwork to characterise and survey ancient field systems on the limestone plateau of South

Devon, little is reported on the extent or effectiveness of this work (Gallant et al 1985, 23; plate facing page 36). The AI&M survey is therefore likely to be the first to assess the effectiveness of a truly systematic approach to this topic using all readily available aerial and remote sensing resources.

The work by Gallant et al was however an important advance in the appreciation of the extent and survival of possible 'ancient field systems' beyond the Devon uplands, and a focus on the Dartmoor reaves. As such, it may be useful to structure a summary of the AI&M survey results in the form of a response to the results and questions raised by the earlier work.

Key questions that might be addressed include:

- Does the AI&M survey data support the interpretation that the fragmentary systems are partial survivals of earlier more extensive field systems?
- If so, does the AI&M survey data indicate that previously extensive land management continued onto 'richer' soils?
- Does the AI&M survey data support the suggestion that the proximity of the limestone field systems, with Dainton as the largest surviving unit, formed a 'complex of interrelated communities'?
- Does the AI&M survey data provide any evidence of a relationship between relict boundaries and later/extant field systems?
- Does the evidence provided by the AI&M survey shed any light on the date or longevity of the field systems?

Before addressing the above points, it is important to clarify that the AI&M survey has transcribed evidence of pre-medieval land management at almost 90% of the sites identified by Gallant et al, including those areas in which they could not survey, either due to subtlety of visible earthworks or dense vegetation. This confirms both the validity of their premise and the suitability of AI&M methodology, in particular the value of lidar data, to survey in such landscapes.

Somewhat ironically, the first exception is at Dainton. Dense scrub obscured much of the field system from view on aerial photographs of the 1940s and by the 1980s quarrying had destroyed over 75% of the earthworks identified by Silvester (Fig 14 and Fig 17).

The second exception is less than 500m west of Dainton at Gallant Site 14, Dainton Bridge; the AI&M survey did not record any evidence of a rectilinear enclosure identified by the earlier survey, only relict boundaries derived from medieval strip fields (MDV8691).

For the remainder of the sites, a simple visual assessment of the AI&M survey transcriptions provides a ready answer to the first point raised above; the survey has in most instances increased the known area of the relict field systems and in the few instances it is has not, it has greatly added to the detail recorded for each field system (for an overview Fig 23).

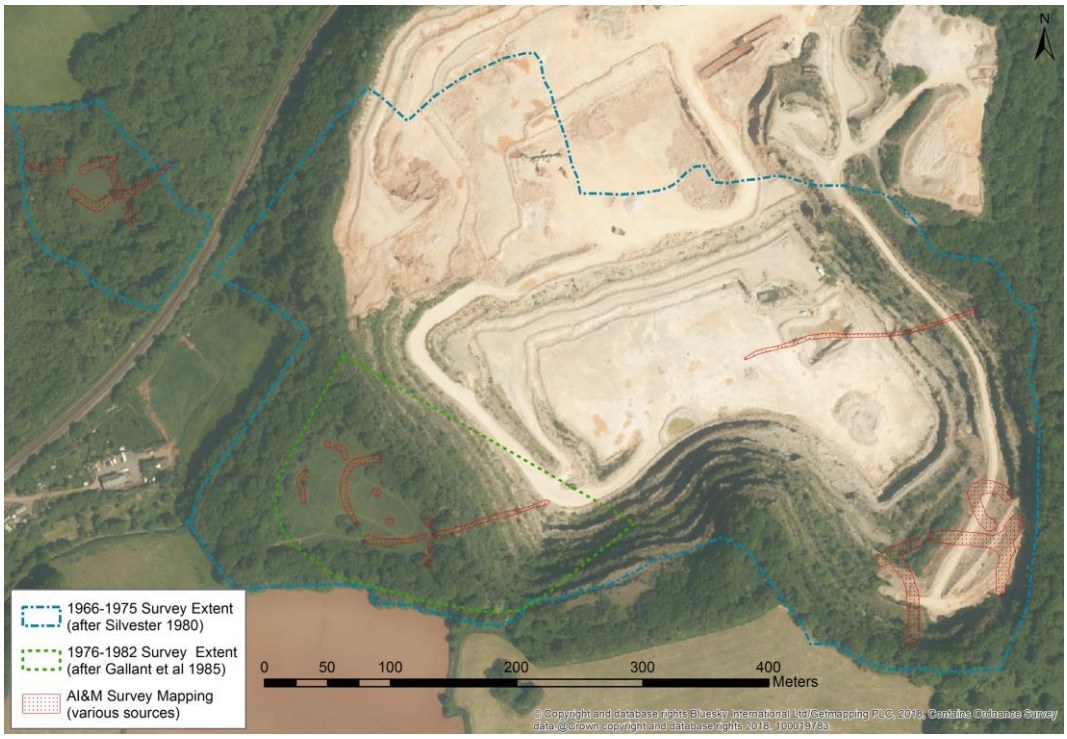
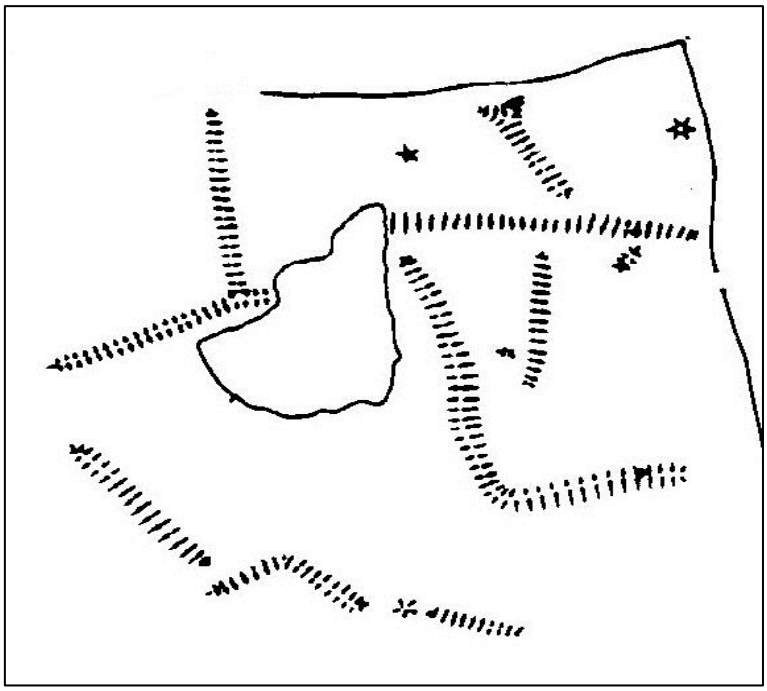


Figure 17: Extent of successive surveys of the prehistoric field system on Miltor Mator Common, Dainton. Gallant Site 12 Dainton, south-east of railway; Gallant Site 13 Dainton Brake to the north-west. Next Perspectives APGB Imagery SX8566, SX8567, SX8666, SX8667 06-JUN-2015.

For instance, at Gallant Site 11, Dornafield (MDV8642), the AI&M transcription corresponds in part with the earthworks previously surveyed (Gallant et al 1985, 28-29; fig. 4) and does not extend significantly beyond the area defined by the previous survey. The AI&M survey has however identified several previously unrecorded elements including an enclosure to the south-west corner of the complex to which the field boundaries are probably appended (Figure 18). This changes the character of the site and has been somewhat corroborated by geophysical survey (Dean 2016a).

In a small number of examples, the improved definition and more accurate spatial data can be interpreted as resulting in an apparent decrease in the known area e.g. at Dainton Brake (Gallant site no. 13; Fig 14 and 17) and Whilborough Common (Gallant site 17; Fig 16 and 31) where the boundaries recorded from the AI&M survey extend over areas 73% and 44% smaller than indicated by the previous survey (Gallant et al 1985, 28; Quinn 1995, 133). Such decreases are an artefact of improved recording and reflect indicative and inaccurate extents derived from the previous surveys. In these instances, Dainton Brake is more appropriately considered as an outlying element of Dainton (Gallant site 12), as previously depicted by Silvester (Fig 14) rather than a separate site. Similarly, Whilborough Common (Gallant site 17) should be considered part of site Kerswell Down (Gallant site 15).



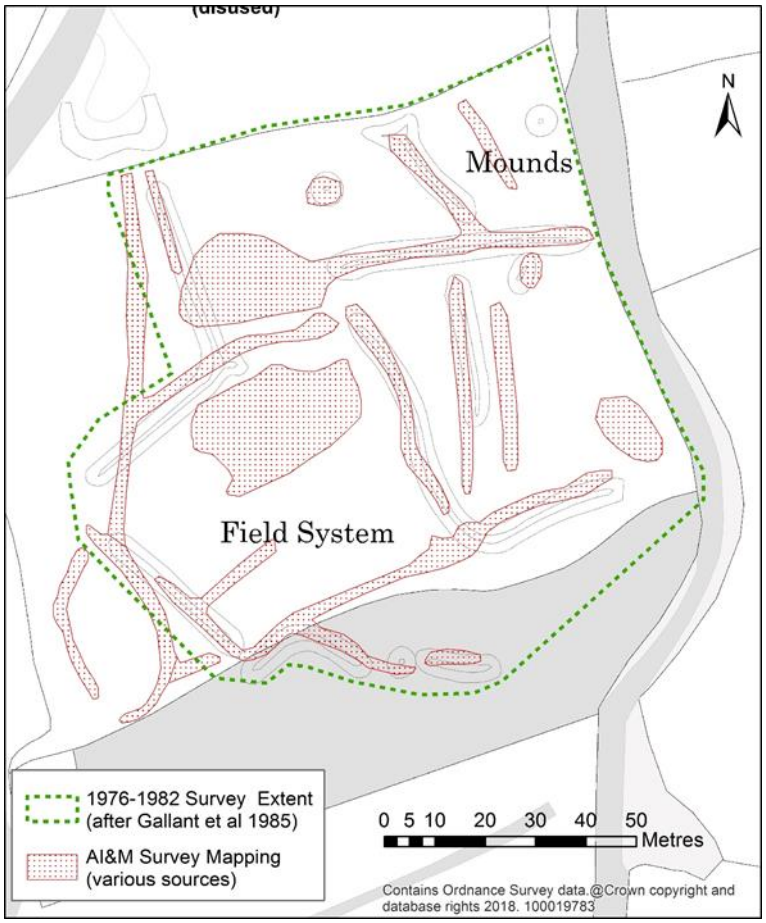


Figure 18: Gallant et al Site 11, Dornafield. Top: reproduced from Gallant et al 1985. © Devon Archaeological Society. Bottom: The AI&M survey transcription. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

In contrast, the extent of approximately 75% of the sites identified by Gallant et al has been extended by the AI&M survey, 40% significantly so. No estimated area was provided by Gallant et al for two of the six field systems not previously surveyed (Beltor, Gallant site 9 and Kerswell Down, Gallant site 15), but the summary descriptions of visible earthworks provided were sufficient to conclude that the AI&M Survey has significantly extended the known resource. For a third un-surveyed system (Gallant Site 7, Clennon Fields), it was stated that 'The majority of the banks are visible only from a distance and are impossible to survey' (ibid), with the area estimated at 9ha; in this case the AI&M survey transcribed banks, clearance cairns and enclosures over nearly 15ha (Fig 19).

For the remaining five sites, the area estimated and/or depicted in associated survey plans by Gallant et al and Quinn can be readily compared to the corresponding AI&M survey transcriptions. In absolute terms, the largest area recorded by the AI&M survey was at Gallant site 3, Deer Park, where the newly recorded area of nearly 22ha represented an increase in known extent of 247% (Fig 20).

The greatest proportional increase in both area and detail, however, was recorded at Gallant site 5, Torbryan Hill (373%), and Gallant site 8, Orley Common (390%), illustrated in Fig 21 and Fig 22.

Figure 19: The AI&M survey transcriptions of relict field boundaries at Clennon Fields, Gallant Site no. 7 (MDV8644) overlain onto the 1845 Tithe Map for Torbryan (© Devon County Council & South West Heritage Trust). Note the partial alignment of relict boundaries with those still in use in 1845. AI&M transcriptions © Devon County Council.

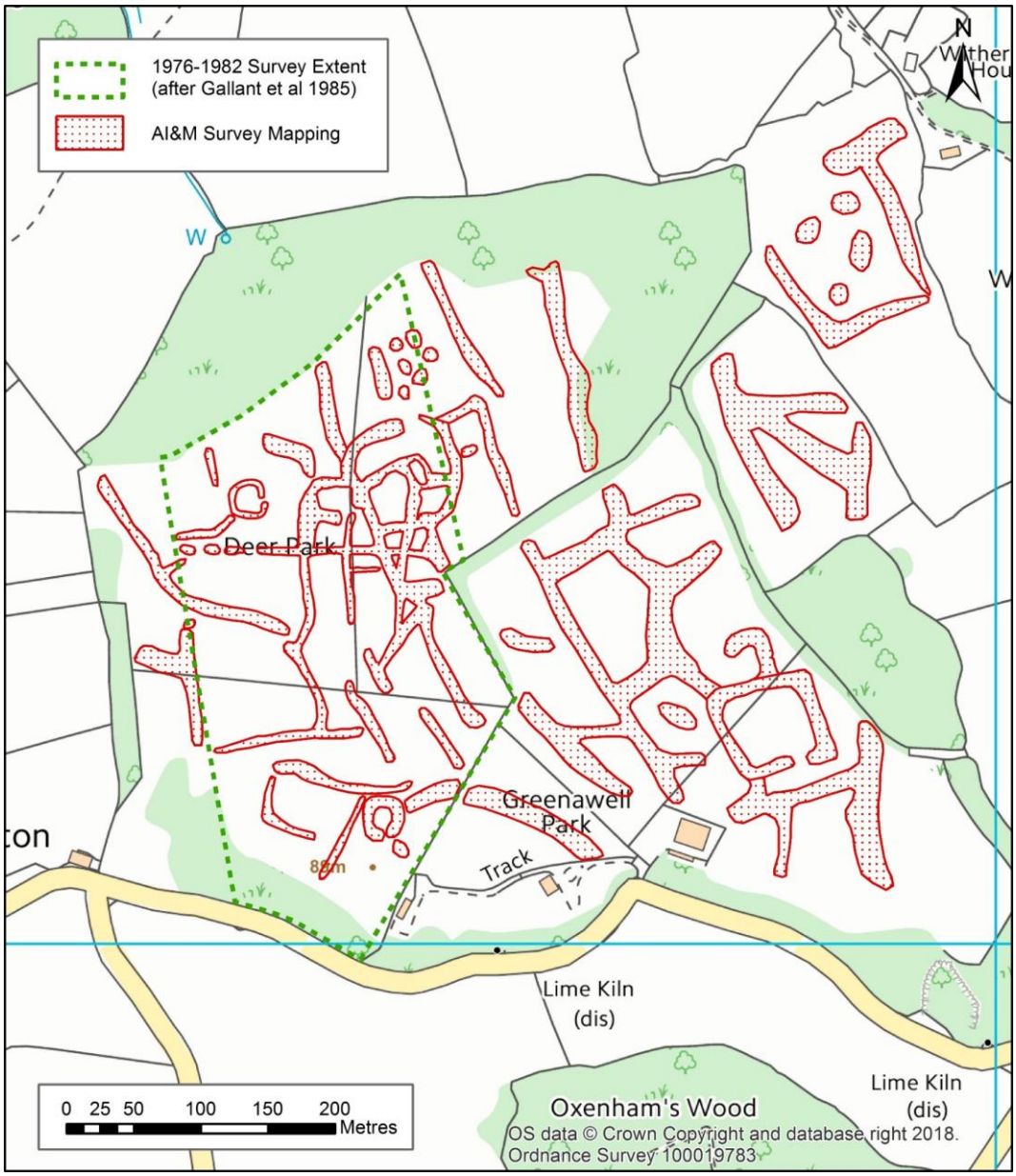


Figure 20: The AI&M survey transcriptions of relict field boundaries at Deer Park, Gallant Site no. 3 (MDV76373). The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

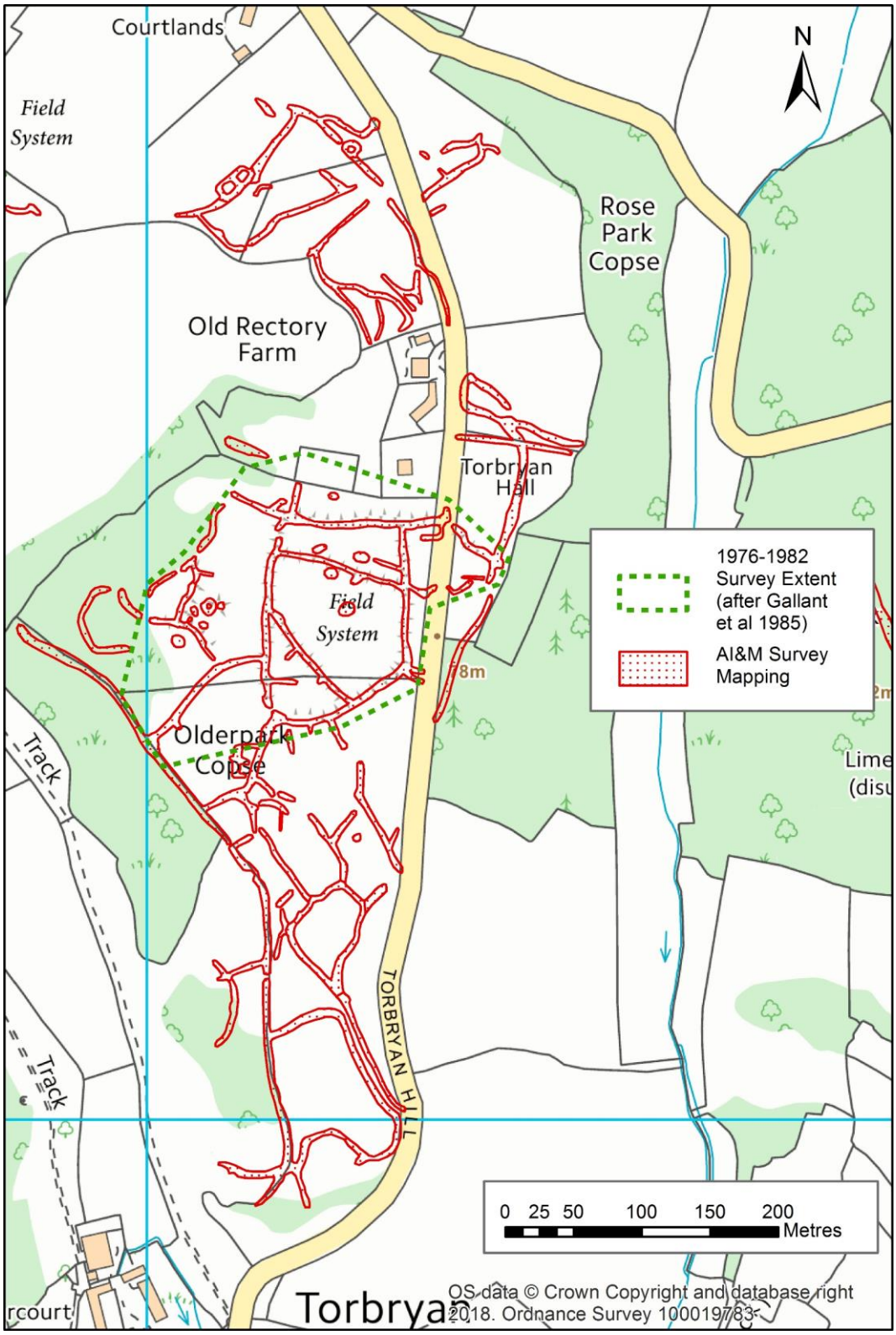


Figure 21: The AI&M survey transcriptions of relict field boundaries at Torbryan Hill, Gallant Site no. 5 (MDV8615). The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

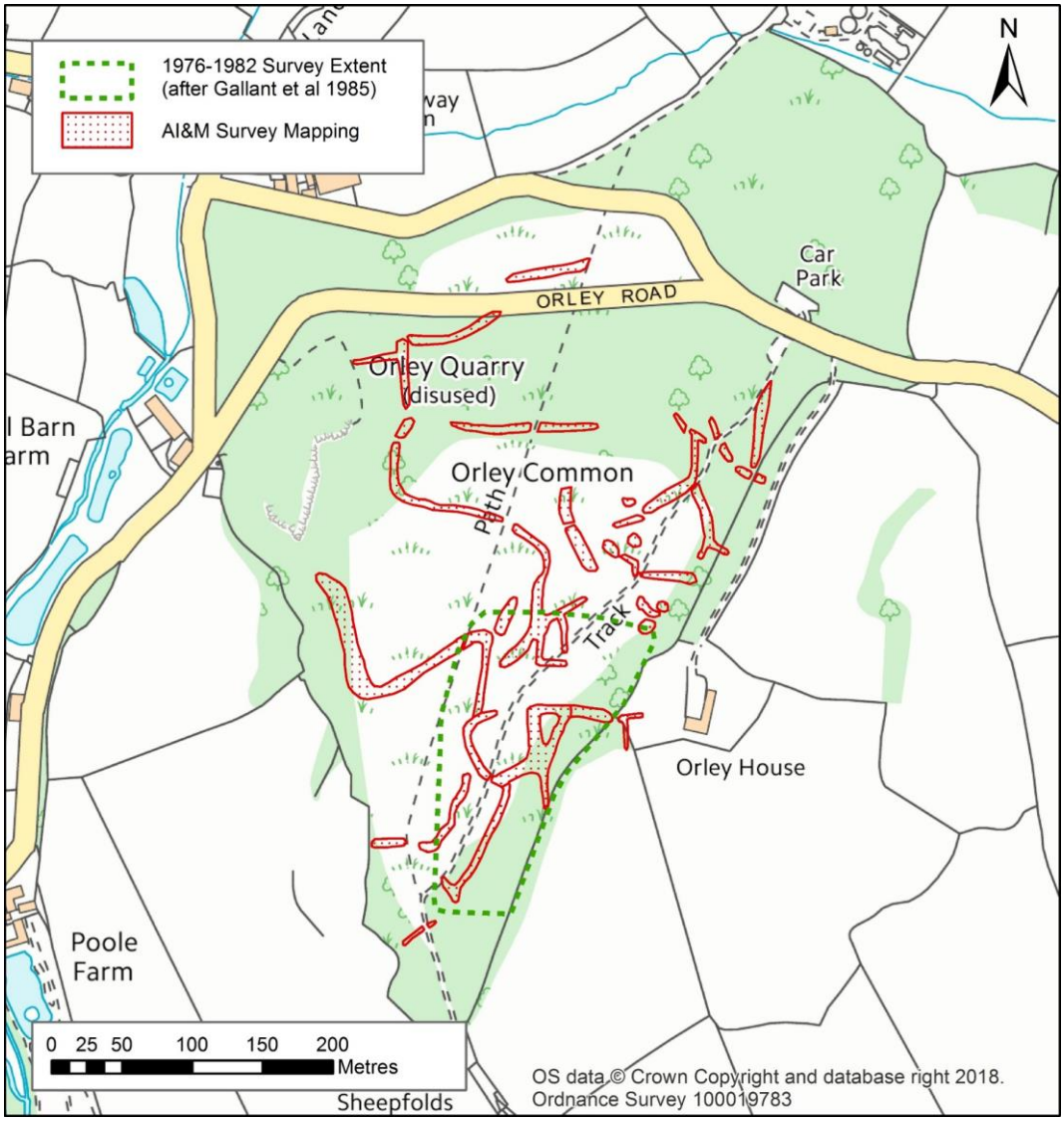


Figure 22: The AI&M survey transcriptions of relict field boundaries at Orley Common, Gallant Site no. 8 (MDV19187). The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

Acknowledging those areas for which no estimate of area was provided, Gallant et al recorded a total area of field system of almost 51ha. Considering only these previously identified sites, the AI&M survey has enlarged the area of visible earthworks to almost 80ha, an increase of almost 57%. These results should not be viewed in isolation, however. The AI&M survey has identified five further areas of relict land management on the Ogwell limestone formation adjacent to those recorded by Gallant et al (Fig 23). Three possible comparators on different geologies were also identified, evidence perhaps of land management on different soils. The possible significance of these is briefly discussed below but they will not be assessed in detail here. The previously un-surveyed boundaries amount to an additional 50ha of earthwork evidence for possibly prehistoric enclosure which, with the enhanced extent of the Gallant et al sites, takes the total of field systems recorded on the South Devon limestone plateau to over 180ha.

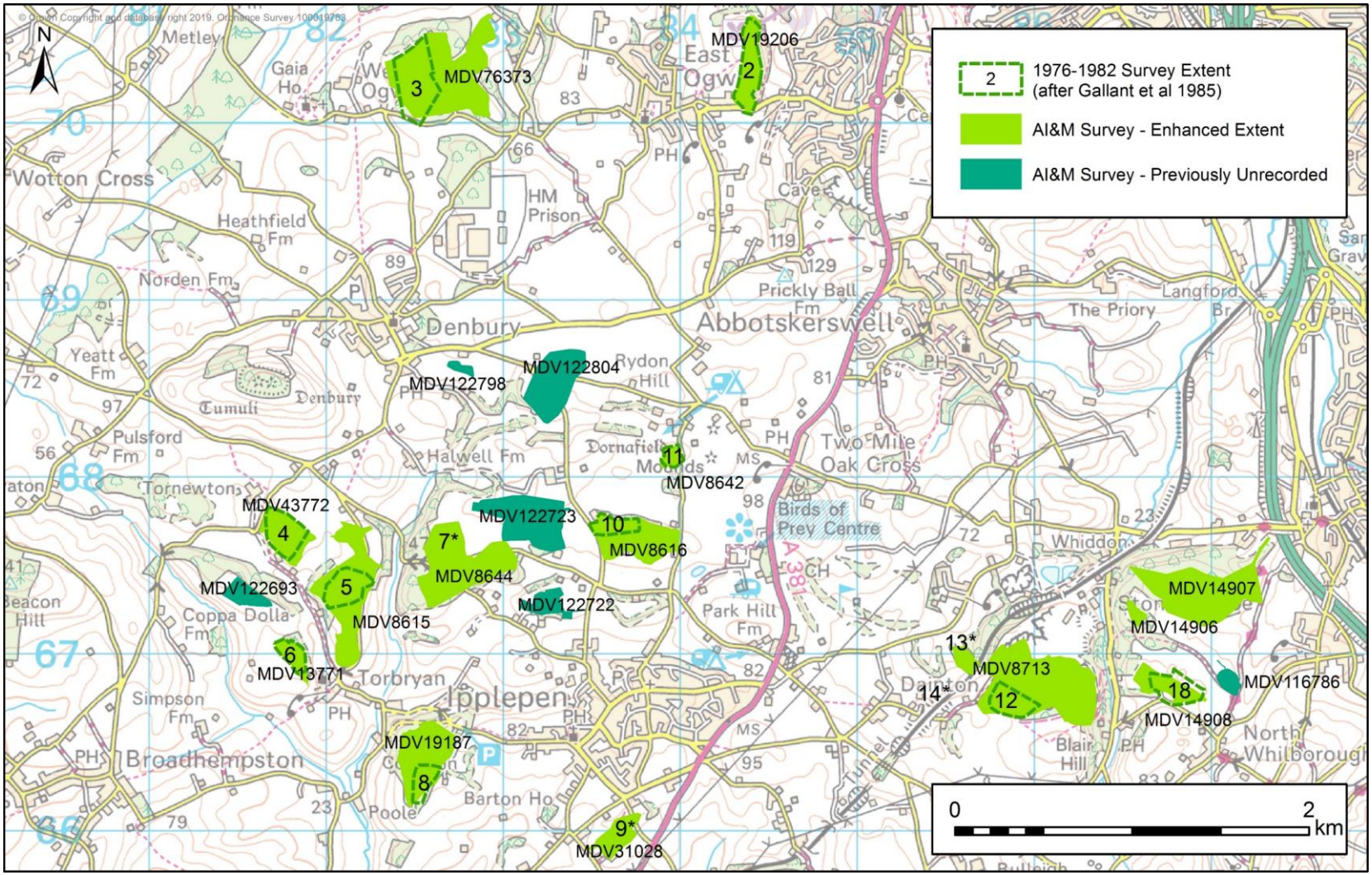


Figure 23: Limestone plateaux fields survey extents. Numbers with asterisk indicate field systems identified but not surveyed by Gallant et al. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783.

Gallant et al revived

The improved spatial evidence for the limestone plateaux field systems is important simply as enhanced historic environment data, illustrating the effectiveness of the AI&M methodology. Greater significance lies in how they allow some of the questions arising from earlier survey to be addressed, and how this data might inform wider discussions of later-prehistoric lowland land management and settlement in Devon, and more broadly, southern England.

To address the questions raised above, the AI&M survey results clearly demonstrate that the fragmentary field systems, as recorded by Gallant et al, *were* partial survivals of more extensive land management systems. Despite the significant increase in known extent the evidence recorded by the AI&M survey remains partial. In contrast to evidence of relict medieval field systems, assessment of HLC data (see Quantification section above) indicates that earthworks interpreted as evidence of prehistoric fields survive in proportionally greater quantities on more marginal agricultural land and usually where there are less intensive agricultural regimes, such as rough ground, woodland, parkland and post-medieval enclosure. Therefore they are on land enclosed later and therefore potentially intensively cultivated for a shorter period and so archaeological earthworks are more likely to survive. It is unlikely that any further earthwork evidence for similar field systems remains will be discovered in the more intensively cultivated (predominantly from the medieval period) land that dominates the survey area AI&M survey area.

The AI&M survey results also clearly demonstrate that the Dainton field system, whilst extensive, was not the largest area of possible prehistoric land management surviving within the historic field pattern, even at the suggested pre-quarry extent of c.20ha (Silvester 1980, 43). The AI&M results also reveal greater cohesion in the relict field systems than was apparent from the earlier work; the individually recorded elements are not simply partial survivals of earlier, more extensive discrete field systems, but are fragments of interrelated, possibly contiguous land management. When considering the previously identified elements, this is most apparent in the increased continuity between Gallant site 4 and Gallant site 5, Tornewton and Torbryan Hill (Fig 24). The insertion into this pattern of the previously unrecorded AI&M survey data further diminishes the previously fragmentary character and reinforces continuity, most obviously between Gallant site 7, Clennon Fields (MDV8644) and Gallant site 10, Stallage Common (MDV8616; Fig 25).

Whilst not truly coaxial, common or dominant axes are identifiable within most field parcels and might be identifiable across several contiguous elements within the emergent pattern (Fig 26). Variance in axis alignment may simply reflect local topography, for instance from Dyer's Wood (MDV122693) in the west to Stallage Common in the east (Gallant site 10; MDV8616), inclusive of Clennon Field (Gallant site 7; MDV8644). However, indications that this trend could extend to the eastern outliers at Dainton and Kerswell Down perhaps points to a degree of regular field accretion over a significant distance, crossing substantial local topographic barriers, perhaps with an as yet unidentified focus to the south (Fig 26).

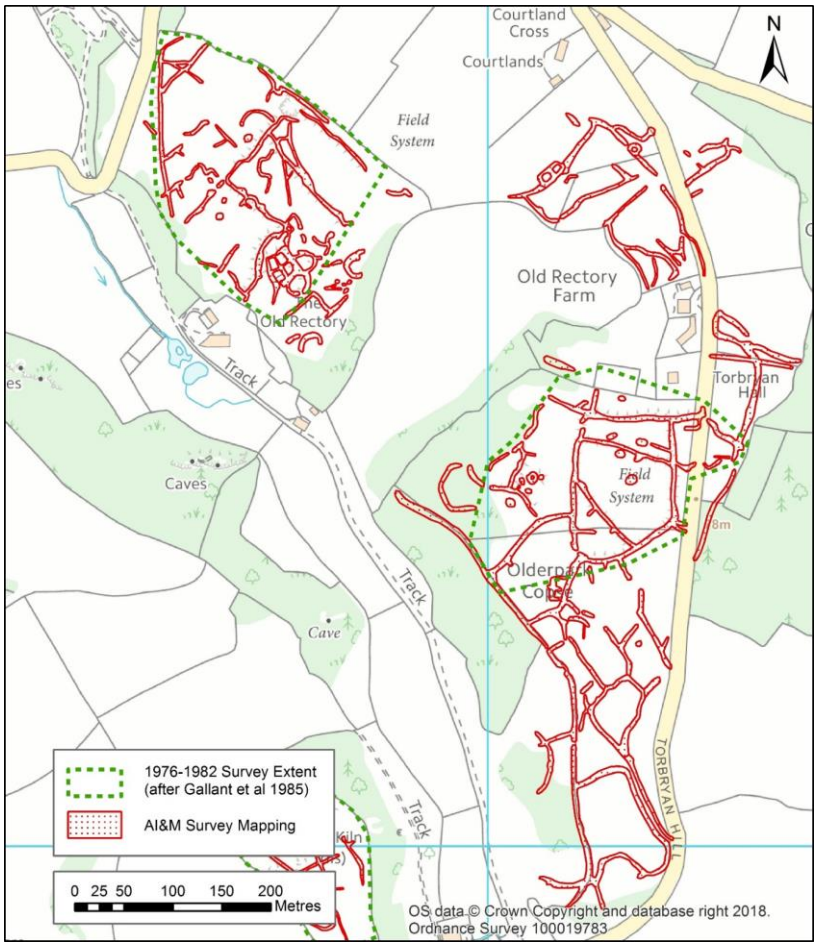


Figure 24: Continuity of field systems between Gallant Site 4 (MDV13772) and Gallant Site 5 (MDV8615), Tornewton and Torbryan Hill. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

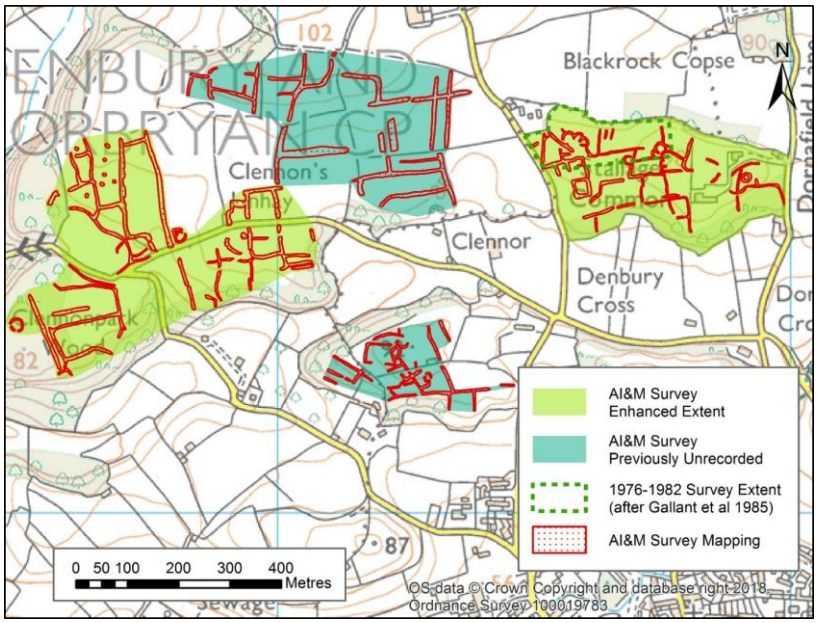


Figure 25: Continuity of field systems between Gallant Site 7 (MDV8644) and Gallant Site 10 (MDV8616). The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

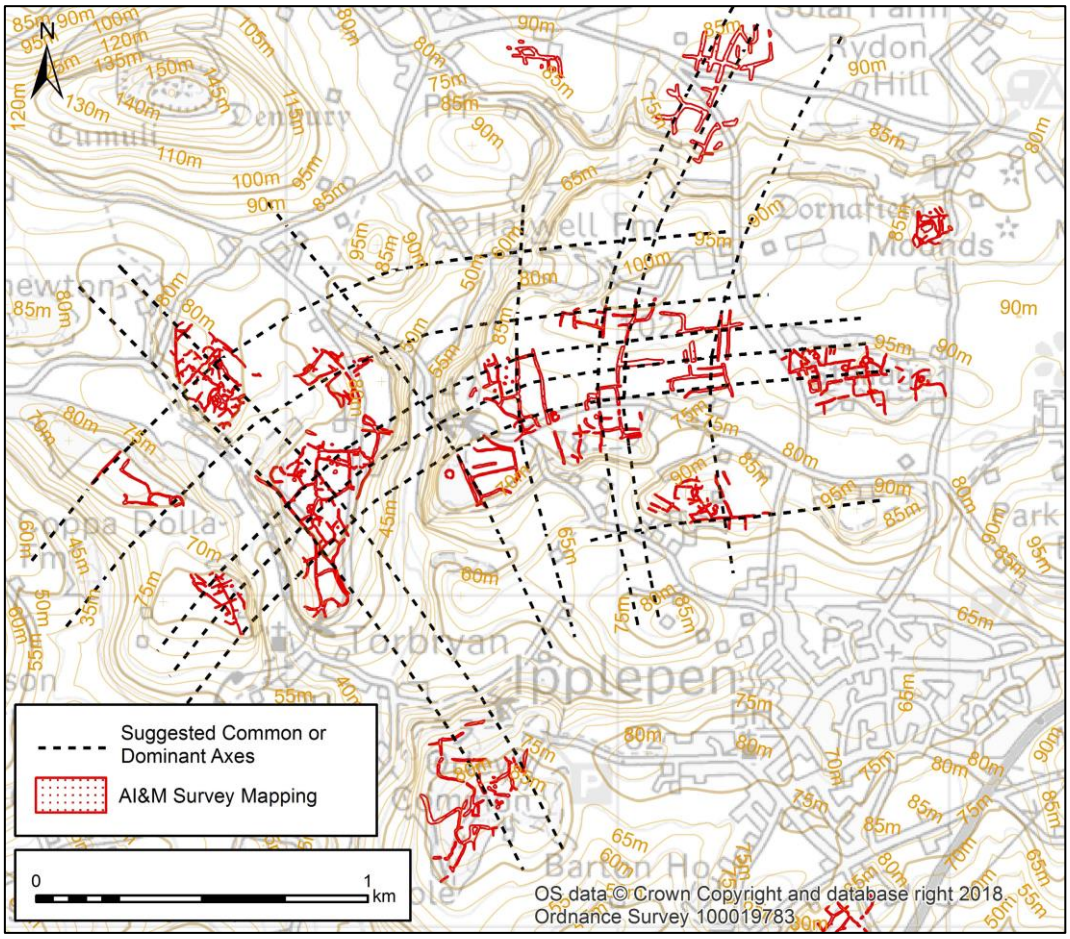


Figure 26: Possible common or dominant axes visible within adjacent units of field system. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

There is not, however, any explicit evidence to be found in the AI&M survey data for direct relationships between the individually recorded elements, for instance in the form of connecting tracks or droveways. Indeed, very limited evidence for any routes within or through the field systems was noted. Those identified tend to locations towards the periphery of the fragmentary systems, with a possible tendency towards the north-west to south-east dominant axis tentatively identified throughout the wider enclosure pattern (Fig 27). Could relationships between closely spaced fragmentary field systems (e.g. Gallant sites 4, 5 and 7) nonetheless be inferred from such indirect evidence?

Gallant et al also raised the question not only as to whether the field systems were interrelated, but whether they could be interpreted as evidence of a 'complex of interrelated communities'? The issue of identifying settlement evidence from such a landscape scale survey is problematical.

Evidence recovered from excavation at Dainton, including structures identified as round houses and artefacts interpreted as occupation evidence, both in association with domestic structures and from less secure contexts, has been interpreted as evidence of open settlement from perhaps the Neolithic to Roman period (Willis and Rogers 1951; Silvester 1985).

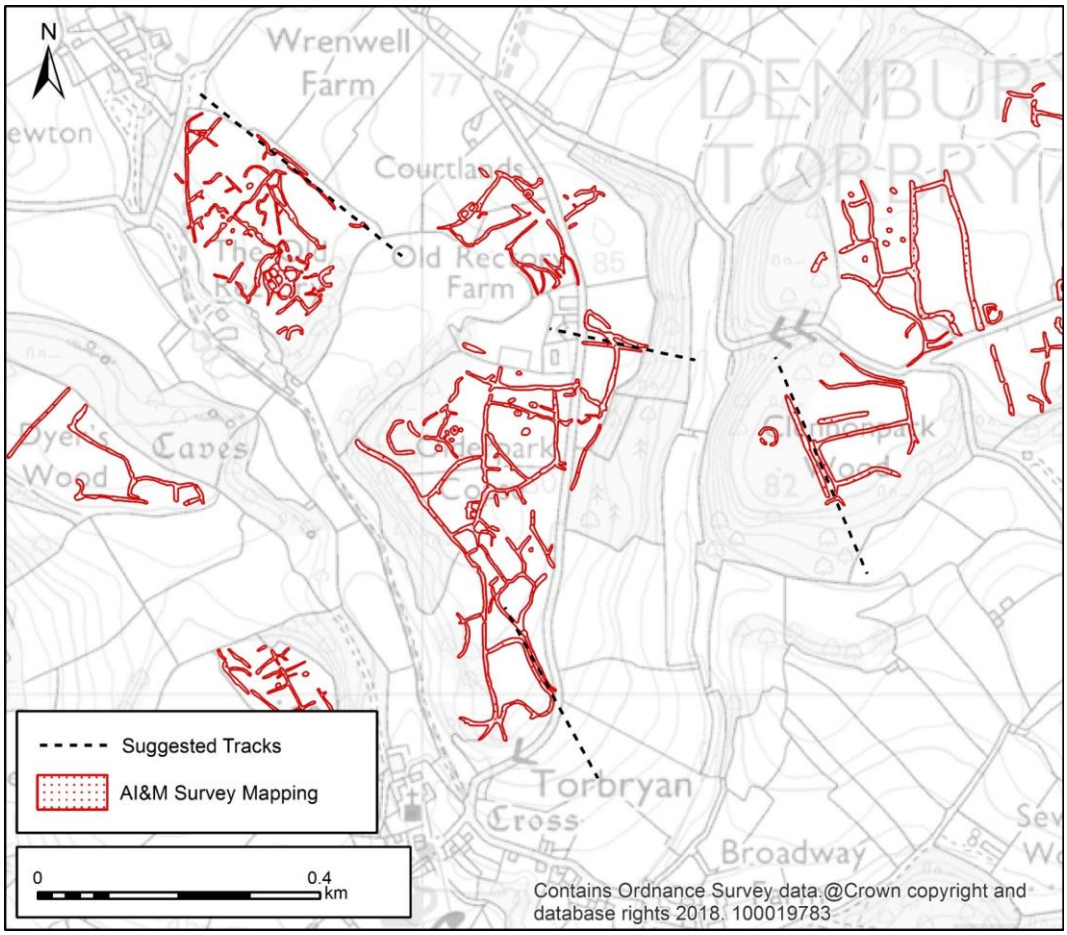


Figure 27: Possible tracks visible within adjacent units of field system. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

In contrast, by analogy with more recent excavation and survey, much lowland Iron Age to Roman settlement in Devon is thought to have been characterised by small, often curvilinear enclosures containing a low number of round houses. Until recently, it was thought that such lowland enclosures typically existed in 'splendid isolation', not associated with field systems, or at least not with ditched boundaries substantial enough to be visible as cropmarks (Fitzpatrick et al 1999; Rippon et al 2006). Excavation evidence suggests that this pattern does hold true for some settlement in lowland Iron Age Devon, such as at Blackhorse, east of Exeter (MDV28620; Fitzpatrick et al 1999).

However, excavation elsewhere also supports the interpretation that Bronze Age and Roman enclosures, typically those that are rectilinear in plan, are frequently associated with field systems. The multi-period settlement at Hayes Farm, Clyst Honiton indicates some discontinuity in land management, with Bronze Age enclosures and fieldscapes succeeded by an Iron Age open settlement, which in turn was followed by enclosed Roman settlement (Simpson et al 1989; Hart et al 2014).

Over 90 apparently isolated enclosures have been recorded as cropmarks throughout the survey area, including several previously unrecorded enclosures revealed by the exceptional conditions during the summer of 2018 (Fig 28).

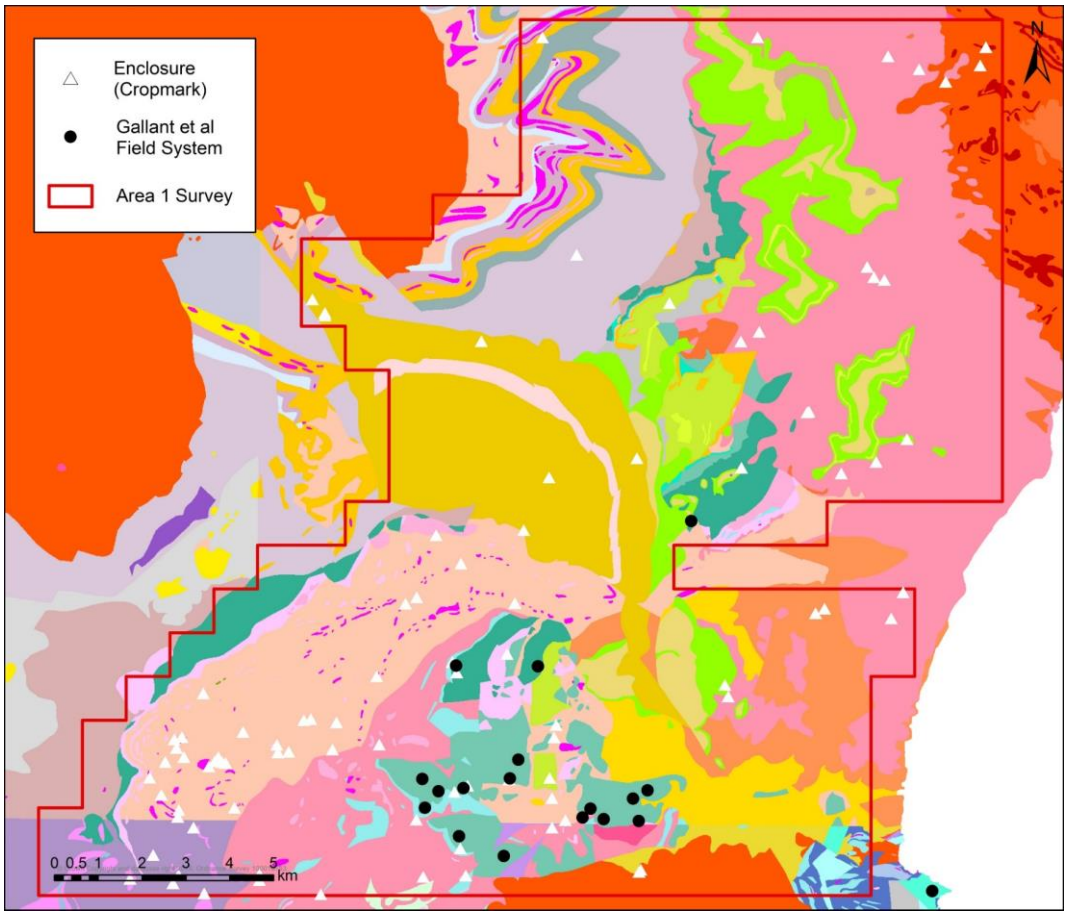


Figure 28: Distribution prehistoric field systems as identified by Gallant et al and enclosures, largely from cropmark evidence, overlain onto BGS simplified bedrock geology. The distribution of enclosures visible as cropmarks shows a positive correlation with slate and breccia geologies (shades of pink) and negative correlation with limestone geologies (shades of turquoise). **For a geological legend see Fig 15**. Reproduced with permission of the British Geological Survey © NERC. All rights reserved.

Whilst possibly supporting the impression of a later-prehistoric landscape populated by isolated enclosed settlement not associated with field systems, caution is required in applying such an interpretation.

For instance, the apparently isolated enclosures revealed for the first time at Dainton Elms Cross, Ipplepen on the 2018 aerial photographs (Fig 29), could be interpreted as typical for a later-prehistoric Devonian lowland context. The cropmarks, however, do not reflect the longevity and complexity of the settlement revealed by geophysical survey, and demonstrated by excavation to be associated with both Iron Age and Roman field systems (Dean 2010; Steinmetzer 2011, 2012, 2014).

On the limestone plateaux, Gallant et al identified seven possible curvilinear enclosures and two rectilinear enclosures scattered amongst five field systems. Whilst a range of probable dates and functions was discussed, the possibility that some represented settlement contemporary with the field systems was proposed; in four cases linear boundaries abutting the enclosures were taken as evidence of an integral position within the regular accreted field systems (Gallant et al 1985, 33).

Figure 29: Cropmarks of ditched enclosures visible at Dainton Elms Cross, Ipplepen (MDV81303). HEA 33541_041 19-JUL-2018. ©Historic England Archive.

A cautious assessment of the AI&M survey transcriptions, including enhanced data for the previously surveyed field systems, has identified 38 possible curvilinear enclosures and five rectilinear enclosures across the same area. In only two instances (Gallant site 7; enclosure MDV122721: Gallant site 15; enclosure MDV70980; both circular enclosures circa 30m in diameter/0.03ha) were the enclosures not conclusively associated with an accreted regular field system or directly abutted by/integrated into one (Fig 30, A and B).

In comparison to interpreting isolated enclosures visible as cropmarks, distinguishing between discrete banked enclosures and banks integral to an accreted field system can be impeded by a surfeit of data, highlighting issues of interpretation, and potentially appearing somewhat arbitrary. For instance, how much clear distance must there be between a field system and an enclosure for them not to be considered associated (Fig 30, A and B)?

As it apparent in Fig 30, the shape, size or extent of the enclosed areas are not characteristics distinctive of either fields or enclosures, with both possible enclosures and probable fields including rectilinear and curvilinear elements and ranging in area from less than 0.1ha to circa 0.8ha. With such variables, how can embanked conjoined enclosures be distinguished from small accreted fields (Fig 30, C, D and E)? And, as is the case here, can exceptionally large areas, (such as Fig 30, F and G), at 1 and 2ha respectively, simply be regarded as large fields?

Issues of definition and date aside, when considered alongside the evidence for greater continuity of land management, a 380% increase in the number of potential enclosures identified within, or associated with, the limestone field systems could

nonetheless be interpreted as significant evidence of settlement and if only a proportion are contemporaneous, perhaps by extension, community.

Fewer conclusions can be drawn relating the relict field systems to settlement on surrounding geologies. All AI&M evidence for field systems interpreted as potentially of later-prehistoric date by analogy with Walls Hill and Dainton, is confined to the well-defined areas of limestone geology.

Two areas of relict field boundaries identified on different geologies to the north might be relevant here; over 5ha of field system was identified on an outcrop of Basaltic lava on Telegraph Hill, Ilsington (MDV123292) whilst over 15ha of relict field boundaries at Hennock survive on igneous deposits of micro-gabbroic geology (MDV27874). Both are interpreted as probably medieval in origin but, in addition to surviving on more marginal outcropping geologies, they share some morphological similarities with the examples discussed above. If elements of these outlying areas of relict field boundaries were to prove to have been influenced by or derived from pre-medieval, perhaps later-prehistoric land management, it could be inferred that such enclosure continued onto the richer soils between them and the limestone plateau to the south.

Nonetheless, whilst the cropmark settlement evidence may place the limestone field systems and associated settlement into a broader context, it would repay further research to attempt a detailed assessment of the wider landscape. Limited geophysical survey and excavation evidence in this area supports the probability that a proportion of the apparently isolated enclosures beyond the limestone plateaux were in fact part of a wider enclosed landscape (Dean 2010 & 2016; Davey 2019; Oltean et al forthcoming), and nuanced interpretation is required.

That prehistoric boundaries have influenced extant field systems can be demonstrated on Dartmoor. Approximately 6km to the north-west of the survey area over 130ha of parallel reaves survive in an island of unimproved land at Easdon Down, North Bovey. Easdon Down is over 1km from the main unenclosed areas of moorland, and the influence of the reaves is readily identifiable fossilised in the structure of the surrounding historic field pattern (Fleming 1988, 29, 46, 50; Griffith 1988, 34: plate 18).

The AI&M survey data, however, adds little to the discussion as to whether the relict limestone plateaux boundaries influenced any neighbouring extant field systems. Silvester suggested that parallel banks within the historic field pattern at Dainton (Fig 14) “implied medieval cultivation” (1985, 43) but it is unclear as to whether this was considered evidence for continuity or adaptation, or simply insertion into the prehistoric pattern (1980, 43).

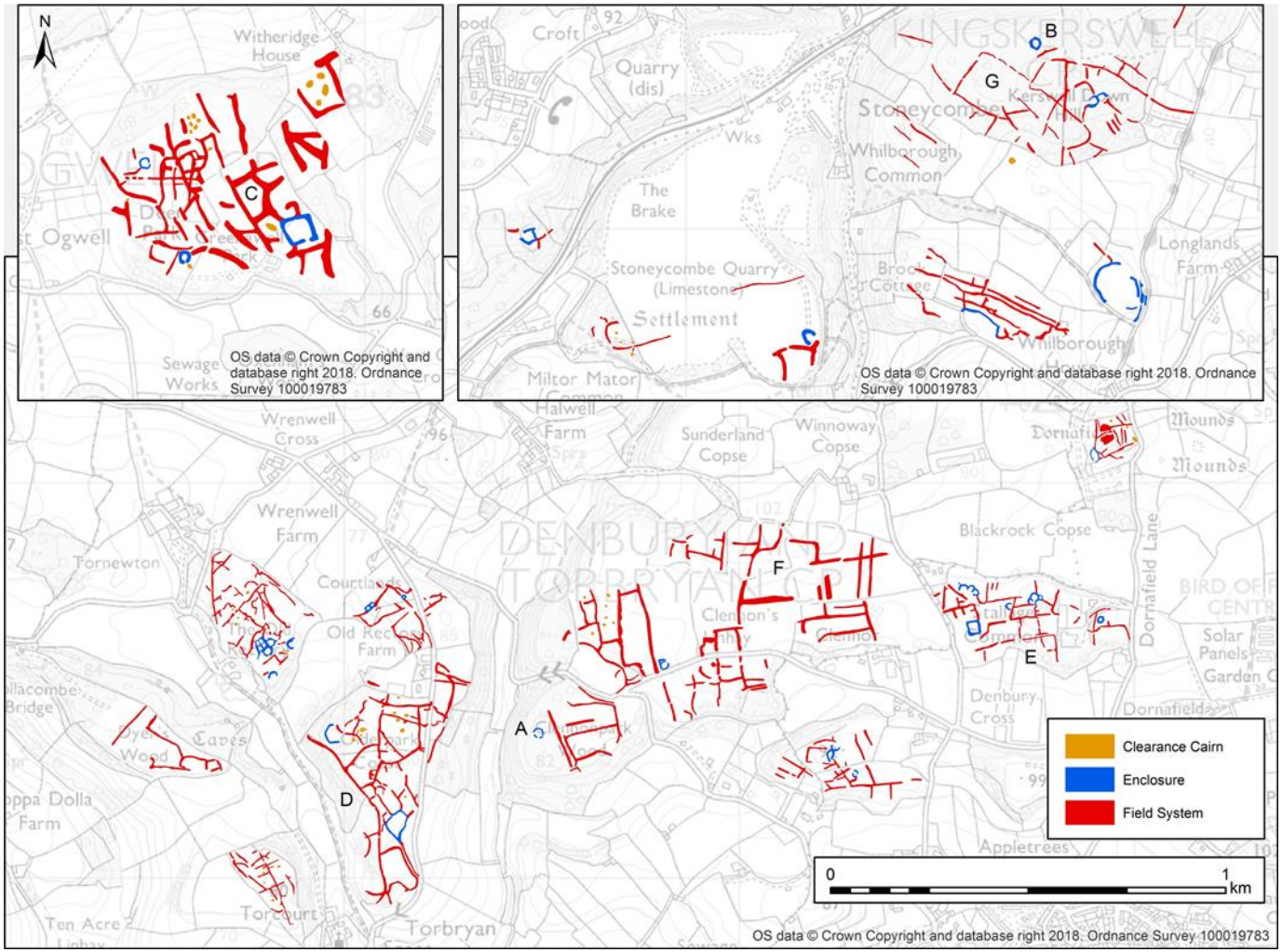


Figure 30: Excerpts from AI&M transcription; enclosures and cairnfields identified within the wider field pattern. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

At Kerswell Down, Quinn recorded relict banks aligned upon extant boundaries, suggesting not only that the field boundaries were previously more extensive, but also 'that they have influenced the layout of the later system.' (1995, 133; Fig 14). A number of possible associations between the relict and extant boundaries can be identified in the AI&M survey transcriptions, particularly to the east and south of Kerswell Down (Fig 31). Whilst the relict boundaries here clearly do not form part of the historic field pattern, elements within it are in keeping with the character of the surrounding field pattern; whether evidence of continual cultivation or periodic reuse, it seems probable that some elements of this field pattern were active during the medieval period.

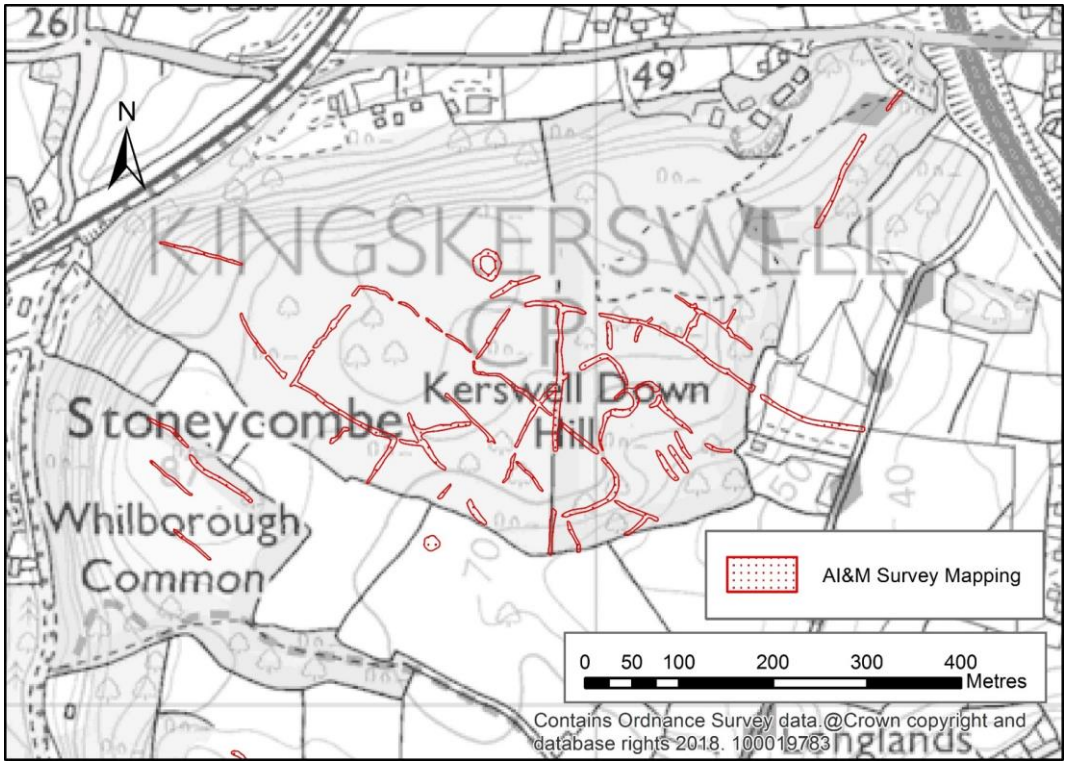


Figure 31: Possible alignments with extant field boundaries are discernible within the AI&M transcription of relict boundaries on Whilborough Common and Kerswell Down (Gallant Site 15 and 17). The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council.

Similarly, a small area of newly recorded earthworks near Denbury (MDV122804) appears to predate the historic field pattern and indeed is trisected by a road that bifurcates at Ipplepen Cross. Nonetheless, a curvilinear field boundary depicted on the Tithe Map for Denbury and Torbryan parish, to the south of Ipplepen Cross, corresponds closely with one of the relict banks, defining the western edge of an enclosure or field boundary (Fig 32).

A partial correlation also was recorded approximately 1km to the south-west, between Denbury and Ipplepen, where a relict field bank not only appears to have influenced a dog-leg in a single, still extant field boundary, but also perhaps the wider north-west to south-east enclosure alignment on this small spur (Gallant Site 7, Clennon Fields; MDV8644; Fig 19)

Although limited in scale this data, in conjunction with the conclusions drawn by Gallant et al and Quinn, might support the interpretation that elements of the relict earthworks remained sufficiently significant landscape features into the historic period to influence later enclosure. This does not, however, indicate continuity of use.

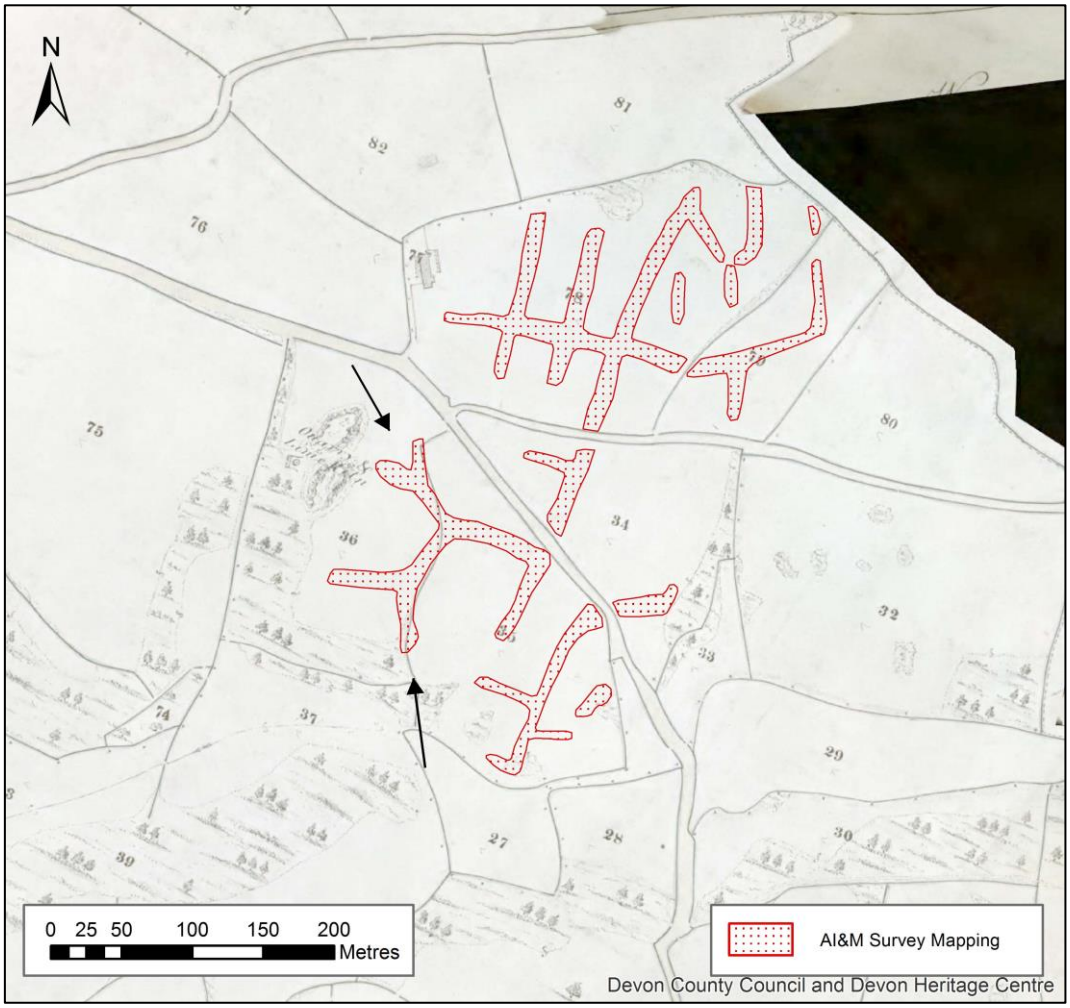


Figure 32: The AI&M survey transcriptions of relict field boundaries at Ipplepen Cross, overlain onto the 1839 Tithe Map for Denbury (© Devon County Council and South West Heritage Trust). Note where the relict fields appear to connect to field boundaries in use in the mid-19th century (arrowed). AI&M transcriptions © Devon County Council.

Date

It is difficult to provide definitive dating evidence for landscape features. Apart from the limited relative phasing evident in the varying orientations of the accreted boundaries described above, few conclusions can be drawn from the survey data regarding the date or longevity or the limestone plateau field systems.

Consideration of findspot data across the wider survey area, and the limestone plateaux in particular might suggest that many of the relict field systems within the survey area are associated with finds of Bronze Age, Iron Age and Roman date (Fig 33). However, such distributions are rarely indicative of a direct relationship. Whilst

surface find of Romano-British pottery from an enclosure at Orley Common (Gallant site 8; Bill Horner pers comm) might be indicative of settlement, coin hoards in particular, it has been suggested, should not be taken as settlement evidence (J. Plouviez, pers comm). It has been proposed, however, that a possible hoard (MDV77369) recorded in close association with the Stallage Common and Clennon Fields systems (Gallant Sites 7 and 10) is similar in character to the dense finds scatter recorded at Dainton Elms Cross, which proved to be a direct indicator of Roman period settlement (Bill Horner pers comm; see below).

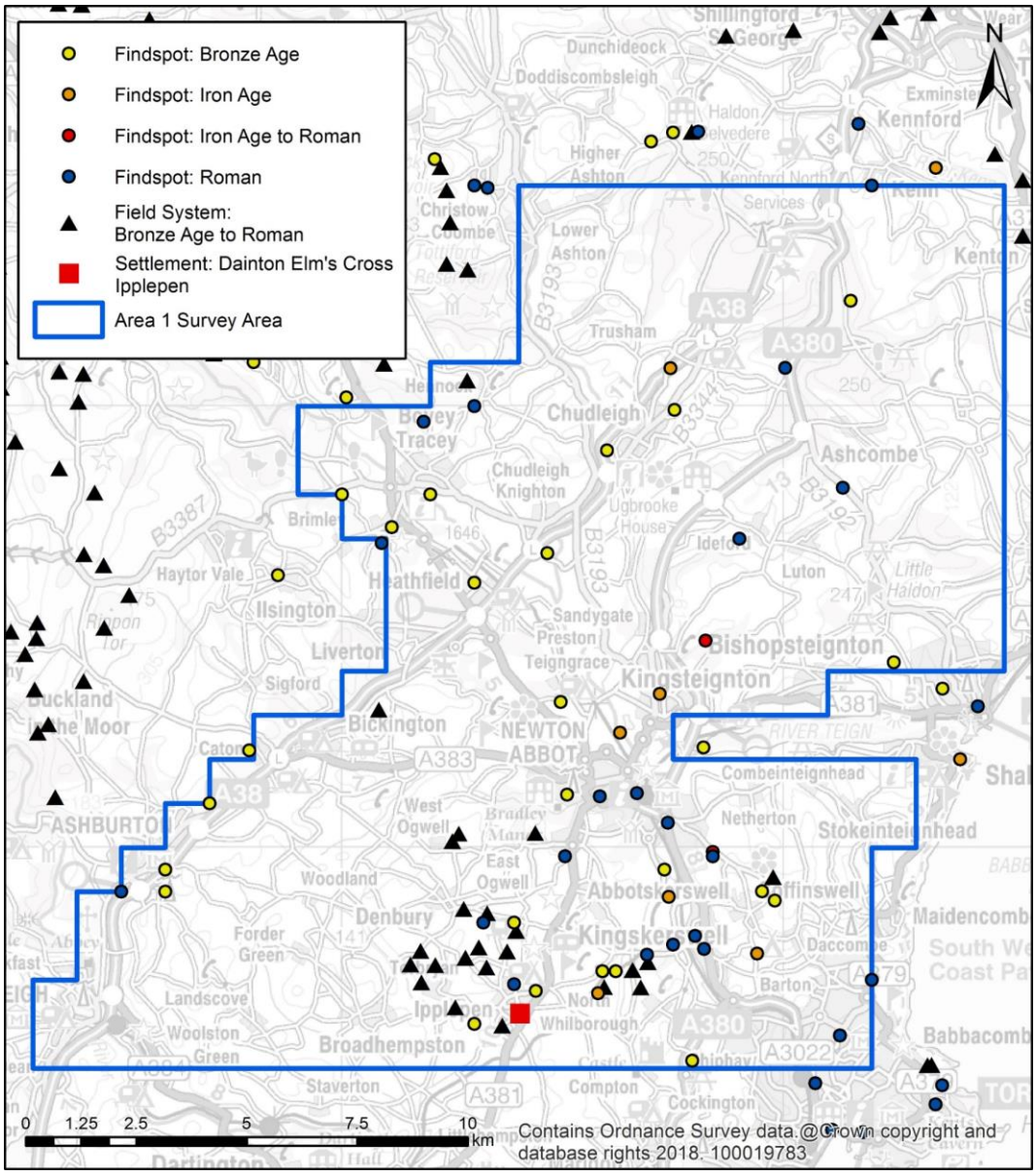


Figure 33: Distribution of Bronze Age to Roman findspots and field systems in the survey area.

The review of previous work summarises the datable artefactual evidence from Dainton, the best understood site in the region, and will not be repeated here. However, the evidence can be summarised as indicating open settlement and agriculture, from the Early Bronze Age into the Iron Age, with high-status metal working dating the earlier activity (Silvester 1980). It remains unclear as to whether

the field system and post-built round house at Dainton are contemporary. The density of clearance cairns associated with both might indicate that the site represents either the conclusion of an extended period of continuous cultivation or phases of expansion onto more marginal soils, culminating in settlement contraction or reorganisation in the Iron Age, possible evidenced by the construction of a clearance cairn over the entrance of a round house, presumably signalling that the dwelling was no longer in use. Although the number of enclosures identified by the AI&M survey across the limestone plateaux might suggest a slightly different character of settlement, perhaps a mix of enclosed and open settlement, it is probable that this scale of land-management represents a longevity of activity similar to that inferred at Dainton.

Recent fieldwork at Dainton Elms Cross to the east of Ipplepen, part of the University of Exeter's Understanding Landscapes project, might be relevant when considering the date and duration of later-prehistoric settlement in this area (Fig 33). Although structural evidence remains sparse, excavation has recorded evidence of continued local rural activity from the Neolithic to the Roman period (Steinmetzer 2014). This includes clear evidence of settlement, specifically a circular enclosure possibly containing evidence for a round house, and field boundaries associated with a ring-ditch from which Iron Age pottery was recovered (ibid 5).

Agriculture and settlement continued into the Roman period, with some reorganisation of field boundaries from an irregular to more regular, coaxial field system. Although no secure evidence for domestic structures post-dating the 3rd century AD has yet been recorded at Ipplepen, post-Roman cemeteries indicate significant economic activity into the 6th century AD, with burial continuing here until the 8th century AD (Davey 2019). With such demonstrable continuity of settlement and agriculture in close proximity to the limestone plateaux field systems, any attempt to ascribe a date to them from survey evidence alone must be approached with caution.

Nonetheless, the evidence would appear to suggest that the field systems on the limestone plateau are likely to be Bronze Age to Romano-British in date. By analogy with the metal working evidence associated with the field system at Dainton, it might be suggested that settlement was established in the environs of the limestone field systems by the Middle to Late Bronze Age. Overall, ceramic and coin hoard evidence in this area indicates continuity of settlement and land management into the Iron Age and Roman periods. It seems possible, by analogy with the excavated evidence at Dainton Elms Cross, Ipplepen, that some settlement or agricultural activity continued on the less marginal limestone soils into the Post-Roman or early medieval periods. Very limited evidence might indicate that this activity, in localised pockets, might have influenced later enclosure to a small degree.

Wider context and significance of the limestone field systems

Although their area is small in absolute terms, the enhanced detail of the field systems now recorded by the AI&M survey is potentially of great significance to regional and national understanding of prehistoric land-management in the south of England. To appreciate their potential significance, it is necessary locate them

within a theoretical framework for the development and role of land-management in later prehistory.

Beginning at the end of the Early Bronze Age, the middle Bronze Age (16th century BC) has long been recognised as the crucial period in the development of domestic settlement and associated agricultural land management regimes in south and east England; it has been described as expressing a shift in investment of energy and prestige from the ritual to domestic sphere; in the 1940s Childe referred to the Bronze Age as the true 'agricultural revolution' (Johnston 2001, 14). Earlier Bronze Age settlements in uplands area were recognised from the 1970s, as was later Bronze Age agricultural intensification (ibid 15).

A number of models have been developed to explain the increasing exploitation of what were considered marginal areas. These have included external, environmentally deterministic models driven by population increase and collapse (Burgess 1980), to emergent structures arising from social change within communities, reflecting shifts in how status and power is acquired and expressed; Barrett and Bradley suggest that power ceased to be expressed through exclusive 'ritual authority' focused on monumental sites, shifting towards a 'prestige goods economy' requiring increased agricultural production to generate a surplus for exchange (Johnston 2001; Barrett 1980; Bradley 1980).

It has been suggested that this system was focussed ultimately on the Mediterranean 'palace' civilisations with Britain and other northern European countries on the fringes of the network, dependant on alliances for trade (Yates 2007). High status 'core' areas have been identified at 'Wessex', the Yorkshire Wolds and the Thames valley, with the latter suggested as forming a more 'europeanised' region with northern France (Johnston 2001; Yates 2007). Elite groups within communities at the 'peripheries' of these core areas were obliged to occupy and cultivate more marginal areas to meet the demands of this expanding exchange economy. Yates also suggests, however, that the significance of symbols of prestige fades with greater distance from the core; this may have knock-on implications for the interpretation of settlement patterns and agriculture in the fringes of this economy (ibid), such as relict field systems the South West of England.

Nationally, the study of this topic has been dominated by models extrapolated from a very limited range of uplands comparators, particularly the 'celtic fields' of the south-east and, in the south-west, this has inevitably focussed on the 'reave' system on Dartmoor. Fleming has argued that the core/periphery model is applicable to Dartmoor, suggesting that during the second millennium BC the demands of agriculture, specifically the needs of inter-commoning pastoralists, conflicted with the established authority expressed through the ritual monuments around the fringes of the uplands. This new competition for land as a resource, he argued, resulted in the creation of territories and construction of the extensive linear boundaries and coaxial field systems, although the mechanism for this process remains unclear (Johnston 2001, 16). In this picture the reaves could be interpreted as a western expression of the 'regimental land divisions' essential to the prestige exchange network core of the Thames estuary and an 'ostentatious display of agency' (Yates 2007).

Yates (ibid) has compiled increasingly compelling evidence from commercially driven fieldwork up to 2007, that identifies lowland evidence for regular later-prehistoric land management, countering the uplands bias. For instance, a Bronze Age enclosure and associated coaxial field system was recorded at Castle Hill, Feniton during work preceding the A30 Honiton to Exeter improvements (Fitzpatrick et al 1999). On the edge of the uplands, continuation of the reave pattern has been recorded north of the moor at Sourton (Weddell and Reed 1997) and south of the moor at Ugborough (Reed 1991) and numerous excavations have recorded evidence for settlement associated with linear boundaries in a range of lowland contexts. The evidence from relatively small-scale commercial and research led excavation is, however, unavoidably partial. At South Down Common, Beer, combined survey and targeted trenching, part of the 'Unlocking Our Coastal Heritage' project on the South West Coast Path, has placed Romano-British settlement within, and possibly overlying an enclosure of Iron Age or Romano-British, itself within a regular 'Celtic' field system (James 2011).

Further west, into Cornwall, numerous field systems have been identified as Bronze Age on morphological grounds, surviving in greater density towards the west of the peninsula, but they are significantly more irregular in form than the very regular reaves or coaxial field systems characteristic of central and southern England (Yates 2007, 69; Cornwall Council). Lowland settlements characterised by roundhouses with enclosures and fields have been securely dated to the middle Bronze Age at Trethellan Farm, Newquay, and well-preserved fields, with cultivation evidence, have been recorded at Gwithian (Fitzpatrick 2008; Novakowski 1991, 2004).

The Cornish evidence is described as predominantly piecemeal, irregular, adapted to suit landscape zones, and within each zone, (upland, lowland or coastal), modified to meet local conditions and communities' needs (Fitzpatrick 2008, 119-120; Yates 2007, 69)

Nonetheless, within these increasingly irregular settlements, 'sporadic instances' of linear and coaxial forms are identifiable, and this has been taken as evidence that the broad concept of 'coaxiality' was adopted and adapted across the entire southern seaboard (ibid 69). This increasing variability in field system plan, from regular or true coaxial, may reflect the south-west peninsula's distance from and the lesser influence of, the pressures of the prestige exchange economy that has been suggested to drive increased agricultural expansion and intensification in the 'core' areas of the south and south-east (Johnston 2001; Yates 2007).

Although the limited excavation evidence from the limestone plateaux field systems displays some evidence of high-status metalworking, direct association with bronze prestige goods is absent. Long distance exchange is demonstrated by a single serpentine bead from the Lizard (Willis and Rogers 1951; Silvester 1980). In combination with land management regimes that could best be described as 'regular accreted' field systems (McOmish 2011) the limestone plateaux field systems could therefore demonstrate some of the markers of a community on the western periphery of a middle to Late Bronze Age prestige exchange network.

However, it is suggested here that despite an identifiable dominant axis, the sinuous boundaries and frequent changes in alignment of the limestone plateaux field systems do not display the 'regimental land divisions' theorised to be necessary for a

productive system to answer the needs of a top-down prestige-exchange system, and neither can they demonstrate an 'ostentatious display of agency' when compared to the relatively close at hand Dartmoor reaves.

Alternatively, internal dynamics may have been the driving force behind processes of second millennium BC 'landscape transformation' (Yates 2007, 16). Rather than elites striving to maintain power through externally imposed values, extensive prestige trade and intensification of agricultural resources, Barrett (1980) suggests that increasing fragmentation of groups and greater attachment to specific locations may have facilitated more investment in 'place' and intensive farming methods. Land boundaries would be central to this process, defining new social structures; for this reason, the variation in middle and later Bronze Age field systems in the South West could simply reflect different groups' responses to local factors and communities' needs. This model may better suit the increasing, and increasingly varied evidence for Bronze Age/later-prehistoric field systems recorded in Devon, including the AI&M survey results on the limestone plateaux.

That settlement associated with the relict field system Dainton (Gallant site 12) endured probably from the Bronze Age into the Iron Age, albeit with some evidence of contraction, has been established by repeated excavation.

It is also accepted that, west of the Blackdown Hills/Quantock Hills, the landscape of the south-west did not experience extensive Romanisation (Rippon et al 2006), or at least not in the manner seen to the east of this boundary. Less than 2km west of the Dainton field system, located between the main groups of limestone field systems, the rural settlement at Dainton Elms Cross, Ipplepen, remained apparently un-Romanised in character and demonstrates continuity of settlement from the Iron Age to the early-medieval period, albeit with some changes in organisation. This has been attributed in part to its position peripheral to the Roman world (Rippon pers comm). Nonetheless, it was well within the Roman administrative sphere, and its apparently un-Romanised character may reflect the nature of the administration in this area, perhaps as Imperial Estate or direct or indirect exploitation of mineral or agricultural resources; coin find analyses suggest an early and enduring official presence and it might be concluded that such a presence might have had an interest in maintaining the status quo, thereby inhibiting other, more recognisable 'romanising' influences, as might be the case in Cornwall (Bill Horner pers comm).

Yates (2007) states that there is little evidence of maintenance of field systems during the Late Bronze Age to Iron Age transition. The AI&M survey results, however, can be interpreted as demonstrating some contiguity between adjacent units of land management on the limestone plateaux during the Late Bronze Age to Iron Age, and continuity onto adjacent geologies and soils. It seems probable that neighbouring communities within the sphere of these Late Bronze Age to Iron Age field systems, away from the limestone plateaux, for instance at Dainton Elms Cross, Ipplepen, had some shared history with this wider landscape management system.

In terms of their significance, the extensive field systems on the limestone plateaux might demonstrate that external factors, be they long-distance prestige goods exchange economies or overt Romanisation, may have had limited influence on

lowland infrastructure management in South Devon. The irregular settlement and field systems on the marginal limestone soils may have emerged and developed on the very periphery of such influences, and land management strategies may have been adapted by, and reacted primarily to, the needs of local communities living and farming on and around the limestone plateau, from the Bronze Age into the Iron Age period. This conservative character is possibly observable at neighbouring communities, such as the Iron Age settlement at Dainton Elms Cross, but which may have had a different development into the Romano-British and Post-Roman period.

Conclusions

The AI&M survey has added significantly to our understanding of the extent and complexity of later-prehistoric field systems on the limestone plateaux of lowland south Devon. With rare exceptions often consisting of passing references (Rippon 2012, 299) these field systems have been overlooked in studies of later-prehistoric field systems that have focussed primarily on upland field systems, such as the Dartmoor Reaves (Fleming 1988; Johnston 2001). In simple terms the AI&M survey has expanded the area of recorded earthworks on the limestone plateaux by approximately 250%, compared to those identified by Gallant et al (1985).

In doing so, the AI&M survey has begun to answer some of the questions arising from this earlier work, namely that the fragmentary systems, as previously identified, are demonstrably partial survivals of earlier more extensive field systems and that the there are indications of interrelationship between the fragmentary field systems, and therefore possibly also between the communities who farmed them.

The field systems demonstrate a degree of regular or coaxial organisation, in broad terms a common dominant axis, albeit with frequent changes in local alignment, perhaps allowing a classification of the field systems as regular accreted, with slight evidence of tracks or routes adhering to this alignment. A significant increase in the number of enclosures identified throughout the field systems suggests a greater density of settlement across the limestone plateaux than previously appreciated.

Whilst the AI&M survey cannot demonstrate conclusively that the field systems continued onto 'richer' neighbouring soils, it can conclude with some confidence that similar field systems do not survive as earthworks beyond the limestone geologies. A growing body of data arising from commercially driven fieldwork across the region, plus a research excavation located on geologies immediately adjacent to the limestone plateaux, indicate that later-prehistoric to Roman land management was widespread across a variety of lowland settings and, in particular, was demonstrably enduring immediately adjacent to the limestone plateaux.

However, the relict remains might best be interpreted as regular accreted field systems with some coaxial characteristics, rather than truly coaxial or 'regimented'. Perhaps evidence of Bronze Age communities sporadically cultivating the readily worked, but easily exhausted lighter soils on the more marginal limestone plateaux, to meet the limited demands for surplus demanded by communities on the periphery of a 'prestige goods economy'.

Alternatively, and perhaps more convincingly, the semi-regular but extensive boundaries might reflect the internal trajectories and priorities of localised land tenure, rather than status-driven external alliances, within the communities of this densely populated later-prehistoric landscape.

It is not possible to ascribe a date to such features from aerial survey evidence alone, but from analogy with excavated evidence from Dainton (Silvester 1980) and Dainton Elms Cross, Ipplepen (Steinmetzer 2011, 2012, 2014; Davey 2019) the limestone plateaux field systems may be evidence of land management, sporadic or continuous, spanning a period from the Bronze Age to the Roman period. A small number of examples might also indicate a degree of continuity between the relict boundaries and later, post-Roman or early medieval field systems.

Although some elements were identified on aerial photographs (Fig 34), multiple visualisations derived from lidar data were undoubtedly the greatest resource for recording these often very subtle earthworks (Fig 35). The field investigations of earlier surveys (Gallant et al 1985; Quinn 1995) indicate that measured survey could build on the results of the AI&M survey.

Figure 34: Devon Aerial Photograph (DAP) of the Tornewton field system (Gallant Site 4: MDV13772). Compare to Figure 35. Devon County Council DAP/HI 12 21-DEC-1986 © Devon County Council.

Gallant et al suggest that evidence of possible later-prehistoric land management is limited to where '[soils of the Torbryan limestone series] cover a relatively large landmass', presumably of Devonian limestone, and that smaller areas of limestone in neighbouring parishes display no evidence of similar settlement (1985, 23-25). Four smaller areas of potentially later-prehistoric field system have been recorded along the South Devon coast, from South Down Common at Beer, East Devon

(MDV19842), now demonstrably occupied into the Roman period (James 2011) to Bolt Head and Start Point in the South Hams (MDV21377 and MDV104236, MDV15083, MDV36183; Hegarty et al 2014, 103-109; Winton and Bowden 2009). It is possible that lidar imagery will prove an important resource in the identification and interpretation of such features on the smaller islands of limestone geology found inland from the marginal coastal strip in the adjacent areas south of Torbay and into the South Hams.

Figure 35: Visualisation (simple local relief) of the Tornewton field system (Gallant Site 4: MDV13772) derived from Environment Agency lidar data. © Devon County Council; source Environment Agency DTM

Recommendations

Interpretation of lidar derived visualisations has been instrumental in defining the extent of the surviving lowland prehistoric field systems on the limestone plateaux. However, the lidar data does not permit any more that the most superficial interpretation as to development or phasing of the earthworks. Further work could use this data as a guide, to inform targeted field investigation at key junctions or boundaries where elements of the regular accreted field systems meet at differing alignments. At best such work may return material suitable for absolute dating; in either case it may improve the understanding of the relative dating and sequence of enclosure. Key areas could include Kerswell Down (Gallant Site 15, MDV14907; SX86816727) or Torbryan Hill (Gallant Site 5, MDV8615) where significant boundaries clearly meet at two alignments.

A greater understanding of the features interpreted as enclosures within the field system is required. Current understanding is that agricultural regimes on the limestone were mixed farming dating to the later Bronze Age and Iron Age. The rectilinear enclosure at Tornewton (Gallant Site 4, MDV13772; SX81806758) has previously been interpreted as of anomalous, possibly intrusive character within the largely curvilinear enclosure pattern. Targeting fieldwork at the junction of this enclosure with two adjacent oval enclosures might inform the relative sequence of settlement within the field system. Environmental sampling and analysis might identify agricultural regimes; the alkaline nature of the geology may have potential for faunal remains although pollen analysis has been hampered in the past (Silvester 1980, 42).

In the few instances where the relict earthworks have potentially influenced the historic and extant field pattern, a combination of documentary research, in particular more detailed map regression and targeted trenching could clarify the character of the boundaries. Orley Common may be a good focus for such study, as geophysical survey might indicate that 'linear and disrupted linear deposits, such as former ditches or banks, of unknown period and probably from more than one phase of past land management' continue immediately north-east of the common (Dean 2016b).

The better-preserved elements of the relict field system are suggested for consideration against Scheduling criteria and are detailed in Appendix B.

RESEARCH THEME: TIN MINING IN THE BOVEY BASIN

Introduction

The rich and varied mineral resources which characterise the South West have long been exploited, from Roman iron ore iron extraction and smelting on the Blackdown Hills and Exmoor to the Roman and medieval stone mines at Beer, the medieval and post-medieval silver and lead mines of Coombe Martin, and the later lead mines of the Teign valley and west Devon, as well as the whetstone mines of the Blackdown Hills which thrived between the 18th and 20th centuries and the copper mines of west Devon which flourished in the 19th century. Whilst many of these industries have long since been abandoned, some continue as major industries in the regional economy, such as the china clay works of St Austell in Cornwall, the china clay industry of south-west Dartmoor and ball clay works of South Devon, which as one of the few known deposits globally is of national and international importance. Evidence of these past and present industries can be seen throughout the landscape, for example as earthworks of former workings, or as abandoned or ruined structures.

Of all these industries, the tin industry was one of the most important to the economy of the South West and is a dominant theme within the project area. In England tin ore is found exclusively in Devon and Cornwall; in Devon principally on Dartmoor and within definable tin zones across Cornwall. In Devon, documentary evidence suggests that tin was exploited from the mid-12th century and was an important component of the Devon economy throughout the medieval and post-medieval periods (Newman 2006, 123-125). Increasing evidence might indicate that tinworking in Devon was however, carried out from at least the mid-Bronze Age onwards. Quinnell (2017) cites smelted tin from a settlement at Dean Moor on Dartmoor, 42 tin ingots from the Salcombe B assemblage from a wreck just off the South Devon coast, east of Salcombe, and a tin bead from the cist burial at White Horse Hill, Dartmoor in support of this interpretation (Quinnell 2017, 19-25).

Evidence of prehistoric and Roman tin streaming or smelting sites in Devon is limited but increasing. Notably, alluvial deposits dated through association with peat deposits in the Erme valley and at Tor Royal indicate low level tin streaming on Dartmoor in the Bronze Age and significant activity in the Roman period, in addition to the more recognised medieval industry (Thorndycroft et al 2004; Meharg et al 2012). Evidence is much better provided in Cornwall where a range of artefacts from the Early Bronze Age have been recovered in association with sources of tin.

Extraction of tin was carried out on a large scale in the medieval period and a variety of techniques was employed. Between the 12th and 16th centuries 'tin streams' were the most commonly exploited sources, and the method used in their extraction was consequently known as tin streaming. Tin streams were formed when tin ore (cassiterite) was detached from the parent lode through erosion and weathering and deposited either along river valleys or on hillslopes or dry valleys. Extraction sites on the former are known as alluvial streamworks, and on the latter as eluvial streamworks (Gerrard 2000). The essential basis of streamworking, with

several variations, is the same in both cases. Following removal of the unwanted overburden, trenches (tyes) were hand-dug through the tin ground, into which a stream of water was diverted. Larger unwanted rocks and stones were sorted and typically dumped in linear or curvilinear banks to one side of the tye. The tin ore, which is denser than the associated waste (gangue) minerals, was concentrated in slow-flowing water to separate tin from the lighter clays, sands and gravels that make up the gangue. The working areas started at the lowest point and progressed upstream after each tye had been worked, with channels of water for washing the tin diverted as necessary. Evidence of streamworkings are apparent across Dartmoor and are one of the characteristic features of this landscape leaving few valleys unchanged (Fig 36). These workings exhibit a number of distinctive characteristics, as shown in Fig 37 and Fig 38.

Eluvial streamworks generally occupied steeper slopes where there was insufficient water to wash away the gangue material. Water was often stored in reservoirs and brought to site using leats. The scarceness of water and the steeper slopes meant that the water supply was carefully managed, and the working area arranged to suit the local topography. At Ivy Tow Water (Fig 38) the resulting spoil dumps are curved, with the upper part lying along the contour and the lower part across the contour (Gerrard 2000, 74-76). Tin ore derived from eluvial streamworks was less well sorted than that from alluvial sources and would require additional processing. A stamping mill (MDV20867) located to the north of Ivy Tow Water suggests that at this remote location such processing was carried out on site.

By the 15th century, as the demand for tin increased, attention had also turned to the mining of the lodes, with the most conspicuous of these workings being the openworks, long curving or linear gullies cut along the length of a lode, and lode-back pits, individual pits dug in a line along a lode (Newman 1998, 21-22). Other important elements of Devon's tin industry are tin mills, which include stamping mills to crush the tin ore, dressing floors to further separate the tin from the waste and blowing mills for primary smelting. Tinners' huts and leats for the conveyance of water are also a common feature of the tin mining landscape.

Devon was divided into four tinworking districts, administered by the Stannary courts based in towns, at Ashburton, Tavistock, Chagford and Plympton, with the Stannary Gaol located at Lydford. Fig 39 shows the distribution of sites related to tinworking in Devon and those recorded within this project area. Such sites are almost exclusively confined to Dartmoor, although a concentration is visible to the south-west of Tavistock. The AI&M survey results also demonstrate the importance of the tinworking industry at Bovey Tracey. Some tinworking monument records, such as lode back pits or tin prospecting pits, are not represented because these specific monument terms do not exist within the HER monument thesaurus and have been recorded with broader terms such as trial pit. Likewise, leats which were fundamental to tinworking operations have been omitted given that they are widespread across Devon and are associated with many other industries.

Figure 36: The spoil dumps of Swincombe Head streamworks (MDV26062). Devon County Council DAP/JW 5 21-JAN-1988 © Devon County Council. The leats visible in the foreground are associated with the 18th -19th-century Whiteworks Tin Mine (MDV6286), not the adjacent streamworks (P. Newman pers comm).

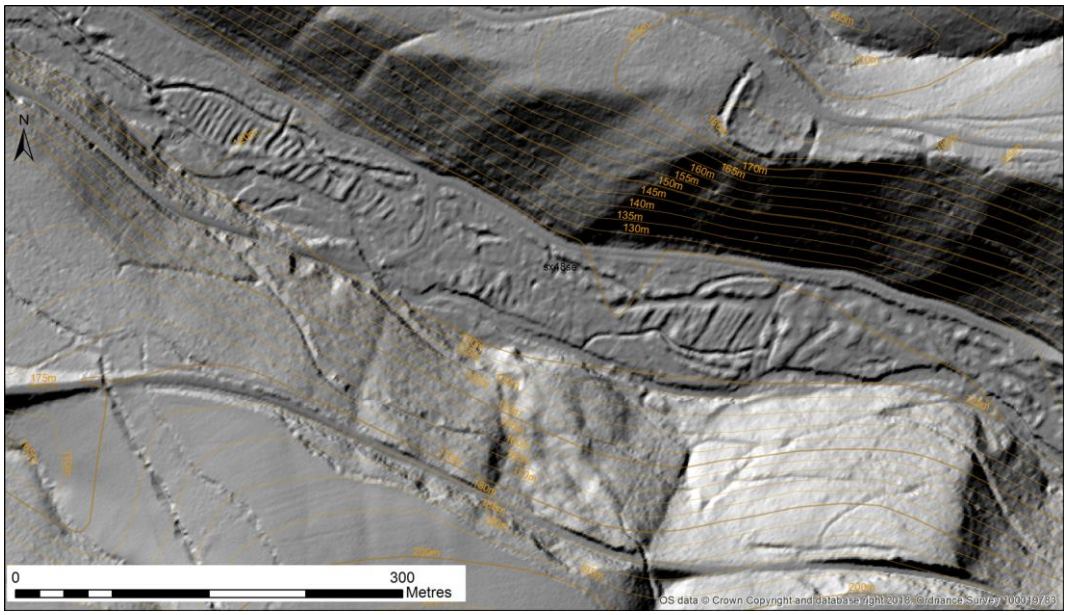


Figure 37: Alluvial valley bottom streamworks at Lydford Woods (MDV26889). LIDAR SX4983 Environment Agency DTM 01-JAN-1998 to 31-MAY-2017. © Devon County Council; source Environment Agency DTM

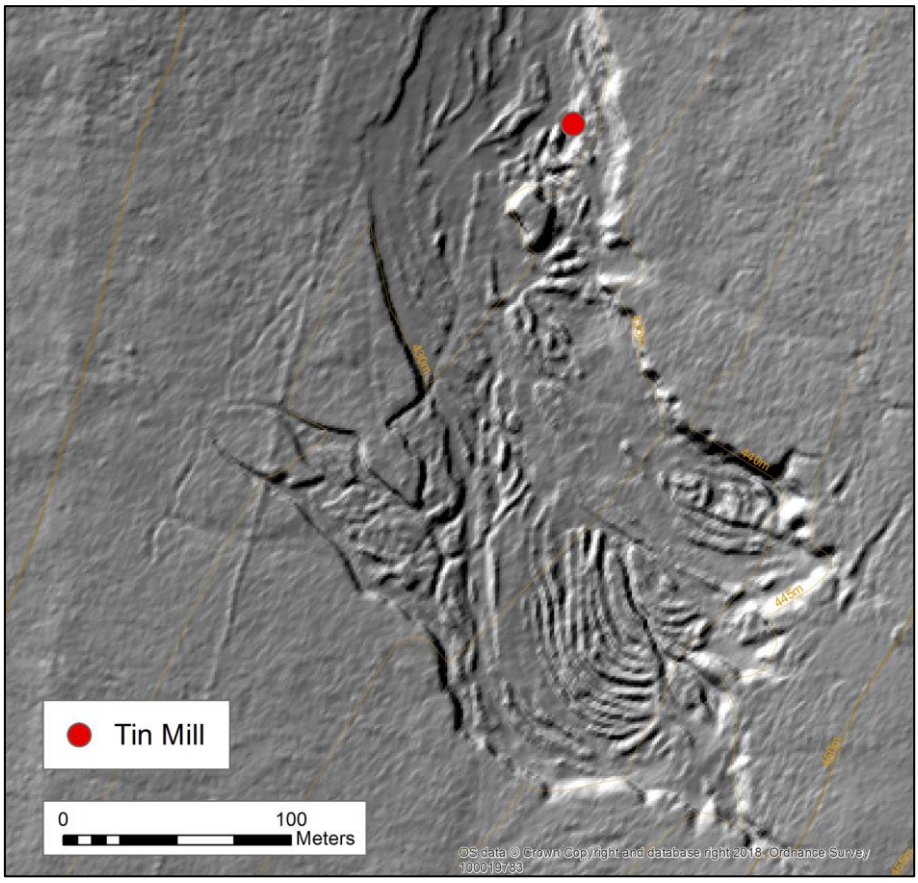


Figure 38: Eluvial streamworks at Ivy Tor Water. LIDAR SX6291 Environment Agency DTM 01-JAN-1998 to 31-MAY-2017. © Devon County Council; source Environment Agency DTM

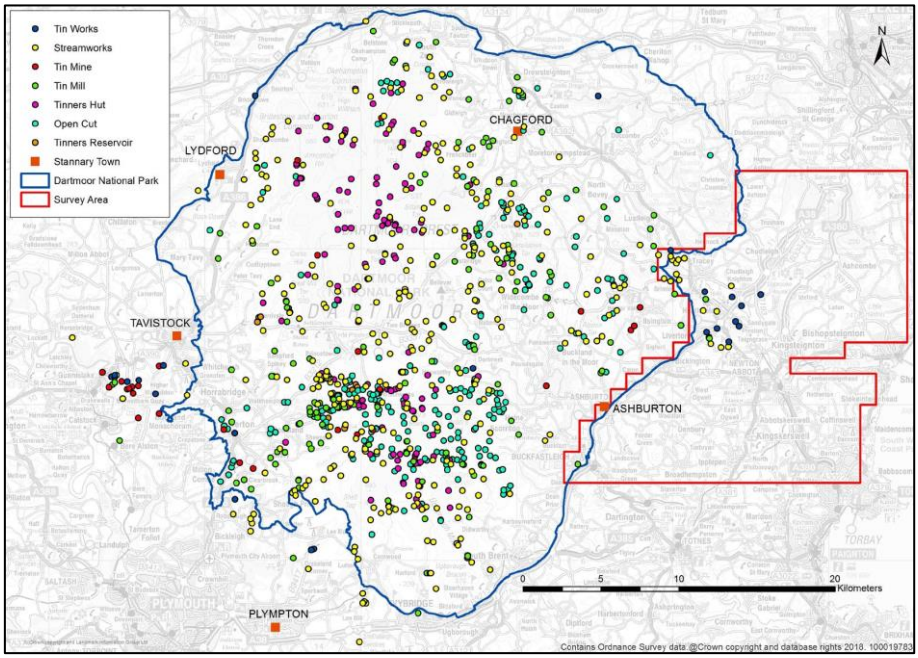


Figure 39: Distribution of sites in Devon associated with tinworking. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783.

Previous study

Devon's tin industry has been actively studied since the late 19th century following the work of R. Hansford Worth. These early studies were primarily concerned with the recording of medieval tin mills, although from the 1960s there was a growing emphasis on the importance of 19th and 20th century workings (Greeves 1990, 6), for example the tin mines of Eylesbarrow (Cook et al 1974, 164-214; Newman 1999) and Wheal Cumpston (Greeves 1978, 161-71).

More recently, there has been a significant increase in the body of work related to the study of Devon's tin industry which has seen a shift in emphasis towards a broader and more contextual approach, seen in detailed surveys and characterisation of earthwork remains, as at Stanlake (Gerrard 1998, reports 6 & 7) and Lydford (Gerrard 1997), and the review of documentary and field evidence to examine the relationship of tinworking and the tinners with farming, settlement and the wider landscape, for example on south-west Dartmoor (Newman 1987, 223-240; 1994, 199-238) and west Dartmoor (Greeves and Newman 1994, 199-219). More recently, general discussions of the Dartmoor tinworking landscape have also become available (Newman 2011, 142-66, Newman 2017).

Important historical work has also been carried out on the Stannary parliament, the tinners' legislative body (Greeves 1987, 145-67; 1992, 39-74; 2003, 9-29; Greeves & Newman 2011). The work of the Dartmoor Tin Research Group established in 1991 has also been instrumental in promoting, conserving and conducting field surveys and documentary research to aid our understanding of the nature and organisation of this industry, resulting in several publications. The former English Heritage Archaeological Investigation team carried out extensive earthwork surveys of tinworks on Dartmoor, as integral components within several projects. Much of this survey data exists as detailed large-scale GIS mapping within the Dartmoor HER, and within the Historic England (Pastscape) archive. Some of this work was documented in unpublished literature, (Newman 1996; 2002) whilst a detailed summary of the upland tinworks and mines was published in 2011 (Newman 2011).

With relatively few exceptions, for example the Okehampton by-pass (Cook & Towell 1986, 20-21) and at Lydford (Gerrard 1997), tinworking sites have not been subject to detailed excavation. A notable example has been the ongoing investigations at Hemerdon, south-west Dartmoor (immediately without the National Park). Since the late 1970s, work here has included detailed earthwork and aerial surveys, a lidar survey, geophysical survey and trial trenching in 2008, which was followed by a comprehensive programme of targeted evaluation carried out between 2011 and 2014. This work probably represents the most detailed investigations of tinworkings ever carried out. The most recent phase of work here recorded a highly complex sequence of intercutting and overlapping earthworks of medieval and post-medieval streamworking channels, lode back pits and spoil dumps, an extensive network of leats and 19th century shafts (Hughes 2017, 77-82).

Limited but important work carried out within the project area includes earthwork survey of a probable streamworks on Bovey Heath (English Heritage 2004), a review of historical and documentary sources demonstrating the importance of

tinworking in the Bovey Tracey area (Greeves 2008), a lidar assessment of woodland at Pitt's Plantation, Blacksticks Plantation, Gavrick Copse and Ice House Copse (Trick 2014, 2015) that revealed earthworks of possible tin streamworks and, at these same locations, detailed earthwork survey (Newman 2015a; 2015b).

Bovey Basin tinworkings

Within the project area, the Bovey Basin holds a rich reserve of alluvial tin, eroded from the Dartmoor granite and deposited along the valleys of the rivers Teign and Bovey which converge at Heathfield, as well as a number of other water courses (Greeves 2008, 16-17). The extent of tinworking here is first alluded to by Charles Vancouver who describes in 1808 that 'the greatest part of Bovey Heathfield is cut up and destroyed by [tin streamworks]' and that the fir plantations which dominate this area were planted 'after levelling the old stream works' (Vancouver 1808, 69, 258-9). The earliest evidence of tinworking in this area, however, is a reference to three Ilsington tinners presenting tin for coinage at Ashburton in 1303, although it is not until the first half of the 15th century that specific reference to a tinworking site within the project area at Bovey Heathfield is first made (Greeves 2008, 21).

Evidence of tinworking within the project area comprises a small but important concentration of sites. Five tin mills were previously recorded from historical sources, including field name evidence and earthwork remains. More significantly, 25 monuments interpreted as streamworks, or where this distinction was uncertain as tin works, have been recorded as earthworks on the Devon HER, of which 20 were unrecorded prior to the AI&M survey.

Fig 40 shows that these sites fall within two distinct groups. They comprise a dense concentration of 12 sites within a 300ha area on the moderate east and west facing slopes either side of the River Bovey, west of Bovey Tracey, and a looser grouping of 17 sites across 1000 hectares on the gentler slopes that characterise the area surrounding Heathfield, south-east of Bovey Tracey. A solitary tin mill is located beyond these concentrations within the south-west corner of the project area.

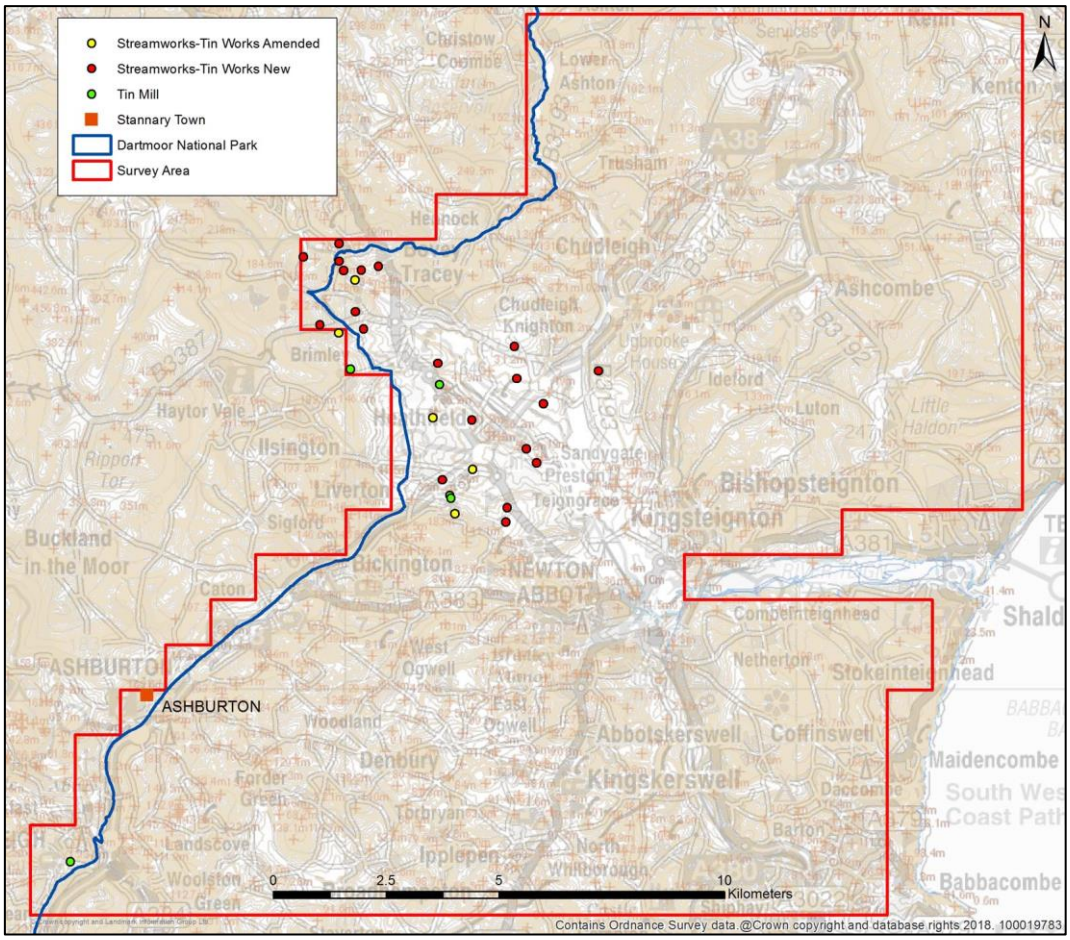


Figure 40: Distribution of newly identified and amended sites recorded as streamworks, tin works and tin mills. The sites clearly occupy two topographically distinct areas around Bovey and south of Ashburton. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783.

When overlain onto the BGS simplified bedrock geology mapping (Fig 41), the distribution of tinworking sites show a clear correlation with Bovey Formation Sand Silt and Clay, with those on the steeper slopes west of Bovey Tracey also showing a correlation with Crackington Formation-Mudstone and Sandstone Interbedded. Within the Bovey Basin, the characteristic clay seams are in places mostly derived from material deposited from the degradation of the Dartmoor Granite (shown in dark orange; Edwards 2011, 112). This correlation then clearly highlights the tin bearing qualities of these geological groups.

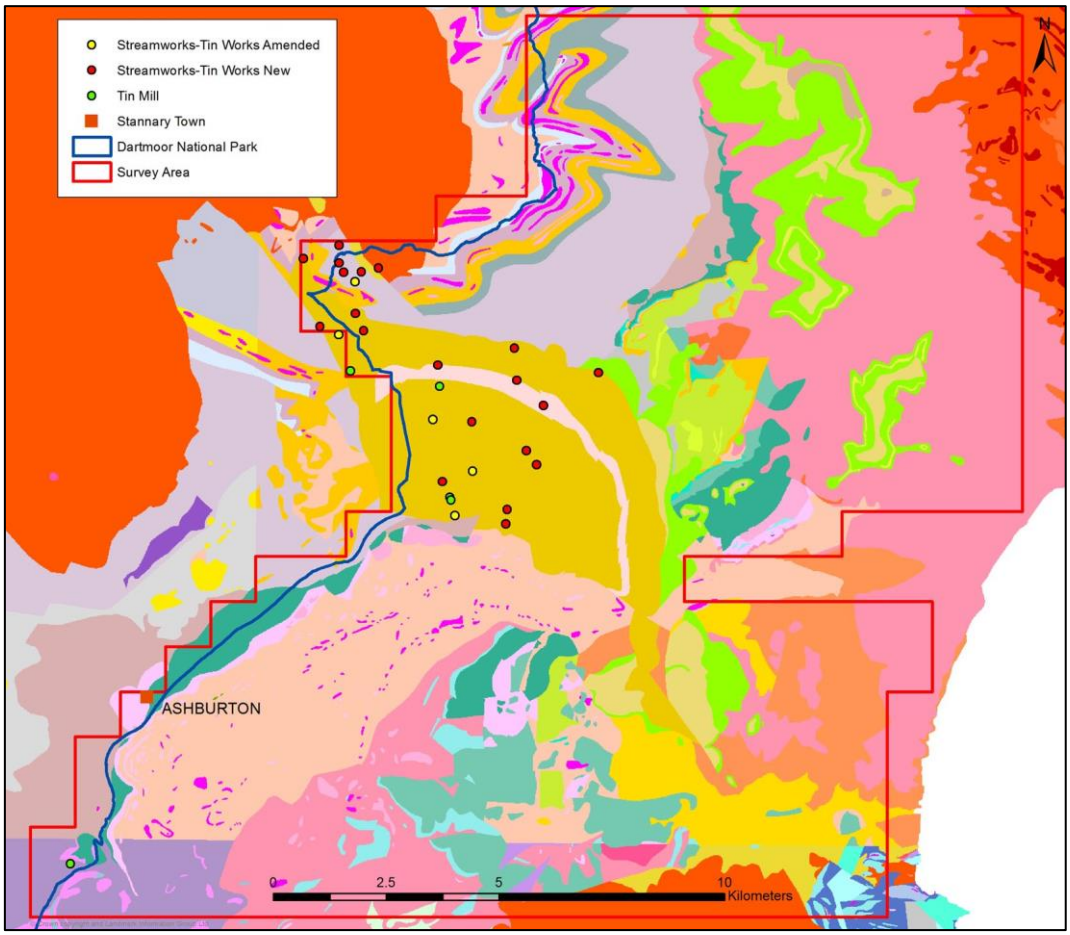


Figure 41: Distribution of newly recorded and amended sites recorded as either streamworks, tin works and tin mills overlain onto BGS simplified bedrock geology. The distribution of sites shows a clear correlation with the Bovey Basin Bovey Formation Sand Silt and Clay (shown in light orange) and Crackington Formation-Mudstone and Sandstone Interbedded (shown in lilac). **For a geological legend see Fig 15**. Reproduced with permission of the British Geological Survey © NERC. All rights reserved.

The distribution of tinworking sites also almost entirely corresponds with areas defined by HLC as Rough Ground, Other Woodland or Conifers. Where earthwork evidence of tinworking has been recorded within Other Woodland or Conifers, the primary source used in their identification and recording has been lidar derived imagery. Typically, hillshade visualisations have been of most benefit in the initial identification of a tinworking site, with both Simple Local Relief and Positive Openness visualisations used more effectively in the detailed transcription and interpretation of the earthworks. Within these wooded areas earthworks are sometimes visible on aerial photographs, but only temporarily, when areas of trees have been cleared, before being obscured again when reverted to woodland, as evident at Staplehill Copse (MDV21250) and Colehays Plantation (MDV19917). Earthworks have also been recorded from aerial photographs on areas classed as Rough Ground, such as Knighton Heath, Chudleigh Knighton (MDV124326). Where earthworks lie preserved within woodland or rough ground, their state of preservation is evidently good, although in areas beyond these which have been subject to agricultural improvement and ploughing, such as the western extent of the Heathfield tin works (MDV69787), which is characterised as Post-Medieval

Enclosures, the earthwork remains lack clear definition and can be barely perceptible.

The earthworks recorded by the AI&M survey are notable for their distinct character when compared to the more studied Dartmoor examples, and this is discussed below. A small number of sites, such as the earthworks located at Staplehill Copse (MDV21250; Fig 42) do, however, exhibit characteristics typical of Dartmoor streamworks. Located within the southern Heathfield concentration, over an area of circa 12.7 hectares, they are aligned along the interface between the steep north-east facing slopes of Tavy Formation Slate to the south and the more moderate slopes of Bovey Formation Sand, Silt and Clay to the north. The siting of a tin works is unlikely to be coincidental and is almost certainly a consequence of being able to more easily access the valuable tin deposits along this interface. Reference to an 'Old Tin Work' and 'Old Tin Pit' in this location is shown on a map dated to 1757. Earthworks recorded as 'Sand Pit' and 'Old Quarry' are, however, also shown here on the First Edition OS map which suggests that the exploitation of other resources have potentially disturbed the tinworking remains. The earthworks are characterised by sinuous channels aligned at a slight angle to the slope and interspersed with irregularly shaped spoil mounds. A series of regularly spaced linear spoil banks to the north-east, flanked in places by narrow water channels, are aligned across the gentle slope and were probably positioned to maximise the flow of water, possibly scarce on this hillslope. In contrast, across the more steeply sloping ground to the west, the curved banks may be evidence of a need for closer control of the water supply. The arrangement of these spoil dumps has parallels with streamworks recorded elsewhere, for instance Stanlake (MDV28201) on Dartmoor (Fig 42).

Within the survey area individual streamworks are small, mostly between 1-7 hectares, comparable to a number of examples recorded on Dartmoor, such as at Pennaton Copse (MDV3077; less than 1 hectare), Caters Beam (MDV25111; circa 2.2 hectares) and Narrator Brook (MDV25290 circa 4.7 hectares). The majority of Dartmoor streamworks are, however, much larger than the Bovey Tracey and Heathfield examples.

Examples of smaller possible streamworks at Ash Hill Copse (MDV9162), Moorlands Copse (MDV123318) and Icehouse Copse (MDV125434), in close proximity to Staplehill Copse, are shown in Fig 43. The southernmost spoil heap at Icehouse Copse was reused for construction of the eponymous structure (MDV9151). The presence of streamworking at these locations has been suggested by Newman (2015b, 12), but has not yet been verified by fieldwork; until this takes place other extractive interpretations, such as sand or gravel quarries, must be considered possible. Although the earthworks here are more random in form than their Dartmoor counterparts, channels which have been cut across the slope, possibly to direct water into individual working areas, are clearly visible within Ash Hill Copse. The intensity of workings is evident at Icehouse Copse where the ground level has been reduced by circa 1m for most of the area (Newman 2015a,1) and it is likely the earthworks at Ashill Copse and Moorlands Copse have been at least as intensively worked. These sites and that at Staplehill Copse are perhaps significant in that they are located on the upper slopes which define the southern extent of tinworking within the survey area, corresponding to the edge of the Bovey

Formation-Sand, Silt and Clay. Other workings recorded within this southern concentration of tinworking sites, such as those of Lower Teigngrace Heathfield Plantation (MDV124273), Upper Teigngrace Heathfield Plantation (MDV124282) and Sandslade Copse (MDV123489) all exhibit similar characteristics.

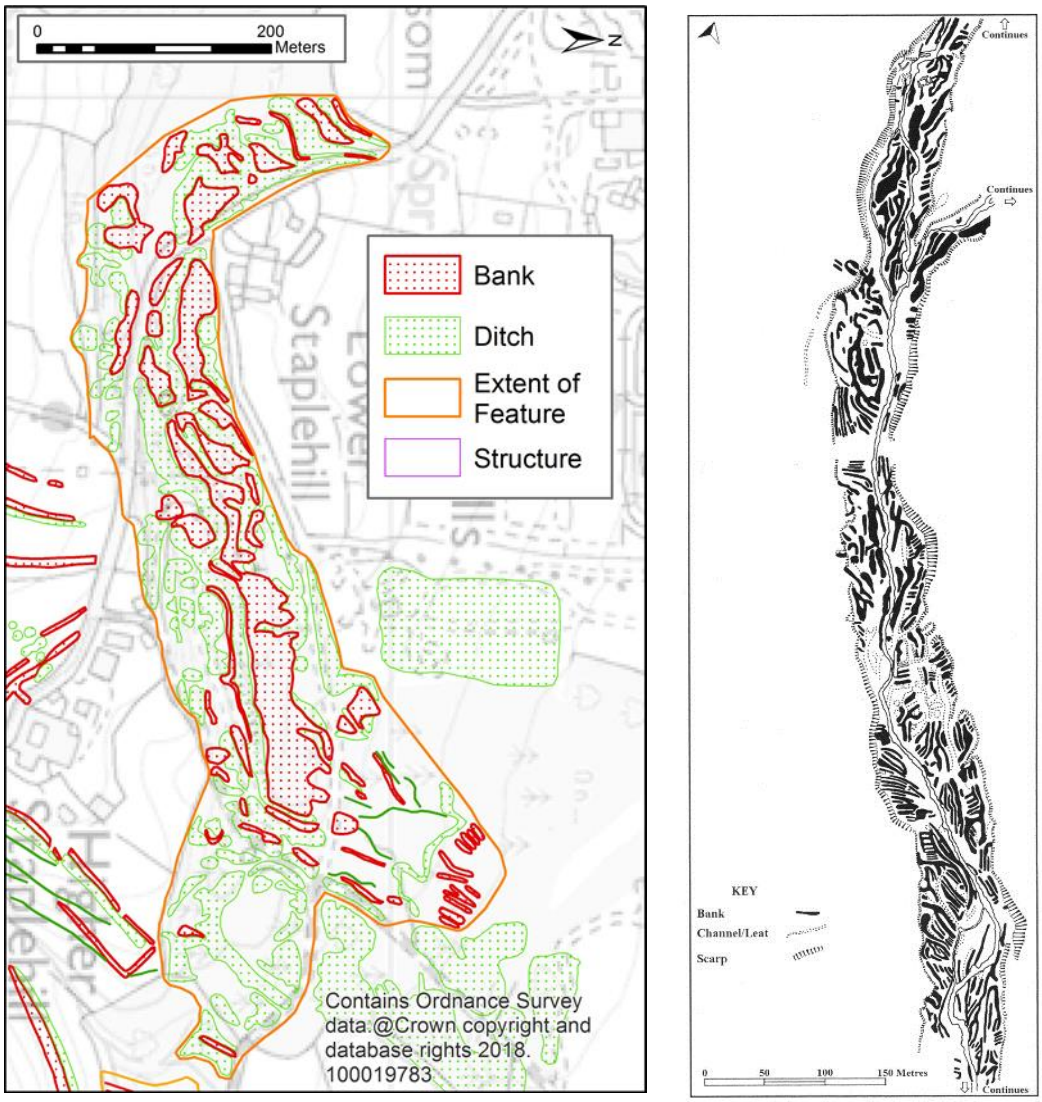


Figure 42: left: AI&M Transcriptions of earthworks at Staplehill Copse (MDV21250), note orientation to north. The extent of the earthworks is outlined in dark orange. AI&M transcriptions © Devon County Council. Contour data Bluesky International Ltd. / Getmapping PLC. © Copyright and database rights 2019. Right: Simplified plan of Stanlake streamworks (MDV28201) © Sandy Gerrard

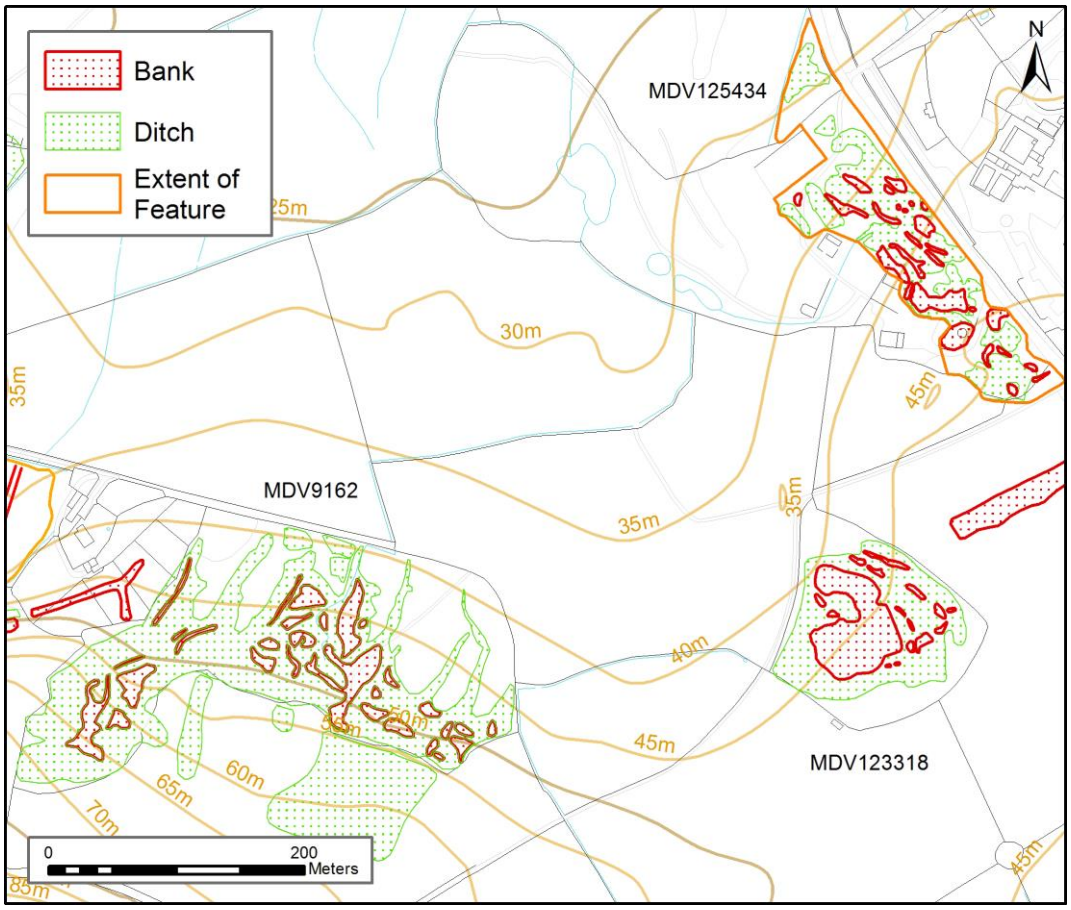


Figure 43: The sites recorded at Ashill Copse (MDV9162), Moorlands Copse (MDV123318) and Icehouse Copse (MDV125434) typify the smaller streamworks recorded in this survey. The base map is © Crown Copyright and database right 2019. Ordnance Survey 100019783. AI&M transcriptions © Devon County Council. Contour data Bluesky International Ltd. / Getmapping PLC. © Copyright and database rights 2019.

By far the largest concentration of tinworking earthworks is visible at Heathfield. These extensive earthworks include monuments MDV124354; MDV69787; MDV124436; MDV61846; MDV124283 and collectively occupy an area of circa 318 hectares (Fig 44). Specific reference to a tin works here is first mentioned in the early 17th century regarding Richard Stuckley who had a one-twelfth share in a tinwork at Gavrick Copse (MDV61846; Greeves 2008, 20-21). Distinction between individual working areas and evidence of phasing is, however, unclear due to successive phases repeatedly encroaching into older workings. This industrial landscape was probably previously more extensive but was reduced by the late 18th century creation of Stover Country Park to the east (MDV56726), the expansion of Bovey Tracey to the north-west, Liverton to the south and Heathfield Industrial Estate to the east. The construction of a Second World War United States army hospital and later Polish resettlement camp (MDV55119), visible to the south-east has also probably impacted on these earthworks.

These extensive earthworks are in stark contrast to the smaller-scale, isolated workings recorded to the north, east and south, suggesting that tin ore was more plentiful and accessible here, which is perhaps unsurprising given that it broadly marks the confluence of the Teign and Bovey, bringing with them abundant

deposits of alluvial tin from Dartmoor. That said, the mostly amorphous character of the visible earthworks is comparable to the smaller workings.

The earthworks on Bovey Heath, to the north-east of the Heathfield concentration, offer the clearest picture of how the streamworks may have operated (Fig 45). A series of sinuous and linear leats (MDV69787) clearly traverse the heath, with linear channels and spoil heaps of the working areas visible perpendicular to the road and the remains of a possible tin mill MDV69788 to north of the site.

The landscape here has, however, been much affected by later extraction, for example by sand pits shown on the First Edition OS map, and it is highly likely that some of the transcribed earthworks originated with such later activity. Earthwork survey undertaken here in 2003 (English Heritage 2004) confirmed the presence of leats and scarps commensurate with alluvial streamworks, in addition to a possible Civil War breastwork (MDV13777) and remains of two prehistoric barrows (MDV13779 & MDV13780). The area is defined by a slight north-west to south-east aligned ridge with a series of sinuous and parallel leats which closely follow the contours on its western side and extend to a length of some 800m. These leats were probably used for the conveyance of water downslope to the working areas to the east which are visible as prominent scarps defining the working face, with linear water channels and spoil heaps of the individual tyes perpendicular to these scarps and the east facing slope. A U-shaped cutting interpreted as a tin mill site (MDV69788) was possibly fed by a launder, visible as a north to south aligned bank that possibly conveyed water to the water wheel for on-site processing of the tin (English Heritage 2004).

The tinworkings within the southern concentration around Heathfield would require a constant supply of water to feed the leats, for washing and processing the tin. The most likely source for this is the River Bovey, but the distance to some of the streamworks would be significant, suggesting that more local water courses were also possibly utilised, such as Liverton Brook which flows in-between Gavrick Copse (MDV61846) to the north and Staplehill Copse (MDV21250) to the south. The supply of water was, however, less of a problem for those examples which make up the northern concentration of sites, west of Bovey Tracey. Here the topographical setting is more comparable to Dartmoor tin works, located on steeper slopes either side of the River Bovey, which could be easily tapped (Fig 46).

No other earthwork or structural features commonly associated with tin mining, such as linear alignments of small prospecting pits dug to locate and assess the viability of tin deposits, was recorded within the project area. Where such features may once have existed, they are likely to have been destroyed by later workings. Other working methods associated with the mining of the lodes themselves, such as lode-back pits and openworks, are almost exclusively confined to the Dartmoor granite.

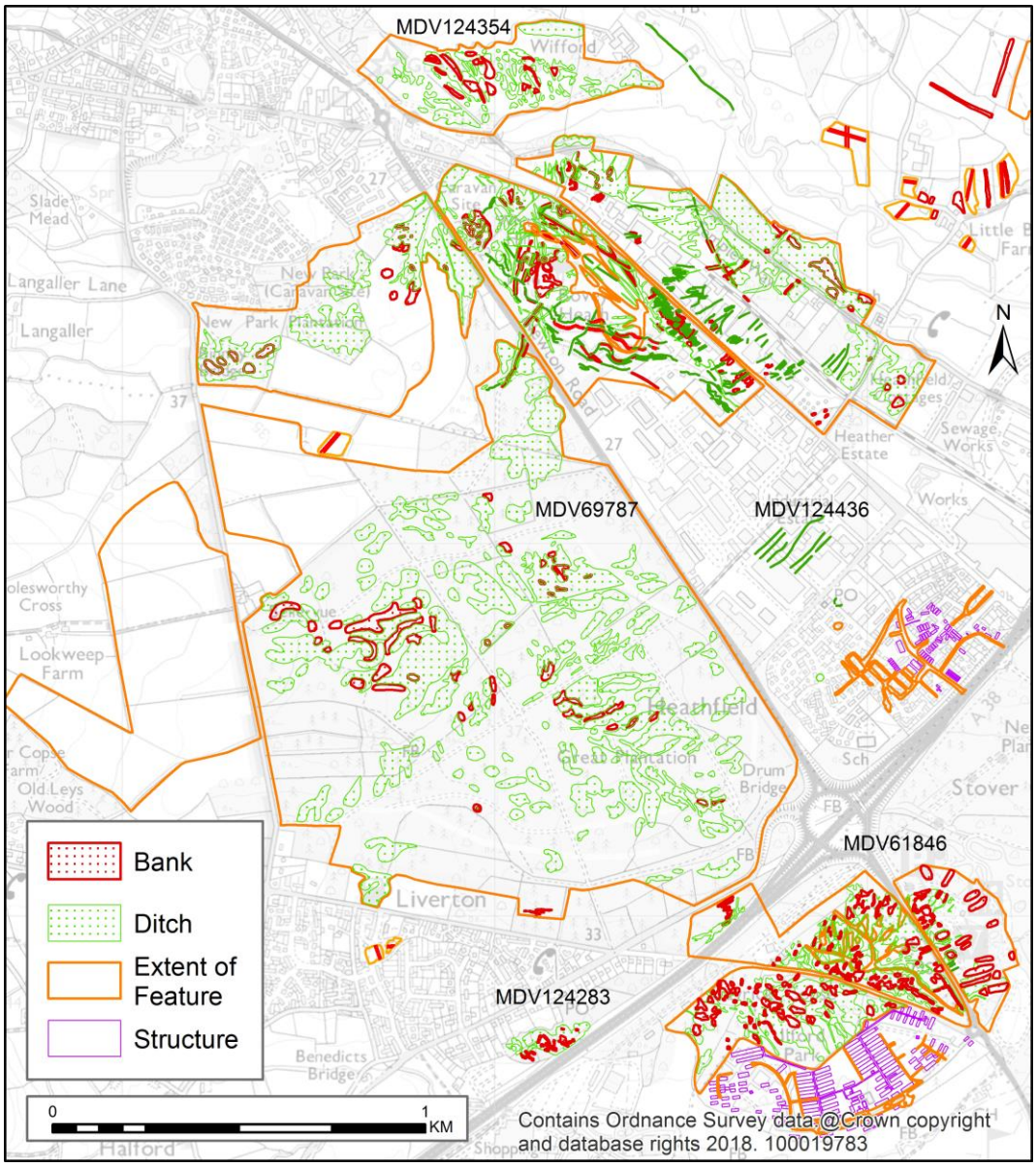


Figure 44: Extensive tinwork earthworks recorded at Heathfield. The extent of the visible earthworks, which in places are too subtle to accurately transcribe, is defined by an extent of area polygon, outlined in dark orange. AI&M transcriptions © Devon County Council. Contour data Bluesky International Ltd. / Getmapping PLC. © Copyright and database rights 2019.

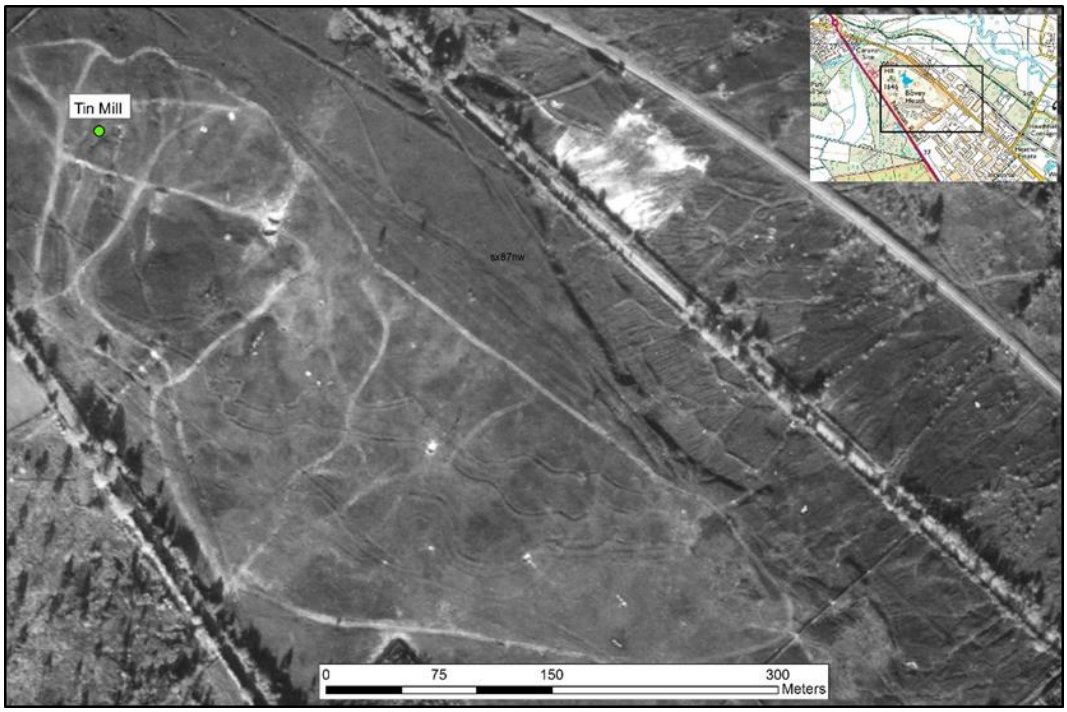


Figure 45: Aerial photograph taken in 1946 of Bovey Heath before being partly subsumed by Heathfield industrial estate. RAF/CPE/UK/1824 RP 3130 04-NOV-1946 Historic England Archive (RAF Photography). The map insert is © Crown Copyright and database right 2019. Ordnance Survey 100019783.

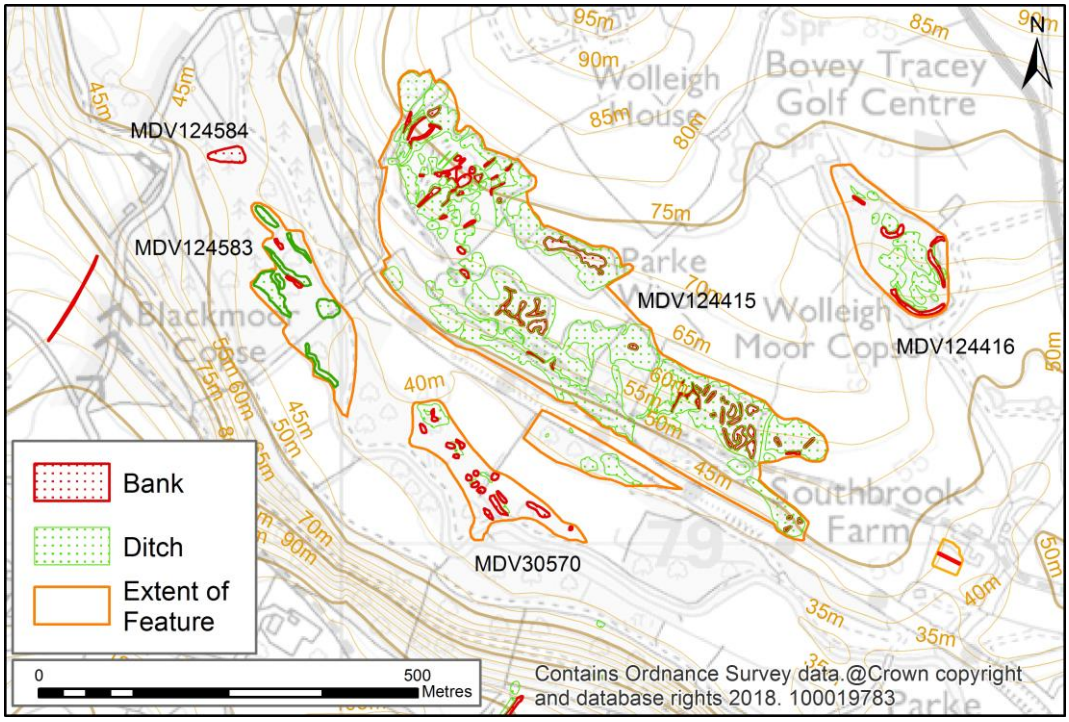


Figure 46: Possible streamworks at Wolleigh Moor Copse (MDV124416), Evelyn Wood, Kathleen Wood and Parke Wood (MDV124415) and at Blackmoor Copse (MDV30570, MDV124583 & MDV124584). AI&M transcriptions © Devon County Council. Contour data Bluesky International Ltd. / Getmapping PLC. © Copyright and database rights 2019.

Wider significance and context of the Bovey Basin tinworkings

The tinners operating within the Bovey and Heathfield areas fell under the jurisdiction of the Ashburton and Chagford Stannaries. These Stannaries had a governing role in the regulation and operation of the tin works, from the registration of individual workings, to diverting water supplies for tin washing and settling disputes with other tinners and landowners. Particularly frequent in the documentary evidence is reference to the Stannaries settling disputes. For example, in the early 15th century, Ivo Baggetor was accused by Joel Underhays of diverting water from a leat which led from Ivo's land in Liverton to Joel's tinwork on Heathfield. The importance of water supply to tinworking was sufficient enough for six of Ivo's cows and four oxen to be impounded as a consequence, although Ivo later broke into the pound and released his cattle (Greeves 2017, 5). Tin extracted from the Bovey and Heathfield workings would be taken to the Ashburton and Chagford Stannaries for assay, weighing and taxation, or '*coinage*', although evidently the Ashburton Stannary bailiffs were held with little regard as 'poore men, of smale credit or estimacion' who spent their time 'boowsing and drincking and other lewde vices' (Stoyle 1994, 17).

At least 5 tin mills are recorded in association with these workings. The well-sorted alluvial tin from the Bovey valley would need little crushing but would require smelting at a mill before being taken to either Ashburton or Chagford. Peat charcoal, to fuel this process was possibly sourced from the same peat supplies as other streamworks on Dartmoor (Newman 2014).

In the early 16th century merchants were vital to Devon's tin industry and men like John Herte and John Braban, both from Bovey Tracey, would have played a key role in the success of workings in this area, being responsible for, among other things, exporting quantities of tin through Teignmouth (Greeves 2017, 7).

The intensity of workings carried out across this area is intimated by the wealth of documentary evidence available between the 15th to the mid-17th centuries. A prominent tinworking family of Bovey Tracey in the 16th century, the Furselands are frequently referenced in relation to the several tin works owned in the area, including several at Heathfield (Greeves 2008, 23). Reference in the mid-19th century is also made to a Mr. Forsland (i.e. Furseland) of Bovey and his company regarding the construction of a new water supply for Plymouth, and it is argued that the Furselands may have been skilled leat engineers (Greeves 2008, 20). It is tempting to suggest that some of the tinworkings and leats recorded during this survey might, in part, be of their doing.

Such workings, here and across neighbouring southeast Dartmoor, would have generated huge quantities of spoil, a significant proportion of which would be washed into the Bovey and Teign rivers, as well as other water courses, and carried through suspension out to Teignmouth. The silting up of rivers which pushed tidal limits further downriver was a serious issue for many harbours across the southwest that were threatened with becoming isolated, so much so that it led to an Act of Parliament in 1531 to tackle the problem. Evidently this had little effect and in 1535 the people of Teignmouth, and other ports complained about the 'marvellous great quantity of sand, gravel, stone, rubble, earth, slime and filth' washed from the streamworks (Pearce 1725, 159).

At Bovey and Heathfield, the tinners probably lived in settlements within easy reach of the workings, and it has been suggested that in Devon and Cornwall they may have worked on a seasonal basis around the requirements of the farming calendar, possibly moving on once a working had been exhausted (Herring 2017, 89-90). Evidence of migratory working patterns is visible in the parish records from the late 17th century onwards which note that many tinners on Dartmoor were from Cornwall (Greeves 2017, 9). Conversely, records also show that many tinners working in Cornwall derived from Devon. As might be expected, the owners of a tin works could have interests in a number of different workings beyond their place of residence. Documentary evidence in 1585 suggests that the Leers from Bovey Tracey, for example, had the right to work three tinworks located within the Walkham valley on the west side of Dartmoor (Greeves & Newman 1999, 204).

It is reasonable to argue that, as noted elsewhere by Greeves (1981), the decline of the Bovey and Heathfield tin industry could in part be attributed to the Civil War of the 1640's when many of the tinners would have been called away. Indeed, a breastwork (MDV13777) traditionally associated with the 1645 battle of Bovey Heath was constructed over the tinworking remains on Bovey Heath, although it is unclear whether the workings had been abandoned by this time. Although workings continued here after this time, the industry was in decline, and other industries, such as the Bovey Tracey Potteries (MDV8963), Great Western Potteries and Brick Works (MDV8965; Fig 47), ball clay quarrying and Bovey Tracey lignite mines (MDV103872) were established from the 18th century or earlier. Whilst many of these redundant tinworkings may have been partly or wholly subsumed by the later industries (Fig 48) or were levelled for the establishment of plantations or for agricultural improvement, some of the relict features were evidently re-used. For example, the late 18th century ice house within the grounds of Stover Park (MDV9151), mentioned above, which was constructed atop a streamworks spoil mound (MDV125434; Fig 49) now within Icehouse Copse. Also within Stover Park, two earthwork ornamental tree mounds (MDV115216) are located amongst Blackstick Plantation tinworkings (MDV61846), and it is tempting to argue that spoil from these workings was used in their construction.

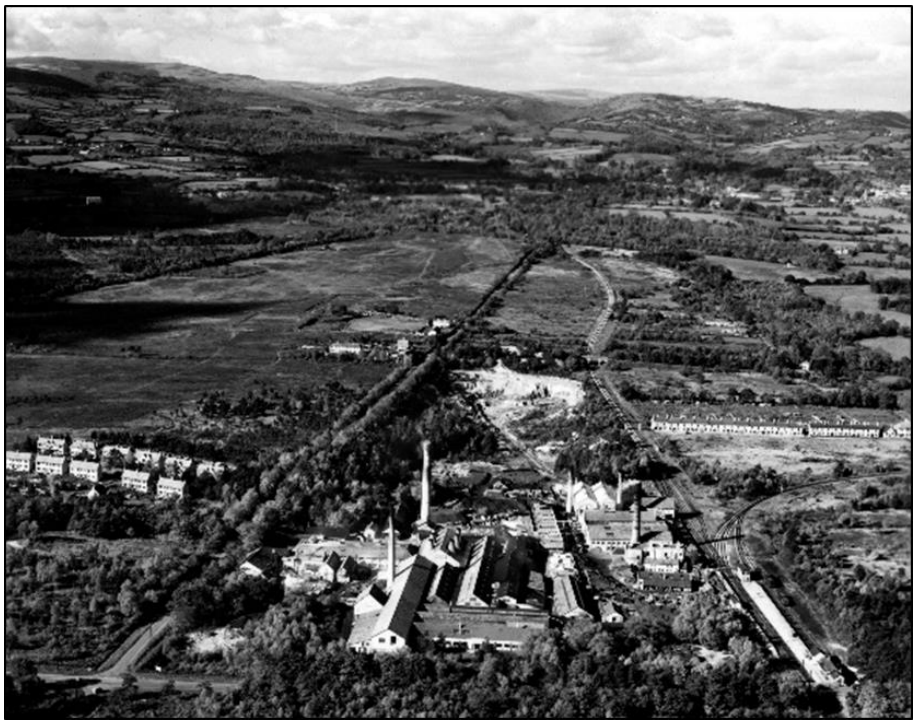


Figure 47: Bovey Heath was dominated by tinworking from the medieval period to the 17th century. In this in 1948 image the tinstreaming earthworks (MDV69787) are barely perceptible. By the mid-19th century industrial landscape is dominated by Great Western Potteries and Brick Works (MDV8965) (foreground with associated clay quarry). Heathfield railway line (MDV9120) and station (MDV52046), essential in transporting the potteries' and brick works' goods are visible to the right. AFL EAW020235 26-OCT-1948 © Historic England Archive (Aerofilms Collection).

Figure 48: Large-scale ball clay extraction at Newbridge Clay Works destroyed the remains of a possible tinworking site east of Jews Bridge during the later 20th century (MDV124324). DAP 6298/07 26-MAY-1988 (KL) © Devon County Council.

Conclusions

Numerous and extensive earthworks recorded by the survey probably originated in intensive tinworking carried out between the 14th to early 17th centuries, although it is tempting to argue that tin exploitation was carried out prior to this and possibly during the prehistoric period. Although no evidence for prehistoric tin exploitation was recorded during the survey, bronze working evidence such as the fragmentary clay spear moulds found at Dainton (MDV8713), one of several extensive prehistoric field systems recorded around Ipplepen, make it tempting to argue that the occupants of these settlements had an awareness of the importance of the tin deposits some 5km to the north.

The earthworks exhibit some characteristics comparable with tin streaming sites recorded on Dartmoor and across parts of Cornwall. However, the seemingly unsystematic nature of the earthworks, more often taking the form of amorphous and apparently random pits, spoil heaps and channels, could be evidence for a different method that that cannot easily be assigned to Gerrard's four-type classification of alluvial streamworks (Gerrard 2000, 66-72).

This is possibly explained in part by topography; the broad, lowland setting of the Bovey Basin and relatively shallow overburden (Newman 2015b, 9) which necessitated a different approach to the extraction of tin, as well as careful water management. In contrast, on Dartmoor, such as at Lydford and Stanlake, the alluvial streamworks are confined within narrow river valleys with an immediate water source that could be easily tapped.

The very different nature of the lowland geology is also an important factor. The linear dumps characteristic of the upland river valleys comprise rocks, boulders and stones, reflecting the systematic techniques needed to work the underlying granite geology. In contrast, the lacustrine geology of the Bovey basin is essentially one of sand and clays. The tin grains would have been found within layers of mixed gravels and sands, the working of which may not have necessitated such systematic practices or resulted in such large and enduring dumps and channels (P. Newman pers comm).

In some places, such as Heathfield, the visible earthworks may also represent several hundred years of activity, working and re-working the tin deposits which subsequently merged to create a confused arrangement of earthworks, obliterating any evidence of systematic workings. These earthworks have also been shown to be disturbed by later activity, for instance sand and clay extraction.

The impact on this landscape would have been huge and disputes over the loss of land resulting from tinworking are recorded in the documentary evidence. The better quality and more fertile agricultural land of the Bovey Basin, in contrast to Dartmoor, may have sharpened these tensions and perhaps led to a more intensive method of working the tin deposits within more restricted areas.

The working arrangements of the tinners themselves must also be considered. If the tin works here were operated on a part-time or temporary basis and under changing instruction, then the workings could lose some degree of continuity and possibly result in its more random form.

Evidence of tinworking has, however, made an important contribution to our understanding of the medieval and early post-medieval industrial landscape character of the project area. The colocation of sites within the geological areas of Bovey Formation Sand Silt and Clay around Heathfield and Crackington Formation-Mudstone and Sandstone Interbedded (Fig 41) highlights the potential that further tin mining sites might yet to be discovered, associated with these tin rich alluvial deposits. Where sites have been subject to agricultural improvement, such as to the west of Great Plantation (MDV69787, Fig 44), it has been demonstrated that the earthworks are particularly subtle, and many more sites may exist in this area that have been largely or completely levelled.

It is probable that medieval to post-medieval tinworkings continued westwards along the southern fringe of Dartmoor towards Plymouth. As such it is likely that lidar imagery will continue to prove an important resource in the identification and interpretation of similar sites to those described above in the neighbouring area.

RECOMMENDATIONS

Until recently the importance, unique character and preservation of the tinstreaming earthworks within the lowland Bovey Basin landscape had not been appreciated within tinworking studies. The survey has both demonstrated the value of lidar data and aerial photographic sources to this new area of research and potentially expanded the known resource. As such, it has validated the inclusion into, and begun to answer, Research AIM 17 of the Historic England Research Agenda for the extractive industries:

- Make more use of LiDAR and other aerial reconnaissance techniques as a means of recording surface evidence, discovery of unrecorded sites, and as an aid to the interpretation of field remains (Newman 2016, 264-265).

Expansion of these methodologies into neighbouring areas is therefore recommended.

An informed programme of fieldwork building upon the AI&M survey is also recommended. Measured earthwork surveys, targeted trenching and environmental sampling would offer greater insight into a different type of medieval and early post-medieval tin extraction that characterised the lowland fringes of Dartmoor, and begin to answer Research AIM 19 of the Historic England Research Agenda for the extractive industries:

- Increase the understanding of all types of mineral extraction and associated sites by making greater use of archaeological excavation (Newman 2016, 265-266).

Suggestions for further work at selected sites, including excavation, are listed in Appendix C.

In contrast to the better studied and protected examples on Dartmoor, the importance of such investigation is all the more pressing given the demands, and effects on these remains of clay and other later extractive industries and development, in particular around Bovey Tracey. These developments also present opportunities, however, for more detailed follow on work to address Research AIM 18 of the Historic England Research Agenda for the extractive industries:

- Increase our knowledge of how mining and quarrying have impacted on other aspects of human activity in the landscape, such as agriculture, non-extractive industries, urbanisation, transport infrastructure, security and defence, monasticism (Newman 2016, 265).

In consideration of the unique character of these earthwork sites, suggestions for selective heritage protection consideration are listed in Appendix B.

ASSESSMENT OF SIGNIFICANCE AND FURTHER WORK

As set out in the project design (Hegarty 2018) the survey team compiled and maintained a list of monuments that in the survey team's professional judgement, and based on information gathered during the survey, warranted consideration for further work and/or heritage protection measures.

Inclusion on the list of further work does not indicate that the features are necessarily under threat, but this may be a factor in their inclusion. Nor does it imply that resources are available for the suggested work. Rather, the list tabulates for each site the stage(es) of work considered the most appropriate next step in clarifying the character of the monument, should resources become available.

Sites included in the list of recommendations for heritage protection consideration include previously unrecorded sites interpreted as potentially of national significance and previously scheduled monuments that, based on AI&M survey interpretations, would benefit from some re-evaluation. This typically comprises the realignment, relocation or extension of a monument's scheduled extent to reflect the improved spatial data recorded during the survey.

This long-list, with interpreters' comments, is included as a table in Appendix B. The list is intended as a tool for Historic England to use to assess the potential significance of selected sites. It is not part of formal application for a scheduling assessment but has been supplied to the HE Listing Team in support of generating a short-list of sites for more detailed listing consideration, with additional supporting information compiled as the survey progressed. This supporting information comprises aerial photographic or lidar-derived images noted during the survey, copies of the survey transcription and monument records, and any other pertinent evidence, such as reports or archived documents and source material, where readily available.

SUMMARY AND CONCLUSIONS

The Haldon Ridge to Dart Valley survey has added over 1200 previously unrecorded monuments to the Devon and Dartmoor HERs. Over 400 further monument records have been substantially enhanced by the survey. This equates to 6 newly created or amended monument records and associated transcription data for each square kilometre of the 290.5 square kilometre survey area, from the Haldon Ridge in the east to the Dart Valley in the west.

This represents an increase of 21% over the pre-AI&M survey monument number. Large portions of the survey area, and a significant percentage of monument records within it, are dominated by the urban centres of Torbay and Newton Abbot. If only 'relevant' monument types are considered i.e. classes of monument potentially identifiable by the AI&M methodology, such as cropmarks, earthworks and some structures, the increase over the pre-AI&M survey monuments is 78%. Compared to pre-AI&M survey NRHE figures (796 monuments), the increase is more notable, at 159%.

This data was recorded directly into the Devon (including Torbay) and Dartmoor HERs, ensuring that the survey's findings were immediately available to researchers, for consideration in planning and environmental management matters, and accessible online by the public via Heritage Gateway and Devon County Council's Environment Viewer. Working in partnership with the University of Exeter's Understanding Landscapes project, the survey data will also inform further targeted research, in the first instance follow-on geophysical survey in the environs of the Iron Age to post-Roman settlement at Ipplepen.

The success of the project can be measured by how well it has met the aims and objectives of the survey, as set out in the introduction above. The project has met all the stated objectives, the dissemination of the survey results in a summary project report being one.

By doing so it has demonstrably begun to fulfil the survey aims, with one exception. A key aim was to contribute to the improved management of historic environment assets in forested areas, particularly those potentially affected by forestry management works or pressures arising from increased recreational use. Certain areas, such as the Haldon Ridge, were identified as of high archaeological potential. As described above, the lidar data available to the survey was either more partial in coverage than anticipated, or of too low resolution to be of value in wooded all areas. As such, in this area the survey did not meet its full potential, and a reassessment of Haldon Ridge and Little Haldon is recommended following the completion of Environment Agency national lidar 1m coverage by mid-2020.

Nonetheless, this report demonstrates that the survey has recorded significant individual features interpreted as relating to funerary, agricultural, industrial and military activity dating from the Neolithic period to the 20th century.

In this instance the most significant themes to emerge relate to later-prehistoric field systems on the limestone plateaux and medieval tin mining in the Bovey Basin. Both are particular to the survey area, defined primarily by specific, local geological constraints. The detailed research themes above acknowledge the extent to which the AI&M survey results have been informed by earlier work, often carried out by local researchers (Silvester; Gallant; Gerard; Greeves; Newman; the Dartmoor Tinworking Research Group).

Importantly, the research themes also illustrate how the landscape approach intrinsic to the AI&M methodology has greatly expanded upon the earlier work, can guide ongoing and future research and inform heritage protection measures.

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APPENDIX A - MONUMENT TYPES RECORDED AGAINST 10 OR MORE RECORDS

Monument Type	Number of monuments	% of monuments
FIELD BOUNDARY	521	25
ORCHARD	189	9
ENCLOSURE	109	5
EXTRACTIVE PIT	108	5
CATCH MEADOW	90	4
BARROW	84	4
QUARRY	81	4
TRACKWAY	60	3
RECTILINEAR ENCLOSURE	56	3
FIELD SYSTEM	56	3
NATURAL FEATURE	36	2
NON ANTIQUITY	35	2
LIMESTONE QUARRY	32	2
CAIRN	26	1
SPOIL HEAP	24	1
GRAVEL PIT	24	1
STREAMWORKS	22	1
MOUND	22	1
STRIP LYNCHET	19	1
ROAD	19	1
LINEAR FEATURE	16	1
CURVILINEAR ENCLOSURE	15	1
WATER CHANNEL	15	1
CLEARANCE CAIRN	14	1
BUILDING PLATFORM	13	1

Continued below.

Continued from above.

Monument Type	Number of monuments	% of monuments
EMERGENCY WATER SUPPLY	13	1
LIME KILN	13	1
OVAL ENCLOSURE	12	1
RING DITCH	12	1
LYNCHET	11	1
SANDSTONE QUARRY	10	<1
TIN WORKS	10	<1
LEAT	10	<1
BANK (EARTHWORK)	10	<1
Others	338	16

APPENDIX B – HERITAGE PROTECTION RECOMMENDATIONS

QS	Site	Period	Priority	MDV	Currently Scheduled?	Comments	Heritage Gateway (and List entry where applicable)
SX86NW	Enclosure, or possible hillfort, south of Coppa Dolla Farm, Denbury and Torbryan	Prehistoric to Romano-British	High	MDV122542	No	Earthworks of a newly recorded possible univallate hillfort. Further survey work, especially geophysical survey, has good potential to better characterise this site. Consider for Heritage Protection.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122542&resourceID=104
SX86NW	Barrow, on Denbury Down, Denbury and Torbryan	Prehistoric to Romano-British	High	MDV37461	No	Earthworks of a disturbed Bronze Age barrow. Recommended for scheduling given its proximity to Denbury hillfort MDV8603 and two barrows MDV8604 & MDV8605, all three of which are group scheduled (1003857).	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV37461&resourceID=104
SX86NE	Field System on Kerswell Hill, Coffinswell	Medieval	High	MDV8705	N0	Well-preserved strip lynchets and field boundary earthworks form an extensive medieval field system of nearly 20 hectares. Threatened by potential development around Kingskerswell; consider for scheduling.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8705&resourceID=104
SX87NW	*Various tin streamworks*	Medieval to Post-medieval	High	MDV124273 MDV124326 MDV124354 MDV19917 MDV124377 MDV30570 MDV124415 MDV124416 MDV69787 MDV124282 MDV124324 MDV61846	No	Good survival of a medieval or post-medieval streamworks. Selective excavation is recommended to determine more fully the nature and methods of tin working operations and for environmental analysis. Given the potential medieval date of the earthworks, consider for Heritage Protection; in particular MDV61846, MDV69787 and MDV124415 which have	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124273&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124326&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124354&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV19917&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124377&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV30570&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124415&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124416&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV69787&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124282&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV124324&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV61846&resourceID=104

QS	Site	Period	Priority	MDV	Currently Scheduled?	Comments	Heritage Gateway (and List entry where applicable)
						good survival of earthworks and are under potential threat from development.	
SX86NE	Field System at North Whilborough, Kingskerswell	Prehistoric to Romano-British	Medium	MDV14908	No	Prehistoric or Romano-British field system, one part of which forms part of a curvilinear enclosure to the south. Consider for Heritage Protection, possibly as part of the nearby scheduled field system MDV14907 (1021377) to the north.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV14908&resourceID=104
SX86NW	*Various Prehistoric or Romano-British field systems*	Prehistoric to Romano-British	Medium-High	MDV8642 MDV122804 MDV19187 MDV31028 MDV13771 MDV13772 MDV122693 MDV8615 MDV8644 MDV122723 MDV122722 MDV8616 MDV122798 MDV122804	No	Extensive earthwork remains of prehistoric to Romano-British field systems and possible clearance cairns on the limestone plateaux around Ipplepen. As well as significantly enhancing the existing records of these field systems, a number of newly recorded sites have also been identified (eg MDV122722, MDV122723, MDV122798, MDV122693 and MDV122804), making these field systems much more widespread than previously thought. Their extensive survival, rarity and threat from ploughing (as noted in many of the records) make them good candidates for designation; site visits and perhaps detailed survey is recommended, to inform (selective?) Heritage Protection.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8642&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122804&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV19187&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV31028&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV13771&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV13772&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122693&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8615&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8644&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122723&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122722&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8616&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122798&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122804&resourceID=104

QS	Site	Period	Priority	MDV	Currently Scheduled?	Comments	Heritage Gateway (and List entry where applicable)
SX86NW	*Various Prehistoric or Romano-British clearance cairns associated with field systems*	Prehistoric to Romano-British	Medium-High	MDV122741 MDV122743 MDV122748 MDV122749 MDV122750 MDV122799 MDV122802	No	Circular earthwork mounds have been recorded amongst a number of the prehistoric and Romano-British field systems and they have been interpreted as possible clearance cairns. Further investigation of these possible cairns is highly recommended in view of possible (selective) Heritage Protection in association with the field systems (above).	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122741&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122743&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122748&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122749&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122750&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122799&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV122802&resourceID=104
SX87SW	*Various Prehistoric or Romano-British field systems and field boundaries*	Prehistoric to Romano-British	Medium-High	MDV19206 MDV123183 MDV76373 MDV123183 MDV123185	No	Extensive earthwork remains of prehistoric to Romano-British field systems and possible clearance cairns on the limestone plateaux southwest of Newton Abbot. As well as significantly enhancing the existing records of these field systems, a number of newly recorded field systems has also been identified, making the survival of these field systems more widespread than previously thought. Their extensive survival, rarity and threat from ploughing (as noted in many of the records) make them good candidates for designation; site visits and perhaps detailed survey is recommended, to inform (selective?) Heritage Protection.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV19206&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV123183&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV76373&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV123183&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV123185&resourceID=104
SX87SW	*Various Prehistoric or Romano-British clearance cairns associated with field systems*	Prehistoric to Romano-British	Medium-High	MDV123178 MDV123184 MDV123434	No	Circular earthwork mounds have been recorded amongst a number of the prehistoric and Romano-British field systems and they have been interpreted as possible clearance cairns. Further investigation of these possible cairns is highly recommended in view of possible	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV123178&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV123184&resourceID=104 http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV123434&resourceID=104

QS	Site	Period	Priority	MDV	Currently Scheduled?	Comments	Heritage Gateway (and List entry where applicable)
						(selective) Heritage Protection in association with the field systems.	
SX87SW	Tin Workings, Bovey Heathfield.	Medieval to Post-medieval	Medium	MDV61846	No	Good survival of a medieval or post-medieval streamworks. Selective excavation is recommended to determine more fully the nature and methods of tin working operations and for environmental analysis. Given the potential medieval date of the earthworks, consider for Heritage Protection.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV61846&resourceID=104
SX86NW	Barrow 'C' east of Dornafield Lane	Bronze Age	High	MDV8586	Yes	The position of the scheduled area for this barrow is incorrectly located circa 30m to the north of the earthworks. Recommend amendment of the scheduled area.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8586&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1003825
SX86NW	Barrow 'B' east of Dornafield Lane	Bronze Age	Medium	MDV8587	Yes	Recommend extension of the scheduled area to encompass the outer earthwork ditch.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8587&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1003825
SX86NW	Barrow 'A' south-east of Dornafield Cross	Bronze Age	Medium	MDV8588	Yes	Recommend extension of the scheduled area to encompass the outer earthwork ditch.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8588&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1003825
SX86NW	Denbury Hillfort, Torbryan	Iron Age	Medium	MDV8603	Yes	Recommend extension of the scheduled area to encompass earthworks to the south and possibly the newly recorded earthwork ditches to the north.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8603&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1003857
SX87NE	Castle Dyke Camp in Ugbrooke Park	Iron Age	Medium	MDV9008	Yes	The north-west part of the enclosure extends beyond the scheduled area by circa 5 metres; recommend adjusting scheduled area to incorporate these earthworks.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV9008&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1003846

QS	Site	Period	Priority	MDV	Currently Scheduled?	Comments	Heritage Gateway (and List entry where applicable)
SX86NE	Prehistoric or Romano-British Field System on Kerswell Down Hill, Kingskerswell	Prehistoric to Romano-British	Medium	MDV14907	Yes	Prehistoric or Romano-British field system, surviving as earthworks. Recommend extension of scheduled area to east and west to include newly recorded field boundaries.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV14907&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1021377
SX86NE	Milber Down Hillfort, Combeinteignhead	Iron Age	Low	MDV8649	Yes	Slight extension of the scheduled area to incorporate what appears to be a newly recorded short section of ditch to the northeast of the hillfort (centred at 288605,69850), visible as a cropmark. Possibly also include enclosure MDV8678.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV8649&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1003178
SX87SW	Castle Dyke, Highweek, Newton Abbot	Medieval	Low	MDV9146	Yes	Recommend extension of the scheduled area by circa 5m to encompass the outer earthwork ditch to the south and bank to the north.	http://www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MDV9146&resourceID=104 https://historicengland.org.uk/listing/the-list/list-entry/1002492

APPENDIX C – RECOMMENDATIONS FOR FURTHER WORK

QS	Site	Period	Priority	MDV	Site visit	Geophysical survey	Earthwork survey	Aerial Survey	Excavation	Oral history	Comments
SX86NW	Enclosure, or possible hillfort, south of Coppa Dolla Farm, Denbury and Torbryan	Prehistoric to Romano-British	High	MDV122542	1	1	1				Earthworks of a newly recorded possible univallate hillfort. Further survey work, especially geophysical survey, has good potential to better characterise this site. **Also recommended for Heritage Protection**
SX87NW	*Various tin streamworks*	Medieval to Post-medieval	High	MDV124273 MDV124326 MDV124354 MDV19917 MDV124377 MDV30570 MDV124415 MDV124416 MDV69787 MDV124282 MDV124324 MDV61846	1				1		Good survival of a medieval or post-medieval streamworks. Selective excavation is recommended to determine more fully the nature and methods of tin working operations and for environmental analysis. **Also recommended for Heritage Protection**
SX86NW	*Various Prehistoric or Romano-British field systems*	Prehistoric to Romano-British	Medium-High	MDV8642 MDV122804 MDV19187 MDV31028 MDV13771 MDV13772 MDV122693 MDV8615 MDV8644 MDV122723 MDV122722 MDV8616 MDV122798 MDV122804 MDV19206 MDV123183	1		1				Extensive earthwork remains of prehistoric to Romano-British field systems and possible clearance cairns on the limestone plateaux around Ipplepen and Newton Abbot. As well as significantly enhancing the existing records of these field systems, a number of newly recorded sites have also been identified (eg MDV122722, MDV122723, MDV122798, MDV122693 and MDV122804), making these field systems much more widespread than previously thought. Their extensive survival, rarity and threat from ploughing (as noted in many of the records) make them good candidates for designation; site visits and perhaps detailed survey is recommended. **Also recommended for Heritage Protection**

QS	Site	Period	Priority	MDV	Site visit	Geophysical survey	Earthwork survey	Aerial Survey	Excavation	Oral history	Comments
				MDV76373 MDV123183 MDV123185							
SX86NW	*Various Prehistoric or Romano-British clearance cairns associated with field systems*	Prehistoric to Romano-British	Medium-High	MDV122741 MDV122743 MDV122748 MDV122749 MDV122750 MDV122799 MDV122802 MDV123178 MDV123184 MDV123434	1		1				Circular earthwork mounds have been recorded amongst a number of the prehistoric and Romano-British field systems and they have been interpreted as possible clearance cairns. Further investigation of these possible cairns is highly recommended in view of possible (selective) Heritage Protection in association with the field systems (above). **Also recommended for Heritage Protection**
SX87SW	Tin Workings, Bovey Heathfield.	Medieval to Post-medieval	Medium	MDV61846					1		Good survival of a medieval or post-medieval streamworks. Selective excavation is recommended to determine more fully the nature and methods of tin working operations and for environmental analysis. **Also recommended for Heritage Protection**
SX86NW	Denbury Hillfort, Torbryan	Iron Age	Medium	MDV8603		1					Earthworks to the south of the scheduled area, and newly recorded earthwork ditches to the north, could be better defined by geophysical survey. **Also recommended for Heritage Protection amendment**
SX77SE	Ring Ditch south-west of Lee, Bickington	Bronze Age	Medium	MDV124457		1		1			This could be a ring ditch but it is only visible on one run of aerial photographs, so further evidence obtained from geophysical or aerial survey would help to confirm or contradict this interpretation.
SX77SE	Rectilinear Enclosure west of Combe Cross, Denbury and Torbryan	Prehistoric to Romano-British	Medium	MDV124349				1			This could be a complex enclosure but it is only visible on one run of aerial photographs. Further evidence from aerial survey would help to confirm or contradict this interpretation.
SX87SW	Possible enclosures, east of Tor Haven Farm, Ogwell	Prehistoric to Romano-British	Medium	MDV123186	1						Earthworks of two newly recorded possible prehistoric or Romano-British enclosures. A site visit is recommended in the first instance to help establish the nature and origin of these earthworks.

QS	Site	Period	Priority	MDV	Site visit	Geophysical survey	Earthwork survey	Aerial Survey	Excavation	Oral history	Comments
SX88SE	Oval enclosure north-west of Beardon Farm, Ashton	Prehistoric to Romano-British	Medium	MDV122779		1					This enclosure is visible on a single run of aerial photographs and may be associated with a ditch-defined metalled road or trackway. Further survey, especially geophysical survey, would potentially clarify the character of this site.
SX96NW	Curvilinear enclosure north-west of Ashacre Cross, Stokeinteignhead	Prehistoric to Romano-British	Medium	MDV52093				1			Enclosure is only visible on a few aerial images; with little detail visible. Further aerial survey in drought conditions could show better detail of the enclosure and any internal features.
SX96NW	Curvilinear Enclosure north-west of Great Hill, Torbay	Prehistoric to Romano-British	Medium	MDV52094				1			Enclosure is only visible on a few aerial images; with little detail visible. Further aerial survey in drought conditions could show better detail of the enclosure and any internal features.
SX97NW	Possible Enclosure East of Teignmouth Golf Club, Dawlish	Prehistoric to Romano-British	Medium	MDV51320	1	1					Cropmarks of ditches and an earthwork terrace visible on aerial photographs of 1992 have been previously interpreted as a possible hilltop enclosure of later-prehistoric date. The earthworks and cropmarks are potentially non-archaeological in origin; further work, such as geophysical survey, is recommended to clarify the character of the features.
SX97SW	*Various newly recorded (possible) enclosures*	Prehistoric to Romano-British	Medium	MDV122641 MDV122590 MDV122588 MDV122574 MDV122525 MDV122502 MDV122501 MDV122490 MDV122479 MDV122672 MDV122686 MDV122687 MDV122711				1			A significant number of newly recorded probable enclosures have been recognised from vertical aerial photographs taken from 1946 onwards. Aerial survey targeting this area in a dry year could confirm some of these, show their extents in greater detail, and potentially help to identify any internal features.
SX76NE	Enclosure to South of Greper Copse, Woodland	Uncertain	Medium	MDV59063 MDV122348		1					The north and south sides of a possible enclosure are visible as substantial bank and ditch earthworks. Further archaeological investigation would help to establish the date and character of this feature, and geophysical survey would probably be the most cost-effective option.

QS	Site	Period	Priority	MDV	Site visit	Geophysical survey	Earthwork survey	Aerial Survey	Excavation	Oral history	Comments
SX88SW	Field System and Possible Settlement northwest of Hazelwood, Hennock	Medieval	Medium	MDV27874	1						Earthwork banks of a relict field system with possible evidence for associated settlement. The field system is interpreted as being of medieval date, although a prehistoric origin cannot be discounted. A site visit may help to assess the likely date of this field system in the first instance.
SX77NE	*Various tin workings and streaming west of Bovey Tracey*	Medieval to Post-medieval	Medium	MDV124577 MDV124583 MDV124733	1		1		1		Probable eluvial streamworks could be better dated and characterised by evaluative excavation; this could also establish their relationship with the Bovey Pottery leat. Alternatively, earthwork survey of the remains on Lower Down has potential to improve our understanding the types of activity without the need for intrusive works. In the first instance a site visit would be useful to assess the survival and form of earthworks.
SX87NE	Possible tin workings of medieval or post-medieval date at Sandslade Copse, Kingsteignton	Medieval to Post-medieval	Medium	MDV123489	1		1		1		Earthworks of a possible medieval or post-medieval tin works. A site visit is recommended in the first instance to assess the survival and form of earthworks. Earthwork survey and selective excavation would then potentially allow the earthworks to be dated and understood.
SX87SW	*Various tin streamworks in SX87SW*	Medieval to Post-medieval	Medium	MDV21250 MDV125434 MDV124283 MDV9162 MDV123318	1		1		1		Earthworks of various medieval or post-medieval tin works within this quartersheet. A site visit is recommended in the first instance to assess the survival and form of earthworks. Earthwork survey and selective excavation would then potentially allow the earthworks to be dated and understood.
SX86NW	Enclosure northwest of Ambrook Farm, Broadhempston	Prehistoric to Romano-British	Low	MDV125514		1		1			Double-ditched enclosure visible as cropmark ditches on aerial photographs taken in 2018. The visible cropmarks suggest the enclosure is multi-phased. Further investigation such as additional aerial survey or geophysical survey is recommended to help confirm this interpretation.
SX87NE	Enclosure within Castle Dyke Camp outer enclosure in Ugbrooke Park, Chudleigh	Prehistoric to Romano-British	Low	MDV37463		1					The plough-reduced remains of a probable later-prehistoric bank and ditch-defined rectilinear enclosure are visible on aerial photographs of 1984 and lidar derived images, within the outer enclosure of Castle Dyke Camp. Further work, particularly geophysical survey, is recommended to clarify the relationship between the different elements, especially the narrow elements visible as cropmarks situated within very much broader earthwork ditches. **Associated monument MDV9008 is recommended for Heritage Protection amendment**

QS	Site	Period	Priority	MDV	Site visit	Geophysical survey	Earthwork survey	Aerial Survey	Excavation	Oral history	Comments
SX96NW	Second World War camp at Audley Park school (now Torquay Academy), Torbay	Second World War	Low	MDV125315						1	A newly recorded military camp in the grounds of Audley Park school, removed soon after the war except for some of the air raid shelters. Exact use not known, but local knowledge suggests Canadian troops were stationed here. Archive research / oral history may help. Possible schools project.
SX86NE	Possible Military Camp or School Buildings off Shiphay Avenue, Torbay	Second World War	Low	MDV125255						1	A group of pitched roofed huts visible on aerial photographs taken in 1944 and 1946 off Shiphay Avenue may be military. Local residents / history groups or the archive at Torquay Girls Grammar School may shed some light on what this site was used for during the war. Potential schools project.
SX86NE	Military Camp off Shiphay Avenue, Torbay	Second World War	Low	MDV125256						1	A possible Second World War military training camp visible as a number of bell tents and Nissen huts, intersected by trackways. The camp had been cleared by 1946, although vegetation marks were still visible. Local residents may be able to shed light on the use of this camp during the war. Possible schools project.
SX97SW	Air Raid Shelters south of Teignmouth Old Cemetery	Second World War	Low	MDV122425						1	Air raid shelters may have been associated with the nearby school. Archive research /oral history may help to confirm or deny this tentative interpretation. Possible schools project.

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