

CAS/DAS Joint Symposium 2023

Landscapes of Extraction from the air: Highlights from the Devon Aerial Investigation & Mapping Project, 2011-2021

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Slides 1-7: Introduction.

My talk covers highlights relating to extractive industries from the National Mapping Programme/ Aerial Investigation & Mapping Programme (the name changed during the programme) projects that were undertaken in Devon over the 10 years from 2011 to 2021.

The project was funded by Historic England and hosted/managed by Devon County Council. The work was undertaken by an experienced team from AC archaeology.

Seven projects were undertaken by the Devon team. This link with projects completed or underway in adjacent local authority areas (Cornwall, Dorset, Exmoor, Dartmoor).

AIMP is a national project – the idea being to study all available aerial imagery, vertical, horizontal, archaeological or other purposes, digital or hard copy. To identify sites and features of archaeological interest and map them in a consistent way across counties regions, the country. The Devon project also put the results directly onto the Historic Environment Record.

The Devon team painstakingly looked at 1000s of images – with not too much ill effect.

Added 12,629 new sites, a high proportion of which related to digging and delving and updated 3381 known sites.

The increasing availability of and area covered by LiDAR has been a huge benefit – particularly for recording the earthwork evidence for mining and quarrying. Being able to see through the tree canopy and thick vegetation provides a significant advantage over conventional aerial imagery – although still requiring interpretation and ground-truthing to be sure.

I will return to tree cover/vegetation throughout the talk – because of the extent to which former landscapes of extraction have ‘rewilded’, often with a bit of help from our ancestors, to create the so called ‘natural beauty’ of the landscapes that we treasure today.

But I’ll start with:

Slides 8-11: Tamar Valley LiDAR Aerial Interpretation & Mapping Survey (2021)

This project was undertaken in 2021 under COVID restrictions, so only digital sources were available. It built on the earlier Cornwall and Isles of Scilly NMP, that didn’t have LiDAR available. The team also worked with University of Exeter’s Unlocking Landscapes project – led by Dr Chris Smart - supporting and enhancing community engagement with interpretation of LiDAR.

Given the known industrial heritage of the Tamar Valley and the west side of Dartmoor, the project did record new mining features, adding to our knowledge of the extent of known mining sites of various types – such as shafts and spoil heaps at metalliferous mine sites in the Tamar Valley, and tin streamworks in the Walkham Valley.

My chosen highlight is the Lumburn Leat. This 16km long watercourse was constructed in the late 15th century, to take water to the silver lead mines of Bere Ferrers, powering pumps that drained the deep workings. Silver mines here date to at least the 13th century.

Many segments of the leat had already been recorded on the HER, and the lidar survey has been able to add to these, identifying earthwork survival at several places, including a 300m stretch near Slymeford Farm, Bere Alston.

Slides 12-24: Moor to Shore 2: Plymouth to the Avon Valley AIMP (2019-2021)

Devon's tin deposits are principally located on Dartmoor. Streamworkings are apparent across Dartmoor and are one of the characteristic features of this landscape. The survey has added to our understanding of these upland workings, but also identified sites on lower ground.

On the uplands, tin extraction in the general area of Crownhill Down is documented in the 13th and 14th centuries, with reference to specific mines from 1563-1633.

Tin streaming, openworks and pits are visible on RAF 1940s and more modern aerial photos. The 2010 photo records the evaluation trenches on the Bronze Age funerary landscape – in advance of planned Tungsten mining over the wider area. The tin workings were subject to detailed analysis by Sandy Gerard prior to the modern development (following survey by AC archaeology and Cotswold Archaeology). The photo also shows the then edge of the Headon china clay works.

AC archaeology's pole-cam shot, and Steve Reed's ground shot show the scale of these extractive works on the ground, and a flavour of the power of water!

Mapping from lidar data, and 1940s RAF aerial photographs, has enhanced understanding of tin streaming at Crownhill Down, despite extensive previous fieldwork, not least by increasing the known extent by 4 hectares beneath the trees at Lower Hooksbury Wood. The site is now known to extend over 20ha.

The early stages of transition to openwork extraction are suggested by possible prospecting pits along the streamworks,

The relationship between the streamworks and a number of historic leats indicates that some water channels pre-dated the streamworks.

The last slide shows Crownhill Down after the enabling works for the Tungsten mine, with Headon clay works to the right.

Off the higher ground a number of newly identified and extensive streamworks were recorded from lidar, for example at Wadland Wood, Ugborough. Lidar records a complex of earthworks, suggestive of a form of stream working. Although Filham silver-lead mine is sited at the north-east end of the earthworks, the earthworks may well relate to tin working. An interesting addition is that the Ugborough Tithe Map records a leat and waterwheel within the area. Possibly the site of a stamping or blowing mill.

Slides 25-33: Moor to Shore 1: Haldon Ridge to Dart Valley AIMP (2018-2019)

Evidence of tin streaming also dominates the results of the survey in the north-west corner of this project area, around Bovey Tracey and Heathfield.

Tom Greeves' research, published in Transactions of the Devonshire Association (2008), includes 14th century evidence (e.g., 3 tanners from Ilsington in 1303) plus a lot of references to mining/tanners in the 15th to mid-17th centuries.

The extensive nature of these earthworks suggests that the tin industry in this lowland zone was carried out on a much greater scale than previously thought, and this area perhaps deserves greater academic attention.

In total 25 monuments interpreted as streamworks or tin working complexes were recorded by the survey, of which 20 were new to the HER.

The water channels, pits and spoil heaps of a possible streamworks were recorded at Pitts Plantation; much of this area was converted to forestry in the 19th century, but the 'Pitt' element of its name must surely reflect the survival of extensive earthworks relating to the earlier industry.

This area has also been the subject of detailed earthwork survey by Phil Newman, for SLR Consulting and Devon County Council, in advance of proposed widening of the A382 from the Drum Bridges A38 junction to Newton Abbot. Evaluation is currently underway by Rocket Heritage.

Workings at Staplehill (revealed under woodland by LiDAR) are perhaps a bit more like conventional streamworks – they are sited at the geological transition from Bovey sands/gravel deposits to slate, where there may be a richer concentration of ore. There is a 1757 reference to old tin workings. But the picture may be confused by later sand pits.

Pitts Plantation and at other lowland sites have a somewhat amorphous and seemingly random form of the earthworks. This suggests that the tin deposits in this area were worked in different ways to the uplands, probably as a result of differences in topography and geology. Here there is a broad lowland, with tin grains quite widely dispersed in shallow surface deposits, containing mixed beds of sands and gravels.

Regarding the tree cover: Vancouver, in 1808, specifically refers to the fir plantations, which dominated the area, having been planted after the levelling of the old stream works.

Slides 34-44: East & Mid Devon River Catchments NMP (2014-2016)

Aerial images clearly reveal the remains of two known and extensive former industries on the western part of the Blackdown Hills.

Extensive open workings from extraction of iron ore were visible as earthwork pits, on RAF aerial photography from the 1940s, and oblique archaeological photography from the 1980s.

Previous radiocarbon analysis has dated partially levelled pits on North Hill to the Roman or post-Roman/early medieval period. This ties in with the Roman and early medieval dates from the iron smelting sites that have been found in the area.

LiDAR has clarified and added to the known extent of the mining – both under current woodland and levelled areas of opencast mining now under pasture.

The spoil heaps, trackways and collapsed adits and galleries of whetstone mines exploiting the greensand geology of Black Down and North Hill can be seen around the scarp on a range of images, although they are obscured by trees (natural regeneration and plantation) on later 20th century aerial photographs.

The Blackdown Hills were once known as the 'Scythestone Hills'. Thousands of finished edge-tool sharpening stones (known as 'Devonshire Batts') were produced from the mid-18th to early-20th century. The mine workings dominated the landscape and local economy; the white spoil was said to be visible from Cullompton in the early 19th century. Early tourists diverted off the Bristol to Exeter Road to buy fossils from the whetstone miners.

The last two slides show Hembury, the south-western end of the Blackdowns. The hillfort here is now owned by DAS. In addition to concealing the true scale of the Iron Age ramparts, the woodland masks the south-western extent of the whetstone mining.

Slides 45-57: Blackdown Hills Aerial Investigation & Mapping Project (2016-2018)

The AIMP project team thought that this particular project really was 'the pits'! Of the 5000 new sites discovered, 2000 were extractive pits or quarries.

Opencast iron mining features again, with extensive areas of levelled pits being identified from LiDAR in the pasture fields around Dunkeswell. The extent is apparent from the map clip from Historic England's Aerial Archaeology Mapping Explorer web portal. Over recent years a number of iron pits have been excavated, in advance of development. Radiocarbon dates from one of the Dunkeswell sites suggest that mining continued up until the mid-16th century – tying in with the documentary evidence for Dunkeswell Abbey having an interest in the industry.

However, a very large number of dispersed pits were recorded. These were for the extraction of clay, marl, gravel, chalk and sand - reflecting the varied geology of the project area. The pits are often hard to discern from modern aerial photo coverage but are clearer on LiDAR. Some, but by no means all, are recorded on historic mapping. Although difficult to date, the size and definition of the earthwork, type of vegetation cover, comparison with

historic maps, field patterns, field names and other evidence can help to infer a date of use. Some pits may have originated in the medieval period (e.g., they are clearly cut by, or are respected by medieval boundaries), whilst others were in use right up to the 20th century.

Marl pits were frequently recorded, reflecting farmers' desire to improve the land through 'marling' (mixing certain clays with lighter soils to decrease acidity and improve structure). Known in the medieval period, map evidence indicates continuation of this practice through to the modern era, and some of the very largest may have been created by periodic use over several generations. It is also possible that marlpits supplied materials for traditional cob buildings.

Clay pits tended to be concentrated around places that produced ceramics such as Hemyock. Some of these pits may well date back to the late medieval period when we know that the industry was already established in these areas. But also iron smelting – in this area from at least the early medieval period – also needed significant quantities of clay for the construction of furnaces.

The AIMP project observed a frequent relationship between the narrow earthwork ridges created for orchard planting and the multiple, dispersed extraction pits. This is corroborated by the documentary record – Vancouver, in 1808, refers to the deliberate planting up of pits with orchards – give saplings a start in life. But the practice is likely to have had much earlier origins – there is a reference in a 1566 survey of the manor of Clayhidon to a pit planted with apple trees.

Slides 58-60: The final AIMP Project was the East Devon AONB Rapid LiDAR Survey (2021)

This was undertaken during COVID, and we took the opportunity to work with the ED AONB to plot evidence from LiDAR transects that had been flown in 2016 – to plug a, then, gap in the Environment Agency Coverage.

This project revealed yet more dispersed pits, on various geologies. Also, many former pits that had been planted orchards - to compliment the findings of the Blackdowns project.

Slides 61-62: Concluding Comments:

Extractive industries have, cumulatively, had significant influence in creating the Devon landscape that we see today. Not just the extensive areas of industrial scale metalliferous mining, and china and ball clay quarrying, but also the many thousands of smaller 'agricultural' pits and quarries. Natural regeneration has played its part, but there has been much more deliberate planting of woodland and orchards on former pits and quarries than has perhaps been previously appreciated. The working of the land for its geological resources has had a significant part to play in creating this green and well-wooded land.

Slides 63-65: Further information available online.