



**DURHAM**  
AT **WAR**



# Durham at War Lidar Landscapes Project Report

December 2017



*Durham County Record Office*  
a mine of information



***Front cover.***

*Lidar image of the site of Deerbolt Training Camp, now occupied by Deerbolt Prison, just west of Barnard Castle (Area 1 in this survey). Little if any sign of the First World War camp survives above ground, though earthworks of a contemporary rifle range do survive, and have been recorded on lidar, on the south bank of the Deepdale Beck, to the west. This image demonstrates something of the time-depth of the historic landscape here, with ridge-and-furrow field-systems, some of which date from medieval times, clearly visible.*

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## **Acknowledgements**

First and foremost, thanks are due to the volunteers who undertook the survey work: D Armstrong, Chris and Audrey Battersby, Barbara Chipchase, Paul Cordes, David Donkin, John Goldsborough, and J P Merrington.

This report has been written by Project Consultant, Paul Frodsham (ORACLE Heritage Services). The Project Management Team for Durham County Council was Victoria Oxberry (Durham at War Project Officer), Liz Bregazzi (County Archivist) and Nick Boldrini (County Durham Historic Environment Record Officer).

# 1. Introduction

This project was completed as part of Durham County Council's HLF-funded Durham at War project ([www.durhamatwar.org.uk](http://www.durhamatwar.org.uk)), which works with local volunteers to commemorate the centenary of the First World War. It was designed to serve two purposes. First, to enable volunteers with an interest in landscape archaeology to familiarise themselves with lidar and its use in archaeological survey. Second, to examine a series of areas where it was known or suspected that features relating to the First World War survived, and to carefully study the lidar in order to record any remnants of these sites, and any other features of potential archaeological importance, that survive above ground.

The project was designed by Project Consultant Paul Frodsham (ORACLE Heritage Services) working in close consultation with a Project Management Team consisting of Victoria Oxberry (Durham at War Project Officer), Liz Bregazzi (County Archivist) and Nick Boldrini (County Durham Historic Environment Record Officer).

Working in partnership with Professor Stewart Ainsworth of Chester University (an expert on lidar survey, best known for his role as landscape archaeologist with TV's Time Team), the Project Consultant has recently overseen the design and delivery of large-scale lidar landscape surveys of Upper Teesdale, Weardale and the Upper Derwent Valley in County Durham, along with Hexhamshire and the Allen Valleys in south-west Northumberland (Ainsworth 2015; Frodsham 2017). These projects, managed by the North Pennines AONB Partnership, involved the participation of some 200 volunteers, and resulted in the discovery of several hundred previously unknown archaeological sites within the often complex historic landscapes of the North Pennines. This First World War project differs from these projects in that it was not aimed at blanket coverage of large landscapes, but at survey of smaller areas with specific targets in mind. The appropriateness of the methodology employed in this project, which is based on that of the North Pennines surveys, will be considered in the Discussion towards the end of this report.

ALSM (or 'airborne laser swath mapping') data, more commonly referred to as 'lidar' (originally a portmanteau of 'light' and 'radar') is a relatively new information source being used by archaeologists to discover, interpret and record archaeological sites (Crutchley & Crow 2009). The data for this project, provided free of charge by the Environment Agency, was gathered using sensors mounted on an aircraft. This data can be processed to make a computerised 3D model of the ground and all the features on it at the time of capture and can be precisely referenced to the OS National Grid, in effect producing what is termed a 'lidarmap'. For this project the 3D data collected has been processed to produce 2D 'hillshaded' images which replicate the 3D data; this technique emphasises features on the ground, including surviving earthworks of archaeological sites and allows the data to be used as image files which can be viewed on home computers. Although the images look like aerial photographs they are not - they are computer models of everything on

the ground that the laser pulses hit. For the lidar to be used in this project the 3D coordinates of approximately 5 million points were collected in each km square.

The degree of detail revealed about the historic landscape by this technique can be staggering, often far more informative than aerial photography, but it still needs human eyes to spot it and interpret it. This is the role of the project volunteers. Only two skills were required to make a contribution to the project - interest and inquisitiveness (coupled with access to a computer). Involvement in the project not only allowed volunteers to develop new archaeological and recording skills, but also provided them with opportunities to understand more about the development of the often complex archaeological landscapes of parts of County Durham.

As noted above, the project methodology was developed during recent volunteer projects in the North Pennines, derived ultimately from that used in the Miner-Farmer project on Alston Moor undertaken by English Heritage (Oakey *et al* 2012). It was designed to enable volunteers with little or no archaeological background to make meaningful contributions to the recording and understanding of the historic landscape, while providing the tantalising prospect of significant, even spectacular, new discoveries. The recording method used software that is either commonly available on most home computers or is freely available on the internet, enabling contributors to work at home at a pace that suits their own circumstances.

The project provided training for volunteers in the process of interpretation and recording using digital lidarmap images on home computers with commonly available programs such as Microsoft Paint and Word. The project was designed to be as paperless as possible and all file exchanges were by email. After participation in this project, the volunteers now have the skills necessary to continue to explore the use of lidar as an aid to landscape analysis, interpretation and recording. The project archive will be incorporated into the County Durham (in a couple of cases Tyne and Wear) Historic Environment Record (HER). Here, it will be available for anyone planning new research projects, while also potentially contributing to future landscape management.

In some cases it has not been possible to state the form or age of a site with any degree of certainty. Volunteers were encouraged to try and identify all sites by reference to a standard 'site type' list; in some cases such identifications might be certain, while in others they may be little more than informed guesses. In all cases, sites have been recorded in outline, enabling closer analysis later where appropriate. Many different types of site were discussed at the project workshops, helping volunteers to improve their general knowledge of the types of site that survive throughout County Durham, in addition to sites relating directly to the First World War.

## **2. Methodology**

The basic methodology is based on that developed for recent lidar surveys of large landscape areas undertaken by teams of volunteers in the North Pennines (Ainsworth 2015; Frodsham 2017). This project is different in that it covers several small areas rather than a large continuous landscape area. However, the basic approach, enabling volunteers to undertake useful survey work with only minimal initial training, was considered appropriate.

### **2.1 Survey areas**

Ten separate survey areas were chosen by the Project Management Team eight in County Durham and two in Tyne and Wear. These vary in size from a single km sq to 5 km sqs. Each was chosen because of the known or suspected presence of features relating to the First World War, such as training camps, PoW camps or training trenches. There were several other potential sites which unfortunately had no Environment Agency lidar coverage, so could not be featured in the project. The ten areas are:

1. West of Barnard Castle. 2 sq kms.
2. Weardale, south of Wolsingham. 5 sq kms.
3. Weardale, Old Park / Heights Quarry. 1 sq km.
4. Weardale, East of Stanhope. 1 sq km.
5. Cocken Hall. 4 sq kms.
6. South Shields. 3 sq kms. (Tyne & Wear).
7. Whitburn. 4 sq kms. (Tyne & Wear).
8. Easington Colliery. 2 sq kms.
9. West of Peterlee. 1 sq km.
10. East of Peterlee. 1 sq km.

### **2.2 Lidar processing**

Processed lidar data for the ten project areas was commissioned from an appropriately experienced consultant. The background to the processing methodology is discussed at some length in the recent Allen Valleys and Hexhamshire Lidar Landscapes project report (Ainsworth 2016) so will not be repeated here. In short, the data was processed to produce Digital Surface Model (DSM - showing all surfaces including trees, buildings, walls etc) and Digital Terrain Model (DTM - with above-ground features such as trees, buildings walls etc removed) tiles for each km sq within the project area. The lidar was processed using Principal Components Analysis (PCA) tools to produce 8-direction hillshade models as single greyscale images that could be easily circulated to volunteers as jpegs. These images provided the basis on which the volunteers undertook their survey work.

### **2.3 Volunteer training and guidance**

Effective volunteer training was an essential element of the project. An introduction to lidar and its use in archaeological survey, an outline of the project and its methodology, and practical training exercises were provided at

an initial 'start-up' workshop at which there was ample opportunity for people to ask questions. All volunteers were subsequently sent guidance notes by email; these gave clear guidance regarding the project methodology. These notes are reproduced here in the Appendix.

#### **2.4 Data circulation and submission of results**

Following attendance at a training workshop, all signed-up contributors were sent a copy of the guidance notes, together with blank recording forms, by email. They were also sent the relevant digital data (DTM and DSM lidar, OS map, and recent colour vertical air photograph) for their first km sq. The contributors then worked through their allocated km squares using the lidar images and recording forms supplied. The results were then returned by email to the Project Consultant, checked, and entered into the project archive. In order to maximise the potential value of the project, from the point of view of volunteer experience as well as project results, participants were encouraged to record all visible archaeological or historic features within their km sqs, not just those potentially associated with the First World War, and to consult with other available sources (eg aerial imagery and historic mapping) to help with the interpretation of the lidar imagery.

#### **2.5 Validation and archiving of results**

All results were inspected by the Project Consultant following submission and are filed within the digital project archive along with the original DSM and DTM images, aerial photo and OS map. Brief summaries of all results are included within the archive on an excel spreadsheet; this is effectively an index to all the results. The Project Consultant did not make any changes to the volunteers' completed data forms, but comments on some are provided within the spreadsheet and this report.

#### **2.6 Results workshops**

A results workshop was held for participating volunteers. At this, the Project Consultant presented a selection of the results, which were discussed by all. This event also gave volunteers the opportunity to discuss the methodology and any follow up work that they might like to do (a possible follow-up project, looking at different parts of County Durham using processed lidar held within the HER, is in development).

#### **2.7 Project report**

This report presents a summary of the project methodology and results. Anyone interested in the results should study the original lidar data as well as this report, as much of the interpretation presented here is to an extent speculative and alternatives may be equally valid.

### 3. Results

Brief summaries of each study area, together with comments on what the volunteers found relating specifically to First World War installations and also any other features of note recorded from the lidar are set out here. Further details of all sites recorded, together with the volunteers' completed data forms and record maps, and the original DSM and DTM lidar maps, are included in the site archive which is structured to tie in with this section, with a separate sub-folder for each area.

All work was done by volunteers who had varying levels of experience and skill, so anyone studying these areas in future is encouraged to consult with the original lidar maps as well as checking what was found during this project.

(Note: 5 or 6 figure numbers in brackets in the following account are the individual site numbers allocated by volunteers during this project and relate to the project database and archive).

#### Area 1.

##### W of Barnard Castle, Teesdale

(2 km sqs: NZ0316, NZ0416).

This area covers the site of the Deerbolt training camp, Startforth, Barnard Castle, used from the 1890s through to the mid twentieth century. A series of postcards in Durham County Record Office indicate that the 3rd Battalion of the Durham Light Infantry was active here in 1909-1910, prior to the First World War, and that the camp was tented at that time.



*Fig 1.1. Photograph of the band and the eight companies of the 3rd Battalion The Durham Light Infantry, on parade, taken at Deerbolt Camp, Barnard Castle, 1909. Image reproduced from Durham County Record Office website, ref no: D/DLI 2/3/16(13).*



*Fig 1.2. Two aerial views of Deerbolt Camp (undated but probably taken during the Second World War). Reproduced from the website of the King's Own Royal Regiment Museum, Lancaster ([www.kingsownmuseum.com](http://www.kingsownmuseum.com)).*



*Fig 1.3. DSM lidar image of the site, now largely occupied by Deerbolt Prison. Note Barnard Castle, on the east bank of the Tees towards the right margin of the image, and the medieval field patterns north and south-west of the prison. (See front cover image for a wider view of this area).*

The site of the camp lies largely beneath the present-day Deerbolt Prison. Given the development of the site following the First World War, it is perhaps not surprising that no remnants of the original camp were noted on the lidar. Part of the site of the original camp remains open ground, however, so it is

possible that some features relating to original camp may survive within the ground.

In addition to the camp, a rifle range existed on the south bank of the Deepdale Beck, as shown on the 2<sup>nd</sup> edn OS map. Today this is largely wooded, but some earthworks in the right location, so presumably associated with it, have been recorded from the lidar. The site is recorded on the HER as D47390. the HER notes that: *'The range remains marked on OS mapping data right the way through to ..... the 1970's, after which the land shows up as paths through woodland by the beck. The targets are on the south side of the beck with markers leading 660yds away to the north-east on the opposite side of the beck. The range is likely to have been associated with Deerbolt Military Camp to the immediate south, the lifespan of the range suggesting it might well have been used as a training site in both the WWI and WW2.'*

The military history of the area extends back many centuries prior to the First World War, as demonstrated by the presence of the great Norman Castle, the location of which reflects the strategic importance of the site. Volunteers recorded some areas of ridge-and-furrow, some of which may well date back to the time of the castle; some of this in km sq 0316 is very well-preserved, though parts of it have clearly been damaged and in places destroyed by later ploughing. Other than this, and a few unclassified earthworks none of which looks particularly important, nothing else of interest was recorded. This area was included within the recent North Pennines AONB Lidar landscapes project, so any features of potential interest visible on lidar should be included within that project's report and archive.

## Area 2

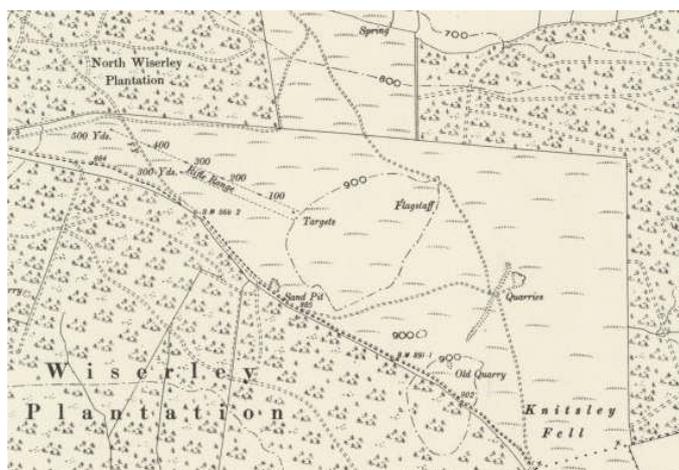
### South of Wolsingham, Weardale

(5 km sqs: NZ0734, NZ0834, NZ0835, NZ0935, NZ0936).

This area was included in the survey because documents dated Nov 1918 and March 1919, held by the National Archives of Canada, refer to activity here by the Canadian Forestry Corps; copies of these documents are held by the Durham County Record Office. These documents make reference to what appear to be two separate light railways, presumably for the movement of timber. An extract in a company diary dated 30 Nov 1918 (ref: RG9 III D-3 Vol 5018 file 764) refers to the armistice of a few days earlier and notes that *'railway construction is finished for the present, the immediate requirements being satisfied. The bridge over the River Wear is completed, ready for the shipping of lumber when the N.E.Ry siding is put in.'* It also notes *'All proposed buildings are now erected, except the Carpenter-shop and Blacksmith's shop.'* A letter (ref: RG9 III B-1 Vol 2475) dated March 4<sup>th</sup> 1919, refers to a light railway on which work commenced on 29 Jan 1919; at the time the letter was written a bridge over the Harthope Beck had been completed and the track was laid *'well on the way to Harthope Wood'*. This letter also notes that the railway was *'the only means by which the timber can be transported from the Harthope and Lyloe (presumably Kyloes) woods.'*

A glance at the pre-war 2<sup>nd</sup> edition OS map shows how heavily this area was forested in the years leading up to the War; recent air photos and the lidar data show a comparatively open landscape. Careful analysis of all available old maps, lidar, aerial photos and other sources might provide information about the activities of the Canadian Forestry Corps, and the possible location of the railways mentioned above, but unfortunately the lidar has not provided any new information. This might be because the main area of activity could have been to the west of the area chosen for analysis; Harthope and Kyloes woods are shown on the OS 2<sup>nd</sup> edition map at NY064340 and NY063334, which is to the west of the area specified for survey. The railway(s) presumably headed north from this general area to a junction with the mainline near Wolsingham.

A rifle range and targets are shown on the OS 2<sup>nd</sup> edition map, so may well have been operational during the First World War, at NY08963510, on Knitsley (or Nitsley) Fell. This location puts it in the SE corner of km sq NY0835, but frustratingly this area has no lidar coverage. To date, the site appears to have escaped incorporation into the HER. There is no sign of it on the OS 3<sup>rd</sup> edition map, which does show a tramway (presumably linked to forestry and/or quarrying, and potentially linked to the work of the Canadian Forestry Corps) in this general area, part of which is visible on the lidar (08356).



*Fig 2.1. Rifle range on Knitsley Fell, shown on OS 2<sup>nd</sup> edn map. (Not on HER).*

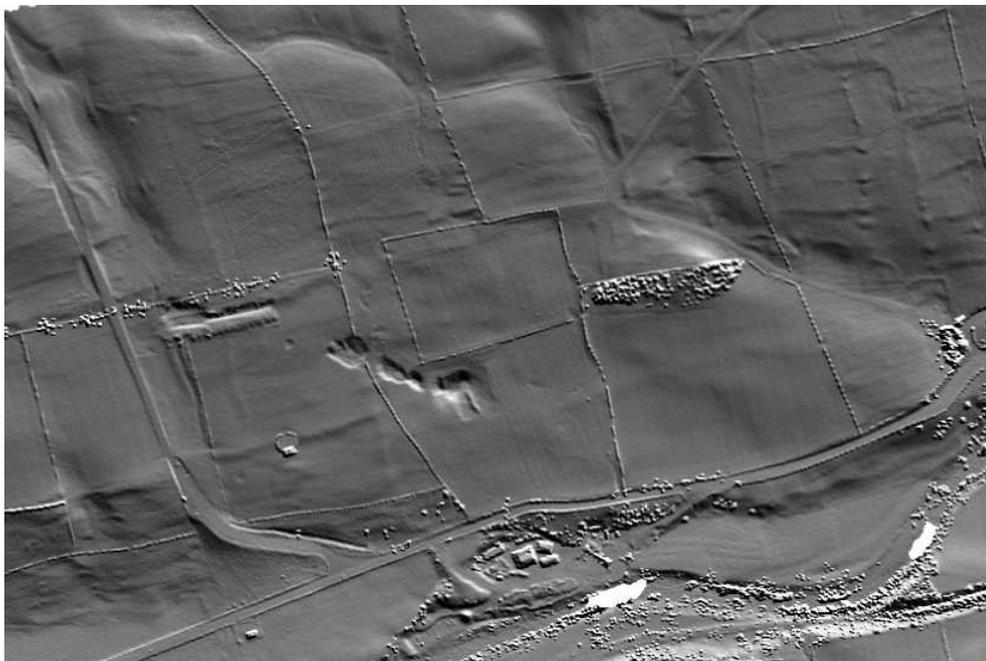
Other than this, the lidar analysis has recorded little other than field systems and industrial remains of post-medieval date. The area is studded with quarries and mines, many of which are shown on historic OS maps. This area was included within the recent North Pennines AONB Lidar Landscapes project, so most of these features should have been included within that project's report and archive.

**Area 3**  
**Old Park / Heights Quarry, Weardale**  
(1 km sq: NY9338).

This area is immediately south of Heights Quarry, Westgate-in-Weardale (HER D9991), a large quarry in a fascinating multi-period archaeological landscape. It is included in the survey because it is known that German prisoners of war worked in the quarry during the First World War. In 1915 a wagonway was built down to the North Eastern railway line to handle extra production. This was later replaced by an aerial ropeway. The wagonway shows up clearly on lidar and is well described in the project archive by project volunteer D. Armstrong.

The lidar coverage does not extend as far northwards as the quarry itself. It does, however, include many clearly visible elements of the fascinating and very important late prehistoric and Roman landscape that survives in this part of Weardale (93382). This is considered in some detail in the report of the recent North Pennines AONB Lidar Landscapes project, the archive of which records several settlements here, many in association with often quite complex and extensive field systems.

This area lies within the Bishop of Durham's great medieval hunting forest of Weardale, and the later Stanhope Park; the prominent earthwork at Cambokeels (HER D2298) sometimes (wrongly) referred to as the 'Bishop's hunting lodge' is clearly visible on lidar (93381). The remains of the adjacent Cambokeels mine (93383; HER D63285) also show up clearly on lidar.



*Fig 3.1. DSM lidar image of part of Area 3. The wagonway is the linear feature running north-south towards the west side of the image. The Wear is clearly visible at the base of the image. The earthworks towards the north-east corner belong to a complex system of farmsteads and fields dating from late prehistoric and Roman times.*

**Area 4**  
**East of Stanhope, Weardale**  
(1 km sq: NZ0038).

This area was included in the survey as it includes the site of Newlandside Working Camp, a prisoner of war camp established in August 1916. Its residents worked in the nearby Newlandside Quarry. By September 1916 it already held 220 German prisoners, all apparently within 24 tents. Some fascinating documentary records are discussed on the Durham at War website. The site is shown on the 3rd edition Ordnance Survey map (below), but had gone by the 1940s.



Fig 4.1. Newlandside POW camp shown on OS map dated 1923.

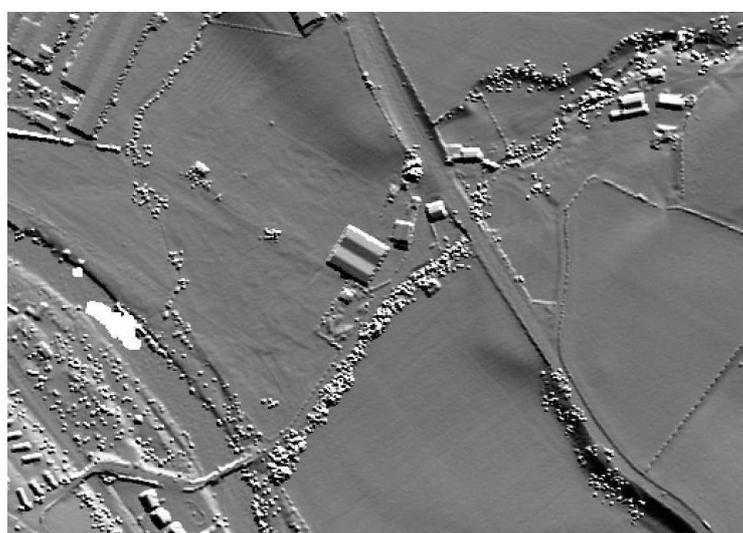


Fig 4.2 DSM lidar image of the site of Newlandside camp.

If all accommodation was in tents then traces left on today's ground surface may well be ephemeral at best, although the tents may have stood on levelled bases, which may have been concreted, so some trace could survive on the ground surface. There are faint traces of earthworks on the lidar and while these do not appear to correspond entirely to the cartographic evidence, on close analysis there certainly are some areas of apparent correspondence. It

does therefore seem as though remnants of some of the camp structures do survive within the ground. This is a case where it would be useful to be able to manipulate the lidar data in 3D.

Also visible on lidar in this km sq are some very well preserved agricultural strip lynchets or terraces that could well be of Roman date, perhaps reused in medieval times. In some places, such as towards the centre of the km sq, these have been flattened by later ploughing. There is also evidence for post-medieval settlement and agriculture, for example at Shittlehopeside Farm. Parts of two vast post-medieval old quarries can be seen on the lidar. The image clearly illustrates how this part of Weardale was a landscape of quarrying and agriculture during the nineteenth century; putting prisoners of war to work in the quarries was the obvious way to keep them usefully busy.

Like the other areas in Weardale and Teesdale discussed above, this area was included within the North Pennines AONB Lidar Landscapes project, and features noted here are included within that project's archive.

## **Area 5**

### **Cocken Hall**

(4 km sqs: NZ2746, NZ2747, NZ2846, NZ2847).

This area includes Cocken Hall, the site of an important First World War training camp. The following background information is taken from the Durham at War website, where much further information is available. Cocken Hall, which had extensive landscaped gardens (evidence of which can be seen on lidar and must not be confused with evidence of the First World War camp), was originally built in the seventeenth century and was demolished in 1928, by which time the camp had already been dismantled. A fascinating overview of Cocken, from medieval times through to the twentieth century, can be seen on the Chester-le-Street Heritage Group website. Survey and excavation work took place here as part of a No-Man's Land project in 2015/16 (see: [www.plugstreet-archaeology.com/blog/?cat=142](http://www.plugstreet-archaeology.com/blog/?cat=142)).

In early September 2014, only a few weeks after Britain declared war on Germany and Lord Kitchener called for volunteers to join a New Army, a committee was formed in County Durham, headed by the Earl of Durham, to raise and equip a County battalion as part of the Durham Light Infantry. Over £10,000 was quickly raised and permission given by the War Office to begin recruiting a County battalion that was formally numbered as the 18th Battalion DLI, but more popularly known as the Durham Pals.

The Durham Pals, however, had no home until Lord Durham loaned the battalion his house and land at Cocken Hall, north east of Durham City. There the first recruits from across the county arrived in late September. Soon a new hutted camp was built in the fields near the old house, new khaki uniforms arrived, and over 1,000 men began their long months of training. It was during this time that a remarkable set of photographs was taken of the Durham Pals at Cocken, giving a fascinating insight into the world of volunteer soldiers in

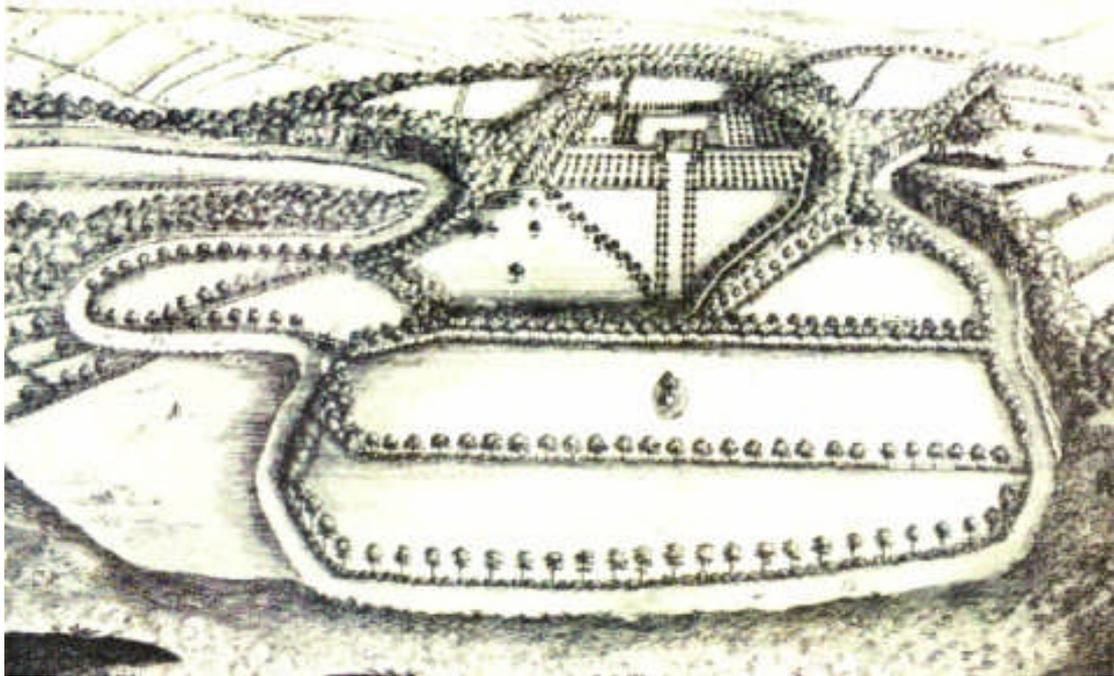
1914 and early 1915. No comparable set of photographs of Durham soldiers from this time is known to have been taken, and, sadly, for some battalions hardly a single photograph has survived.

The site of Cocken Hall is now largely wooded, so analysis of this area concentrated on the DTM rather than the DSM lidar. D Armstrong has recorded a number of features here that seem to correspond to known features of the hall complex, in addition to some outlying features that could possibly relate to the First World War camp. These features should be compared with the results of other recent fieldwork in the attempt to establish whether they do relate to the camp. To the west, on the opposite bank of the Wear, some linear earthworks (27471, 27465, 27466) visible on lidar were interpreted as possible training trenches, but this interpretation is far from certain. In short, the lidar must be used along with other data, rather than in isolation, in the attempt to recognise possible surviving features of the camp.

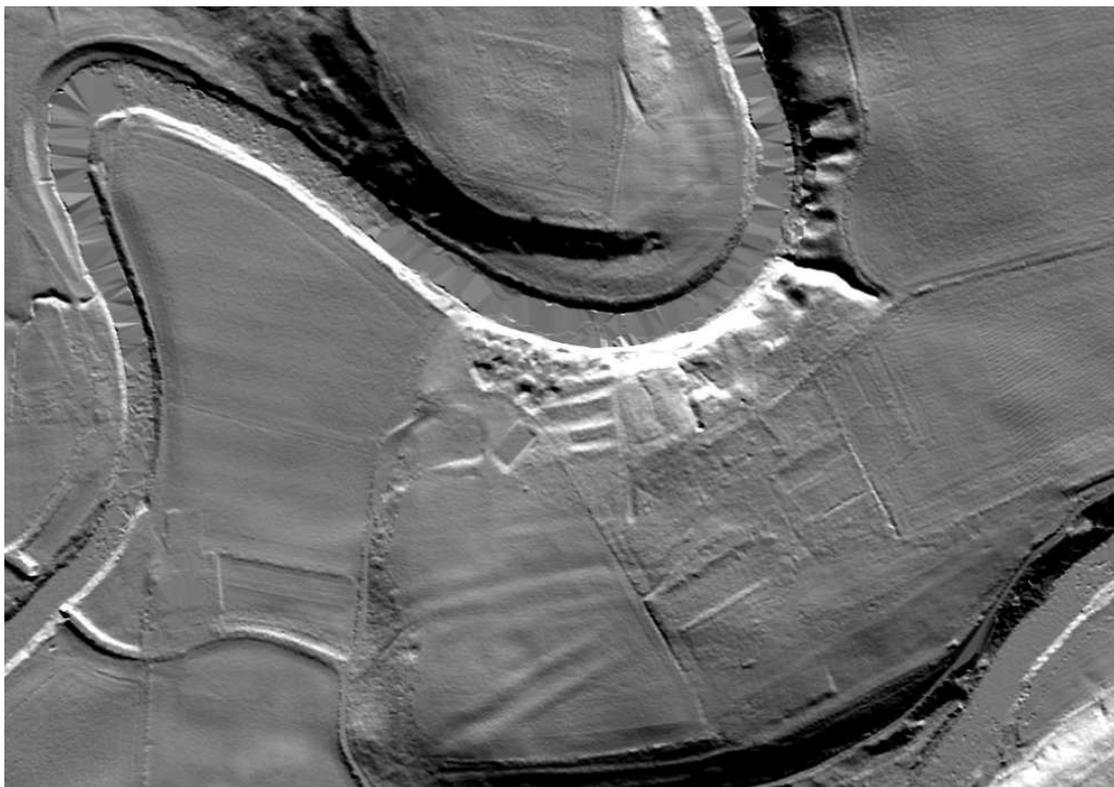
A few features of possible interest, in addition those discussed above, were recorded by volunteers in the km sqs surrounding Cocken Hall, but most fields in this area have been ploughed quite heavily over recent decades and are now featureless in terms of surviving earthworks. Most features recorded by project volunteers are recent in date and of minimal, if any, archaeological significance.



*Fig 5.1. Exterior of miniature rifle range and drying room at Cocken Hall Camp. (DCRO ref: D/DLI 2/18/24(137)).*



*Fig 5.2. Cocken Hall in the 18<sup>th</sup> century. Image reproduced from the Chester-le-Street Heritage Group website.*



*Fig 5.3. DTM lidar image (with trees and buildings removed) of the site of Cocken Hall.*

## Area 6 South Shields

(3 km sqs: NZ3866, NZ3965, NZ3966).

This area was included within the survey due to the suspected presence of coastal defence installations associated with the 3rd Battalion, The Durham Light Infantry during the First World War (fig 6.1). Much of the survey area is now built up, so survey concentrated on the coastal strip between this and the North Sea.

No clear trace of the 'fort' and 'camp' shown on the 1918 map was noted on the lidar (figs 6.3, 6.4), and nothing else of certain First World War date was noted. Slight remains of ploughing of apparent post-medieval date cover much of the ground, and a few possible earthwork features were noted by the volunteers though it is impossible to be sure on the basis of lidar alone what these might be - some could just be natural features, disturbed by ploughing. There is also much industrial activity in this area, including quarrying, recorded on historic OS maps. Some of the recorded features are old field boundaries, of minimal archaeological interest. Perhaps the most interesting, and potentially worthy of investigation on the ground, is what could be a small zig-zag trench system at NZ39056555 (396513).

While checking old OS maps along with the lidar of this area, a rifle range was noted near Trow Point. This may have been in use during the War. No sign of it is visible on the lidar. In addition, some curious rectilinear and very regular parchmarks were noted on Google Maps aerial imagery south of the Gypsies Green Recreation Ground, immediately north of the survey area (NZ379666). These are of unknown origin; they do look potentially military but could be a result of recent activity (though one appears to underlie the wall around the adjacent stadium).



Fig 6.1. Map held by the Durham County Record Office, dated May 1918, showing the coastal defences of the 3rd Battalion, The Durham Light Infantry (DCRO ref: D/DLI 2/3/10). Note that the area labelled 'THE BENTS Training Ground' is now largely built over. This map relates to Areas 6 and 7 in this survey.

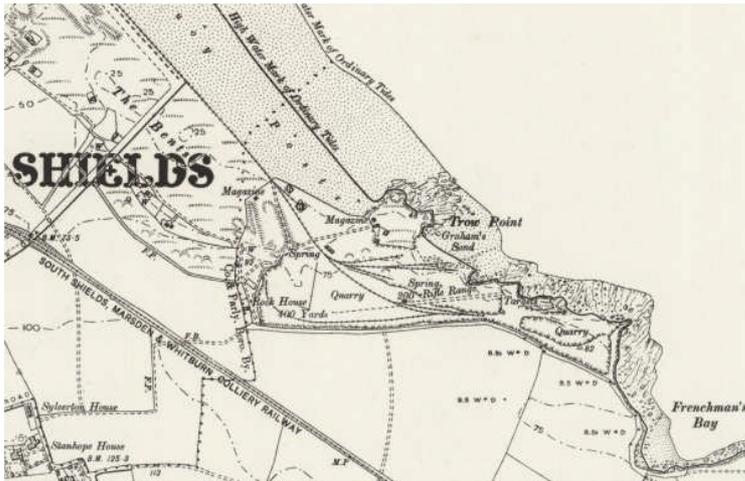


Fig 6.2. Extract from pre-First World War OS 2<sup>nd</sup> edition map showing a rifle range and targets near Trow Point.



Fig 6.3. Extract from Fig 6.1 showing a 'fort' and 'camp' above Frenchmans Bay. (Note that this map is aligned with north-east to the top).

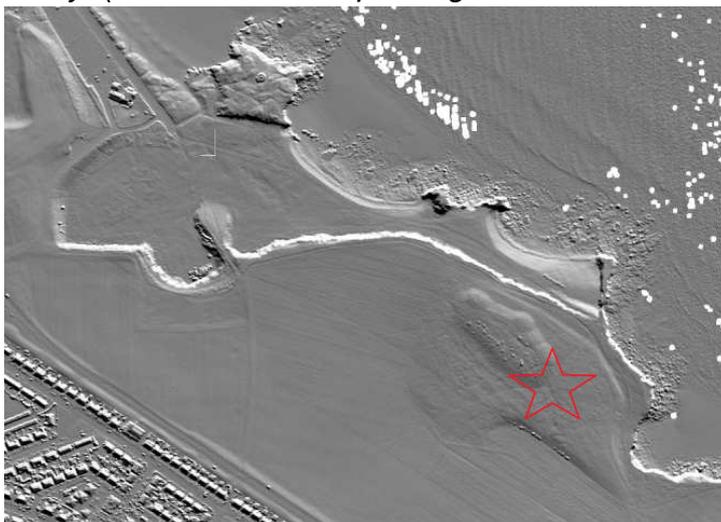


Fig 6.4. DSM lidar extract with the approximate location of the 'fort' and 'camp' shown on Fig 6.3 marked with a red star. Although hints of earthworks are visible here, these do not suggest remnants of a fort or a camp.

## Area 7 Whitburn

(4 km sqs: NZ4063, NZ4064, NZ4162, NZ4163).

This area was included in the survey because of the presence here of a rifle range and also First World War practice trenches (see fig 6.1). The following useful background information is reproduced from [www.28dayslater.co.uk/whitburn-rifle-range-sunderland-feb-13.t78174](http://www.28dayslater.co.uk/whitburn-rifle-range-sunderland-feb-13.t78174).

*Five firing ranges, one of 40yds, one of 600yds and three of 500yds. This is possibly associated with a group of buildings on Mill Lane which may be barrack blocks. The earliest representation of these ranges seen so far is on the 1921 OS 6" map. This area was once part of the medieval field system associated with Whitburn village (HER 887). Sections of the medieval ridge and furrow earthworks were scraped away to create the ranges but elsewhere within the site boundary, evidence of the former cultivation system can be clearly seen. World War One practice trenches can be seen on aerial photographs. The land for the range was bought from Sir John Sherburn by the Territorial Force Association in 1912. The camp was occupied by the Regular Army throughout the First World War and wooden huts were built for a garrison approaching battalion strength. A trench system was dug using the characteristic 'Greek Key' pattern of firing bays and communication trenches. After the war the camp reverted to the Territorial Association until the Regular Army returned between 1939-45. During this period, some of the trenches of the earlier war were re-excavated. By 1953 the wooden huts of the First War were replaced by the modern brick bungalows which today stand on the range. This work was carried out between 1954 and 1962, providing accommodation for approximately 250 troops. During the 1960s the Royal Engineers carried out ground clearance works, eliminating the 'bumps and hollows' between the butts and the camp and removing almost all traces of the trench system. At the same time concrete pillboxes were demolished and destroyed.*

The five firing ranges are clearly visible on lidar (fig 7.1), but no sign of practice trenches or other features relating to the First World War has been noted (figs 7.2, 7.3).

The landscape throughout this area is largely either built up or has clearly been heavily ploughed over recent decades, while the massive Marsden Quarry has also removed a large area of the ground surface - there is thus little chance of survival of significant earthworks liable to discovery through lidar survey. The only ancient feature recorded is the ridge-and-furrow, which could well be medieval, in the area of the rifle ranges. This has presumably been preserved here due to the lack of recent ploughing owing to the presence of the rifle ranges. The fact that it survives here, albeit only now as a few isolated fragments, suggests that there must have been much more ridge-and-furrow here back in medieval times, and that there may also have been other earthworks in the local landscape. But anything that was here has now been ploughed flat, so is not detectable by lidar.

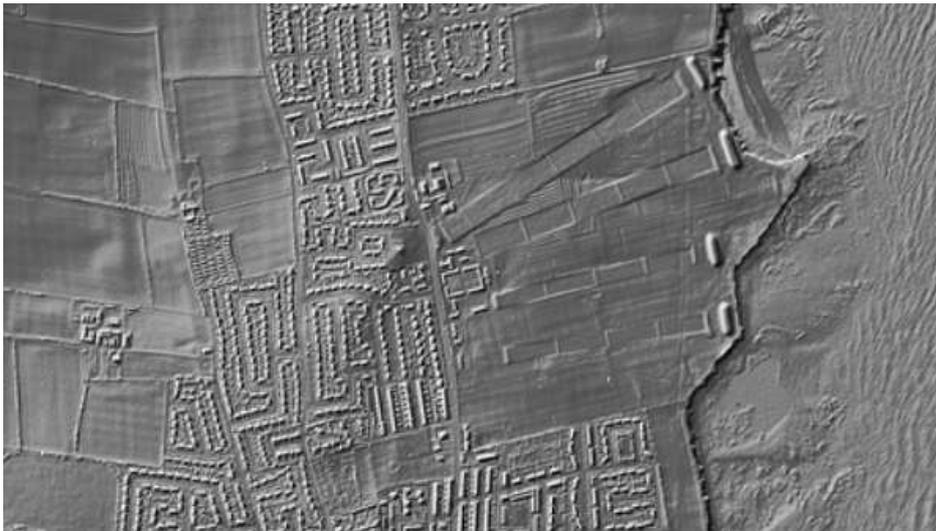


Fig 7.1.  
DSM lidar  
image of  
coastal  
firing  
ranges at  
Whitburn

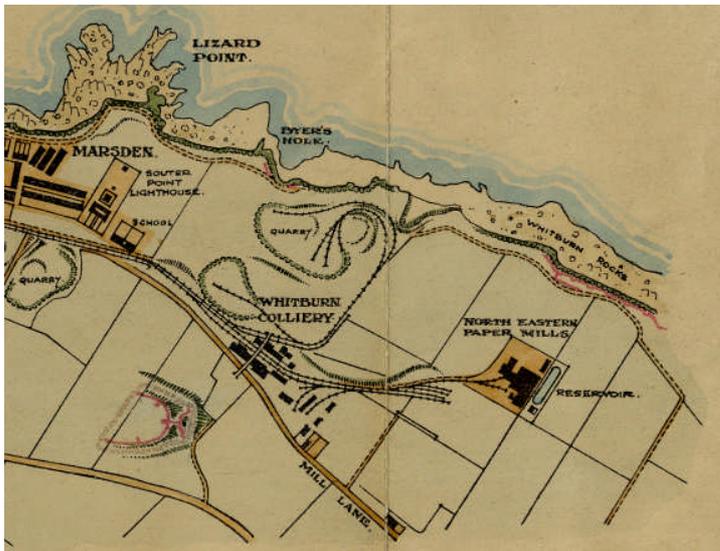


Fig 7.2 Extract from Fig 6.1  
showing apparent  
depiction of trenches (in  
red) above the coast above  
Whitburn Rocks.. (Note  
that this map is aligned  
with north-east to the top).



Fig 7.3, DSM lidar map of the coast at  
Whitburn Rocks, as shown on Fig 7.2. No  
sign of the trenches shown on the map has  
been noted on the lidar.

**Area 8**  
**Easington Colliery**  
(2 km sqs: NZ4344, NZ4445).

This area was included in the survey due to the supposed presence of practice trenches. However, the possible trenches actually recorded on the HER, at White Lea, are not within either of the two areas hallmarked for survey (it could be that a simple error was made when initially defining those areas to include in the survey). The HER records a cropmark of 'Zig-Zag Lines, could be World War 1 practice trenches' (D53832) at White Lea, Easington Colliery. Lidar is available for this area, so might be worth checking, though whatever this feature is, if it only survives as a cropmark rather than an earthwork then it will not show up on lidar.

A curious zig-zagging earthwork (44451) is visible right on the coast. The HER records a 'rocket station' at this location, but notes nothing is visible on the ground. The area was included within the 'Turning the Tide' project (1997-98), so anything surviving here may previously have been noted. Perhaps this is just a track, albeit an unusual one? It should be checked on the ground in case it is of archaeological interest.

Km sq 4344 is partly built up, with much of its eastern half having been heavily ploughed in post-medieval and/or recent times and largely devoid of features of potential interest. A few possible features were recorded and are included in the archive, but nothing of potential First World War interest.

**Area 9**  
**East of Peterlee**  
(1km sq: NZ4540).

This area was included within the survey due to the presence of trenches at Castle Eden Dene which it is thought could date from the time of the First World War (HER D8293).

Several possible trenches were recorded on the lidar, most of which may be tracks and are probably not actually of archaeological significance (though they should be checked on the ground). One of these (45401) looks particularly promising and may well be First World War trenches.

Nothing else of significance was noted on this km sq, which includes two large heavily ploughed fields, a built up area, allotments and woodland - none of which is conducive to the survival of earthworks that might be seen on lidar.

**Area 10**  
**West of Peterlee**  
(1km sq: NZ4142).

This area includes the site of Little Thorpe Hospital (HER D60586), built between 1898 and 1919 and demolished in 1995, about which project volunteer D. Armstrong has collated much information (see the detailed report in the project archive). He also found this image (below), which is undated (reproduced from [www.rhdixon.com/2017/01/16/fever-hospital](http://www.rhdixon.com/2017/01/16/fever-hospital)) but may date from the first half of the twentieth century.

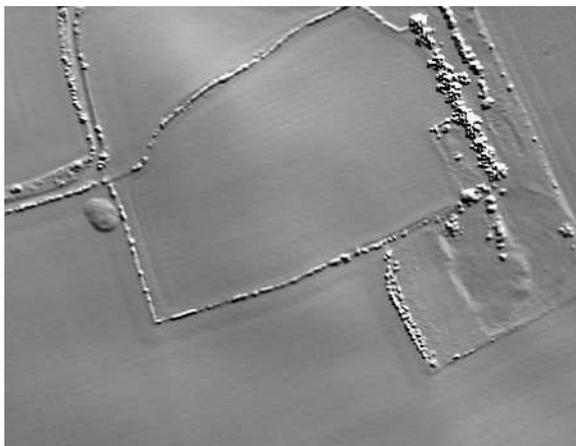
The footprint of the hospital buildings can be clearly seen on the lidar.

Just west of the hospital site is the site of an Anglo-Saxon cemetery on Andrew's Hill (NGR NY41704270). This area has been heavily ploughed no features of potential archaeological interest are visible on the lidar.

Nothing else of potential significance was noted within this area.



*Historic photograph of Little Thorpe Hospital. (Reproduced from [www.rhdixon.com](http://www.rhdixon.com)).*



*DSM lidar image of the site (towards the right margin) of Little Thorpe Hospital, within a largely featureless sea of heavily ploughed fields that retain little visible sign of archaeological features of any date.*

## 4. Discussion

This small-scale project has been rather different from other recent lidar landscapes surveys, principally because it was designed primarily to investigate small areas for remnants of specific sites. This means the results were always going to be a bit 'hit and miss' - either evidence of these sites would be found, or it wouldn't. In contrast, other projects have been designed to investigate extensive landscape areas for any evidence of archaeological sites of any period, and these have consistently resulted in large numbers of important new discoveries, even in areas previously thought to be of low potential. A general search of the areas included in this project was undertaken, alongside the search for First World War features, but given the small size of the areas, and the fact that several of the km sqs included built-up areas, extensive heavily ploughed fields and areas of sea, the potential for important new discoveries from the outset was not particularly high. Also, some of the areas chosen for analysis had already been covered by other lidar landscapes surveys (Frodsham 2017), so any important discoveries within these areas should already have been made. That said, it should not be forgotten that this was also a training exercise for volunteers; whether or not important remains were found, the volunteers received training and experience in using lidar for archaeological survey which hopefully they will use elsewhere in future projects.

The results, as set out in this report and in the project archive, may appear a little disappointing as no spectacular new finds were made. However, in most cases, some evidence of the target sites has been recorded on the lidar maps, although the nature of this evidence is often unclear. For example, the site of the PoW camp of Newlandside at Stanhope, Weardale, still retains earthwork evidence of structures, although it is not easy to equate the visible remains with the cartographic evidence for the form of the camp. In such cases, field visits, or even perhaps geophysical survey or the excavation of trial trenches, may be necessary to clarify the nature and condition of sites.

In some cases (eg Trow Point, South Shields; Knitsley Fell, Weardale), features relating to the First World War were noted on historic OS maps even though no obvious trace of them was noted on the lidar maps. This illustrates the fact that lidar should only be used as one tool amongst many, along with historic mapping, aerial photography, the HER and other available sources, when undertaking landscape research.

The volunteers all had differing degrees of relevant experience, and some were better able to notice and record archaeological features from lidar than others. Consequently the nature of volunteer results is inevitably variable; some recorded post-medieval, modern and natural features in great detail, while others struggled to identify quite obvious features of potential archaeological interest. None of this is a problem - all were requested to record what they thought they could see, and offer their best interpretations of what they thought different features might be. In future, with the experience of

having taken part in this project, volunteers will be better informed as to what is worth recording when doing this kind of work.

Given the project's basic aims, and the restricted budget, the methodology (as described in Section 2, above) is considered to have been generally sound, though it would perhaps have made sense to explore wider areas, if only to enable sites of potential interest to be seen in their landscape context. Ideally, more time would have been available to discuss individual km sqs with volunteers while work was in progress, either at a progress workshop or by email. Given the small scale of this particular exercise, and the fact that all results were discussed in some detail at the results workshop, this was not a problem, but if undertaking larger-scale lidar landscapes projects in future then thought should be given to arranging 'work in progress' workshops at which volunteers can ask questions and discuss things they have found.

A further potential benefit would have been the facility to use 3D lidar models, but this would have necessitated further training and the acquisition of dedicated software. Had this been available it would have enabled the examination of potentially interesting areas in greater detail, and would have been of potential interest to the volunteers. It is possible that the lidar data could be subjected to 3D analysis at a later date, though there is no guarantee that the results would be substantially different to those presented here.

The project database, along with this report, has been presented to the County Durham HER and the results, as appropriate, will be incorporated into the HER, making them publicly available. The project archive, in digital form, has been passed to the Durham County Record Office.

The results of this project, in terms of volunteer training and in establishing the extent to which surface traces of the target sites still survive, has been generally successful, and the methodology could certainly be adapted to enable the undertaking of further projects in future. It is hoped that a follow-up project can be undertaken to enable many of the participants involved in this project to develop and enhance their important work to date, and thus make further significant contributions to our understanding of County Durham archaeology.

## Appendix

The guidance notes sent to participating volunteers were as follows.

### **Durham County Council** **Durham at War project - lidar workshop**

The use of lidar to record archaeological features, in particular features relating to a number of First World War sites, was discussed at a workshop for volunteers, led by Paul Frodsham, at County Hall on 28 January 2017. Following that event, lidar maps are being distributed to volunteers, who will record features on them using a standard methodology developed during the Lidar Landscapes project in the North Pennines AONB. For that project (which has resulted in the discovery of many hundreds of previously unknown archaeological sites by volunteers with no previous experience) participants are sent a comprehensive Project Manual, but the purposes of this small-scale exercise the following notes (based on the Project Manual) should suffice.

The basic object of the exercise is simple: to study the lidar maps very carefully and record everything you can see that you think might be of archaeological significance. Everything you decide is worth recording should be highlighted and numbered on a copy of the lidar map, and a record form for each site should be completed. Don't worry about getting anything 'wrong' - the idea is to record everything you think might be of interest, so you can't really be 'wrong'! The plan is to study all the results at a follow-up workshop, where potential further lidar survey work will also be discussed.

So, the basic methodology is as follows.

1. For each km sq you will be sent a DSM lidar map, DTM lidar map, OS map, and aerial photo.
2. Make a copy of the DSM lidar map - this is to be your working copy on which you will record what you find. (Note - do the same for the DTM lidar map only if you can see something on the DTM that doesn't show up on the DSM; in most cases this will not be necessary).
3. Using a basic drawing package (most people use 'Windows Paint'), highlight and number your sites using a simple colour scheme. Small 'point' sites (eg single mine shafts, or burial mounds) should be surrounded with a small yellow circle. Straight lines (eg roads, railways, linear boundaries) should be marked using a blue line. Larger areas of interest (ie sites that are not small 'point' sites and not linear features) should be drawn around in red, creating a red polygon that surrounds the site. Please save the completed workmap as a jpeg, with a filename consisting of the OS map number followed by 'workmap' (eg 'NY7788workmap').
4. Each site should be given a number, the numbers being added sequentially for each km sq, regardless of the colour of each site.
5. For each site, a Recording Form must be completed. This may initially appear complicated, but it isn't! Most of the fields should be self-

- explanatory. Don't worry if you aren't sure what to put in some of the boxes, as all will be explained at the follow-up workshop.
6. The bits to concentrate on are Table 2 and Table 6. In Table 2, don't worry about the first 3 lines, but please try to complete the final four. Under monument type, record what you think the thing is (eg 'ridge and furrow'). Under monument period, say which of the following general periods you think it belongs to: Prehistoric, Roman, Medieval, Post-medieval, Unknown). Under monument form, record the current form of the site (eg 'Earthwork', which will cover the vast majority for sites). Under 'Feature', place a cross in the relevant box according to which colour you have drawn it on the workmap (see above). In Table 6, please describe the site - say as much or as little as you like. Speculative interpretation, saying what you think the site might be and why, is encouraged!
  7. Elsewhere on the form, put an 'X' in table 3 according to whether the site can be seen on DSM, DTM and/or the aerial photo. And put an 'X' in the relevant box of table 4 - box 'A' if you are confident you have identified the site correctly, box 'C' if you haven't really got a clue! Put your name in table 5. And if you like (most people don't bother) include a scanned sketch of the site in Table 7.
  8. Each form should be saved (ideally as a Word file) in the format: map number\_site number (eg NY7788\_1.doc).
  9. Please send your completed workmaps and record forms to (EMAIL ADDRESS TO BE INSERTED HERE)

And that's pretty much that. Remember, you are just recording what you think you can see, so you can't get it 'wrong'. Just do your best, and all will be discussed at the next workshop. Good luck!

## References

Ainsworth, S. 2015. *Shedding Light on the North Pennines. The Allen Valleys and Hexhamshire Lidar Landscape Survey*. Unpublished report, available on the Altogether Archaeology website: [www.altogetherarchaeology.org](http://www.altogetherarchaeology.org)

Crutchley, S. & Crow, P. 2009. *The Light Fantastic: Using airborne lidar in archaeological survey*. Swindon: English Heritage.

Frodsham, P. 2017. *Lidar Landscapes - North Pennines (East). Project Report*. Unpublished report for North Pennines AONB Partnership.

Oakey, M., Radford, S. & Knight, D. 2012. *Alston Moor, North Pennines. Miner-Farmer Landscapes of the North Pennines AONB*. English Heritage Research Report Series no. 4-2912. Portsmouth: English Heritage.





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