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ABOUT THE ASSOCIATION

What did the Romans do for us? One thing they certainly did was to lay the foundations for our modern road network, with millions of us driving every day along roads first laid out by Roman surveyors two millenia ago (such as Oxford Street in London, and large parts of the A1, A5 and many others). Unfortunately though, much of the Roman road network is not represented by modern roads, and despite a common assumption that Ivan Margary’s comprehensive gazetteer, Roman Roads in Britain (1973) made our understanding of the Roman road network reasonably complete, less than 40% of the network is actually known with any certainty. That false assumption has also frequently led to a lack of attention from the professional archaeological community (with the notable exception of roads in Wales), and for most of the past hundred years the serious study of Roman roads was left to a handful of disparate individuals and small amateur groups, with little or no co-ordination or cooperation between them.

The RRRA was formed in 2015 as a registered charity to bring those disparate individuals together, and to coordinate a nationwide programme of consistent and high quality research, promoting the study of Roman roads and Roman heritage throughout the former Roman province of Britannia. Over the last couple of decades, it has often been a race against time to discover and record what we can of the 60% of the Roman road network about which we are still uncertain, since modern agricultural methods and urban development have been steadily removing surviving features from the landscape. Fortunately, new technologies such as LiDAR and geophysical survey have helped enormously and enabled researchers to identify the remains of hundreds of miles of previously unknown Roman roads, along with associated Roman sites, and we continue to work to fill the many gaps. Research is only half the story though, we also have to ensure that the results of our work are readily available. We aim to:

1. bring together all known information on Roman roads in Britain, summarised in a freely accessible online interactive gazetteer, expected to be complete by 2026.
2. identify key sites where important questions remain, and organise fieldwork necessary to answer those questions. 100 Ha of geophysical survey have been completed, with a further 500 Ha already planned, and several future excavations are currently at the planning stage.
3. encourage the involvement of as many people as possible in our activities. We care passionately about community archaeology, and will always encourage local people to get involved in our work, without any charge (unlike some organisations, we will never do this!).
4. organise events to keep people up to date with research including online talks & seminars.
5. ensure that all our published work is Open Access, including our quarterly newsletter and Itinera (following a very short initial members only embargo).

Membership is open to everyone, and our three hundred or so members come from a wide variety of backgrounds ranging from those with just a general interest in our Roman heritage to professional archaeologists from both the public and commercial sectors, alongside seasoned Roman roads researchers. Joining the RRRA gives you the knowledge that your modest subscription (just £14 a year for a single adult) is helping to support our important work. You might even get a warm and fuzzy glow.
FROM THE CHAIRMAN
MIKE HAKEN

Whilst it may no longer be fashionable for academic journals to carry a Chairman’s message or annual review, we felt that for our first ever volume a brief outline of our activities in 2020 was more than justified, especially in the current circumstances of the Covid-19 pandemic.

The Roman Roads Research Association is a young organisation and was less than five years old at the beginning of 2020. Of course, at that time we had no idea of the challenges that the Covid-19 pandemic would present. For ourselves, the impacts were felt mainly in our fieldwork and public engagement. Our plans to revisit the site of our hugely successful community excavation on Dere Street (RR8a) and a nearby Romano-British settlement in 2019 had to be shelved, and we currently cannot say with certainty if we will revisit the site this year. The pandemic also prevented us moving forward with our Devil’s Causeway project in Northumberland, examining possible Roman military sites along the route of the Roman road, and it seems unlikely that much fieldwork will take place there until 2022. Similarly, plans to launch a major community based geophysical survey also had to be postponed, as did a planned community project near Doncaster which was to process the finds from a fieldwalking survey conducted just before the first lockdown on a newly identified Roman roadside settlement.

However, the year’s events were far from being entirely negative. Despite the difficulties, or even perhaps because of them, 2020 did bring positive changes as well. It was right at the start of the first lockdown that we took the decision to launch *Itinera*, and just over a year later you are now reading our first ever volume. Our increased social media presence resulted in a doubling of our membership in the year, a trend that has continued since, with membership now standing at 311 at the time of writing (early March 2021). Whilst most of our community projects were postponed, our small but highly dedicated team conducting geophysical survey on parts of the road corridor between Doncaster and Aldborough did achieve some excellent results (when the regulations permitted). Turning out in all weathers, even in a blizzard, they surveyed the fort at Roecliffe, confirmed the route of RR720b as it approaches *Isurium Brigantium* (Aldborough, N. Yorkshire), and discovered an entirely unexpected ‘new’ road near Tadcaster. These are just a few examples of their many achievements, and the reports for all these surveys will be published on our website later this year.

2020 also saw the launch, quietly, of a pilot project in the East Riding. *Living Beyond the Town – Petuaria* is our contribution to the *Petuaria ReVisited* project (shortlisted for the 2020 Marsh Award for Community Archaeology) and will conduct a magnetometer survey of the Roman road corridor out of Brough (Roman *Petuaria*) heading towards York, as far as South Cave. The project aims to give us a clearer idea of how the Roman period landscape developed.
along this road corridor. The survey is being carried out by a group of fourteen local volunteers, who have all received training and support in using our equipment, and it will cover about 300 Ha. It is one of the largest community geophysics projects ever conducted in this country, and if successful it will be replicated elsewhere in Britain.

Without question, the most significant event for us in 2021 is the launch of this first volume of *Itinera*. From the beginning, the Editorial Committee was very conscious of the increasing problems faced by researchers when attempting to access academic papers, even by those with access to university libraries, since so many academic journals these days are held securely behind a publisher’s pay wall. We wanted to ensure that no researcher would ever struggle to obtain a paper published in *Itinera*, and so we took the decision to produce the journal entirely ourselves and without the aid of a publisher. This was far from being a straightforward process, but we have now proved that with a dedicated group of volunteers, inexpensive publishing software and the advice of people with experience in publishing, typesetting and illustration, it can be done. We can only hope that others follow our lead. Crucially, by going down this route we can not only keep the price of the printed version low but are able to make the entire journal open access online, after an initial members-only embargo of one year.

We continue to promote a strong community-based approach, and 2021 will see the launch of two further community geophysics projects examining sites along the course of Roman roads, one in Nottinghamshire and the other in North Yorkshire. Another potential project is being discussed in Cambridgeshire. We are very well aware of an apparent bias towards projects in Yorkshire; this is an unintentional but inevitable consequence of the Association being founded in Yorkshire. However, we are extremely keen to undertake fieldwork elsewhere in Britain, especially geophysical survey, and welcome any suggestions for areas of future research. In time, we hope that we can meet many more of our members face to face, whether that be by our planned zoom series of chats and lectures, or back out in the field when circumstances allow.

Despite the uncertainties of the coming months, thanks to the enthusiasm and participation of our membership, the long-term outlook for the RRRA is extremely bright. In the meantime, we hope all our readers remain safe and well in these challenging times.

Mike Haken

Chairman

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The first Editorial of a new annual journal is a significant moment. Launching *Itinera* marks a step forward for the RRRA, focusing light on an aspect of Roman archaeology that has not previously enjoyed its own published academic outlet. That such a development is possible, demonstrates the current health and breadth of an area of Roman studies that will always be associated with the expert labour of Ivan Margary in the middle years of the twentieth century.

*Itinera* is, from conception, a journal intended to bridge the gap between academic researchers and that large band of enthusiasts – the backbone of so many local societies and our own RRRA membership – who wish both to stay informed about, and contribute to, developments in the field. Thus *Itinera*’s content will include quality work by capable independent researchers alongside significant papers from established academics. To ensure maintenance of standards, all papers are peer assessed.

*Itinera* has been established to offer a point of reference for all those doing work which can develop and broaden understanding of Roman roads and land communications. It is an aspect often touched upon in wider archaeological investigations (see for example Janet Phillips and Pete Wilson’s paper in the current volume) but in the past such isolated findings have not always been treated with due emphasis and made readily available for a better understanding of the road network as a whole. *Itinera* will allow Roman road studies to make their proper contribution to understanding Roman society, technological practice, communications, and military and economic development. The journal will inform academics about the current state of knowledge while also making it available to local individuals and societies, allowing future work to be targeted for maximum efficacy. Thus this journal is published both in digital form for maximum reach (free to RRRA members), and in paper form for permanent academic reference and record.

Our content, as may be judged from this first volume, is wide-ranging. The first paper, from David Ratledge, shows how an experienced and skilled practitioner is able to exploit modern technology (in this case LiDAR) to expose and clarify routes that were previously imprecisely defined. Other papers demonstrate the findings of specific excavations, examine the artefactual and archaeological evidence for Roman transport, explore issues of planning and surveying, and speculate about the extent of local road networks. A major contribution from Bill Trow represents the culmination of many years work in testing some of Selkirk’s conclusions regarding the existence of a ‘Proto Dere Street’. A roundup of the year (interpreted broadly for this first volume) keeps track of investigative work relating to Roman roads around the country.
The starting point of Roman road studies has long been Ivan Margary’s classic study, ‘Roman Roads in Britain’. A major challenge for the present day is how to build constructively upon this work in the 21st century, allowing recent findings, seldom pulled together, to be readily referenced by the archaeological community. Two important papers in this volume, from Mike Haken and Dave Armstrong, examine ways in which the RRRA supports identification, classification and nomenclature of new discoveries, building upon Margary’s work and ensuring that it remains fit for purpose in the twenty-first century.

A new journal is not launched without the labour of a dedicated band. Our editorial committee has met regularly on-line throughout this year of pandemic to resolve the many issues that have arisen. It has established ground rules; invited, gathered, reviewed, and selected material; communicated with authors; edited text and images; created and used templates; entered materials into publishing software; stitched together the journal itself; and finally sent the completed journal for printing and circulation.

Mike Haken, the RRRA Chairman, has been unsparing of his time and expertise, actively involved at every stage. Dave Armstrong, indefatigable as the man at the centre, has pulled together the materials into the form of a journal, always positive and perceptive, no labour too challenging. Mike Bishop has given generously of his archaeological knowledge and crucial publishing experience; Chester Forster has brought his experience from other archaeological journals both to head up our band of local correspondents and to manage the indexing of this volume; and John Poulter has been a valued consultant. Paul Bidwell and Pete Wilson, among several others, have acted as readers and referees, their immense knowledge and expertise allowing us to maintain a solid academic basis to this venture.

Nevertheless, it is the authors to whom a journal is ultimately indebted for its success: we thank all our contributors for making Itinera’s first volume possible. We trust that others will be inspired to maintain and develop this journal, taking note of our mid-November deadline for 2022 copy. Similarly we welcome offers of help for our next volume in terms of reading, reviewing, managing images or digital typesetting.

We look forward to receiving ideas for relevant and authoritative papers, whether from inside or outside the UK.

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THE CAM HIGH ROAD, RR73, AT BAINBRIDGE, WENSLEYDALE, NORTH YORKSHIRE.

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ABSTRACT
The Yorkshire Dales have been described as home to one of the best preserved archaeological landscapes in Europe. Despite this, very little is known about the Roman lines of communication. Of the few known Roman roads, Cam High Road has been called ‘one of the finest in England’; even so, the course it took as it descended into Wensleydale and entered the fort at Bainbridge is unknown. Analysis of the topography, earthworks and historic boundaries in the area through study of LiDAR data, earthwork survey, and historic mapping, have allowed the most likely course of the road to be proposed.

INTRODUCTION
The Pennines are a range of mountains and hills described as the backbone of Britain. They extend from the Midlands in the south beyond the Stainmore gap in the north (Aitkenhead et al, 2002, ix; 1) to the Scottish border and form a significant obstacle dividing the western and eastern sides of northern England.

The rocks of the Pennines are rich in mineral resources, including lead, zinc and coal (Aitkenhead et al, 2002, 4-5). The richest deposits of lead are found in Swaledale and Arkengarthdale (Gill 2004, 57), north of Wensleydale, though the monks of Jervaulx Abbey had rights to work lead mines in Wensleydale in the medieval period (Page 1914, 200-14). Iron was also extensively mined and smelted at this time (Moorhouse 2003, 354). It is believed that Pennine lead, at least, was mined in Roman times (Gill 2004, 52; Gaunt and Buckland 2003, 18).

The Pennines are cut by a series of Dales, deep valleys trending west to east. A Roman fort was constructed in the middle of one of these Dales, now known as Wensleydale, at a location now called Bainbridge (Fig 01). The fort occupies a drumlin of Devensian Till (an egg shaped hill formed by glaciers) in the floodplain of the River Ure, which occupies the Dale. Just to the west of the drumlin the River Bain, a tributary of the Ure, flows to meet it. The
Fig. 1. Left, below and opposite page. Location of Bainbridge in Wensleydale in Yorkshire. Contains Ordnance Survey Data © Crown copyright and database right 2020
Bain is a short river, just 3.4km long from its origin in Semerwater to its confluence with the River Ure. Despite this short length, the Bain's valley, Raydale, is deeply incised and presents a significant obstacle to passage up or down the south flank of Wensleydale (see Fig. 3).

Excavation has suggested that a fort was probably established at Bainbridge cAD80 (Bidwell 2012, 50). The earthworks visible today belong to a second fort constructed cAD85. Significant building work was undertaken by the sixth cohort of the Nervi cAD205-7, including construction of an annex on the eastern side, and the fort remained in service for the remainder of the Roman occupation (Bidwell 2012, 45). With an internal area of 1.1ha the fort is smaller than usual, suggesting a special purpose (Bidwell 2012, 57). The siting of the fort has been linked to the strategic nature of Wensleydale as the principal pass through the Pennines in the area between the much more important passes at Stainmore, c22km to the north, and the Aire gap, c30km to the south (Historic England 2020). However, whether originally established for this strategic purpose or not, it seems more probable that the purpose of the fort was to control and protect the mineral resources of the Pennines and the routes along which they were transported (Bidwell 2012, 58-9).

There is archaeological and documentary evidence that Bainbridge fort remained a focus for occupation beyond the end of the Roman period. Finds from the fort include an Anglo-Saxon glass bead (later 5th - 7th century) (Croom 2012, D35) and 8th - 10th century burials. It is possible that part of the principia was converted into a church at this time (Bidwell 2012, 93-5). However, it was considered that, within the excavated area, the structural remains did not provide any clear evidence for continuity of settlement (Bidwell 2012, 93). However, it has been independently argued from other evidence, including analysis of the pattern of medieval townships centred on the fort, that there is likely to have been continuity of settlement from the end of the Roman period right through to the 12th- or 13th century, when Jervaulx Abbey undertook substantial reorganisation of the area (Moorhouse 2003, 303).

The Dales have been described as containing one of the best preserved archaeological landscapes in Europe (Moorhouse 2003, 293) due to the survival of a rich palimpsest of earthworks that range in date from prehistoric to modern. However, much less is known about how the fort at Bainbridge fitted in to the wider network of communications in Roman Yorkshire (e.g. Bidwell 2012, 47) than might be expected given such a statement. In part this may be due to the intensive agricultural exploitation of the floodplains of the Dales in medieval and later periods. This, combined with rivers that can seasonally be very active, depositing over-bank silts and eroding ground, may mask or obliterate earlier evidence. The lack of knowledge is also likely to be due to the absence of large scale building or infrastructure developments that, through archaeological mitigation conditions imposed on planning consents, have been responsible for revealing so much about the Roman period in the rest of the country over the past few decades.
The easiest lines of communication across the Pennines are east-west, following the Dales. Even today in an age of vehicles driven by powerful internal combustion engines, the main routes through the Pennines run in this direction. Despite this, the known Roman roads in proximity to Bainbridge are to be found mainly on the more difficult high ground between Dales. They are the Cam High Road (Margary RR73), running south-west out of Bainbridge towards Ribblehead then on to the west side of the Pennines; and a recently discovered road (Margary RR732(x)) heading north-east from Bainbridge towards the richest lead ore fields of the region in Swaledale and Arkengarthdale, and perhaps onwards to Greta Bridge (County Durham) (Wilson 2013, 294) or Bowes (County Durham) (Haken 2018). A road said to run south from Bainbridge towards Wharfedale (Margary RR730) (Bidwell 2012, 47) seems unlikely to be Roman (Haken 2017a).

It has also been assumed that there 'must' (e.g. Bidwell 2012, 47) also have been roads running east-west up the Dale. It has been speculated that one linked Bainbridge to the fort at Wensley (e.g. Ottaway 2003, fig 35), further east along Wensleydale (though the two forts may not have been in contemporary use - Bidwell 2012, 50), and then on to join Dere Street, the main road running north from York (Margary RR8). Where this road or roads (designated Margary RR733(x)) are considered to meet Dere Street varies: perhaps at the fort at Healam Bridge (Ottaway 2003, fig 35) or at Catterick, both in the Vale of Mowbray, or somewhere else along the route of Margary RR8 south of Healam Bridge (summarised in Haken 2017b). A road running west, up the Dale from Bainbridge to Mallerstang (Cumbria), has also been suggested (RRRA 2018). While cropmarks hint at a road adjacent to the fort at Wensley (Haken 2017b), there is otherwise no archaeological or LiDAR evidence to support any of the proposed routes, and indeed even the existence of the roads themselves are considered questionable (RRRA 2018; Haken 2017b).

The disposition of the known roads therefore hints that the fort at Bainbridge was more likely located to control the mineral resources of the area (Bidwell 2012, 58-9) than to guard a pass through the Pennines (Historic England 2020).

**The Cam High Road (Margary RR73)**

Cam High Road has been called 'one of the finest specimens of Roman road in England' (Collingwood 1928, 263 cited in Haken 2017a). The alignment of the road on the centre of the fort at Bainbridge (Collingwood 1928, 263) seems to indicate that the fort probably formed one terminus of the route. From here it leaves Wensleydale and ascends the high ground to the south-west on a dead straight course. Approaching Wether Fell the surveyors employed 'a series of short straight lengths, the longest being only a mile, cleverly utilising the topography to make the easiest possible crossing' (Haken 2020). The road continues towards Gearstones in Ribblesdale. This half of the road is considered to be Roman in origin, and 'with the exception of the first short section climbing up from the R. Bain, there is no indication at all of there ever having been any deviation from the current course at any time during the last two millennia' (Haken 2020). The south-western half of the road is much less
clear. John Warburton believed it went to Kirkby Lonsdale (Cumbria) (Warburton 1720), while Margary was less certain but proposed a more south-easterly route, down Chapel-le-Dale and via Ingleton (N Yorks) (Margary 1973). Both the precise route and the ultimate destination, however, are debatable (Haken 2020). In part this may be due to the Richmond to Lancaster turnpike road, which opened in 1751 (YDNPA 2020). Archaeological and documentary evidence suggests that the turnpike was built on top of the existing Roman route over the north-eastern half of Cam High Road, but archaeologists may have been led into erroneously interpreting the route of the turnpike as the Roman road in the south-western half (Haken 2020).

Unlike the north-eastern road from the fort (Margary RR732(x)), which clearly went out of use after the Roman period as it is overlain by traces of medieval agriculture (Wilson 2013, 293), Cam High Road apparently remained in use, being named in medieval documents. Despite the original surface being buried under significant depth of hillwash in parts, it apparently needed only repair and resurfacing when the turnpike was constructed (Haken 2020).

The present study is concerned with the route of the road in that 'first short section climbing up from the River Bain'. Considering the route from the other direction, descending from the fells the road follows a dead straight course until it is c1.3km from Bainbridge. At this point the modern route becomes more sinuous (Fig. 2:a) and the Roman course becomes unclear. The road is not picked up again until near the south gate of the fort. Here a terrace running obliquely up the side of the drumlin to the south gate is believed to represent its course (Bidwell 2012, fig 2). The terrace, which excavation has demonstrated has a metalled surface, has the rather narrow average width of 1.5m (RCHME 2012, D7).

**METHODOLOGY**

The present survey was undertaken in advance of proposed archaeological investigation in the village of Bainbridge by Mercian Archaeological Services CIC. The possible courses of the Cam High Road approaching Bainbridge were assessed via desk-based GIS analysis of LiDAR data and historic map regression, together with limited field survey and observation. The scope of the investigation was limited to the part of the road in proximity to Bainbridge.

Computerised Geographical Information Systems (GIS) are tools for the analysis, storage, retrieval and display of geographic information (Fotheringham and Rogerson 1994, 2). In essence, they allow different spatial data such as historic maps, earthwork survey data, aerial photographs, LiDAR data, etc., to be viewed and interrogated.

LiDAR (Light Detection And Ranging) is a method of remote sensing that employs lasers to determine three dimensional data points (Historic England 2018, 1). It can be used to capture data on a range of subjects, from individual artefacts to whole landscapes. It has been widely employed by the Environment Agency to gather topographic data on the environs of England's waterways. This data has subsequently been made available to researchers (Environment Agency 2020). Due to its sensitivity, when used to capture topographic data,
LiDAR survey also picks up even very subtle earthworks deriving from past human activity as well as natural processes. The Digital Surface Models (DSM) and Digital Terrain Models (DTM) (Wheatley and Gillings 2000, 9) supplied by the Environment Agency were analysed in GIS in the present study. The sources of data were the Environment Agency's 2017 0.5m resolution DSM and the 2019 1m resolution DTM. Different algorithms were employed to visualise and enhance the data. The main methods were perspective modelling, with exaggeration of the elevation (Chapman 2006, 82), used to make the topography and subtle earthworks more visible; and hillshade modelling. Hillshade modelling calculates the aspect and slope of each pixel in the DSM or DTM to determine its reflectance when lit from a given direction and altitude by a virtual light source (Chapman 2006, 81-2). Hillshade models produce an output similar to that of aerial photographs, where even subtle earthworks may be revealed by low angle sunlight, but have the advantage that the 'sun' can be moved to anywhere in the sky, at will, to cast the shadows that best reveal the details of the earthworks: it is even possible to have multiple 'suns' in the sky at once!

The LiDAR DTM was also employed for viewshed analysis. This calculates the intervisibility of points within the model. In the present study it was used to calculate which parts of the possible routes at Bainbridge were intervisible with an observer of a nominal 1.75m height standing on the ground surface in the south-western corner of the Roman fort. The algorithm used was GRASS GIS r.viewshed (GRASS Development Team 2020) While the
technique cannot prove that location 'X' was definitely intervisible with location 'Y' in the past due to a range of factors, not least unknown variables such as former vegetation and subsequent changes in the land surface resulting from fluvial activity and alluviation, for example (Wheatley and Gillings 2000, 5-6), it can at least provide a guide to whether certain areas may or may not have been visible.

These methods were used to assess the possible courses of the road as it approached Bainbridge. The basemaps used to display the data have been digitised from the 0.5m LiDAR DSM, with the 1m DSM used for the areas not covered by the 0.5m data.

THE ROUTES

In order to model the possible routes the road might have taken it is necessary to make some assumptions. Roman roads are often considered to be straight and the Cam High Road is no exception. The series of short, straight segments employed to manage the terrain on the crossing near Wether Fell (Haken 2020) are considered typical of Roman road engineering in the Dales (e.g. Haken 2017a). Because of this it seems to be a plausible hypothesis that a similar approach would have been employed as the road dropped towards the crossing of the Bain: the engineers are unlikely to have used stretches of road curving around contours here if they did not elsewhere on the route. It may also be reasonable to infer that the route was probably planned to ensure changes of direction, and deviation from the 'ideal' straight route, were kept to a minimum.

On these grounds the curving line of the modern road (Fig. 2:s) around Scott Hill can be discounted: this route was in place by the First Edition Ordnance Survey 6" to 1 mile map of 1856 but was probably a relatively recent replacement for the substantial hollow way (Fig. 3:a) running straight down the side of Scott Hill. It is likely to have been built to allow easier access, especially for wheeled vehicles, from the village to the Cam High Road than the hollow way, which would have been impassable at certain times of year. For a similar reason a track, now a public footpath, curving up the other side of this hill, can be discounted. This runs from near Bain House and curves up the hillside on a terrace c4-5m wide, before entering a substantial cutting as it turns west (Fig. 3:b). Its metalled surface is clearly visible today. It too looks likely to have been constructed for wheeled traffic. It is possible that one or other of these roads were part of the turnpike.

With these two roads discounted, and taking the above hypotheses as a starting point, possible courses of the road can be extrapolated from the existing evidence. The possibilities (Fig. 4) are:

- 1) (red) A continuation of the straight part of Cam High Road;
- 2) (blue) A continuation of the line of the causeway running from the south gate of the fort;
- 3) (yellow) A route utilising the earthwork hollow ways.

1) As noted by Collingwood (1925, 263) and others, this route clearly lines up with the centre of the fort. It is likely it represents the 'ideal course' that the road would have taken in the
absence of topographical constraints. However, this route encounters several steep slopes, including a diagonal traverse across the side of a substantial spur of land on which the earthworks of a late Bronze Age Slight Univallate Hillfort (Historic England 2020b) and field systems are located, followed by a steep drop down the side of the valley of the Bain to its floodplain beyond (Fig. 5:a). The drop to the Bain is probably sufficient to make the projected route untenable (Fig. 8:a). Additionally, the traverse across the side of the slippery glacial till slope below the hillfort would almost certainly require the road to be terraced into the hill. While part of this land parcel has been ploughed in the past, the earthworks of the hillfort and field system are still clearly visible, but there is absolutely no sign of a terrace on the projected line.

2) Apart from the slightly different alignment, this route is similar to (1) and is unlikely for the same reasons.

3) This route requires a number of changes of direction in a short space. To minimise these, having reached the flatter ground at the foot of Scott Hill it is projected as heading directly east to cross the Bain. Whether it then continued straight before turning a right angle to
head directly up to the south gate of the fort (as shown) or went diagonally up the causeway is perhaps immaterial. This route at least has some archaeological evidence for its existence. At several points before it reaches Scott Hill the LiDAR shows braided hollow ways which suggest a well-used route ran in the projected direction (Fig. 3). These hollow ways, as well as the curves in the road, which coincide with the heads of small gills running towards Raydale, may represent gradual modifications to a formerly straight route that occurred as traffic sought the easiest path across the terrain in bad weather, once the metalling of the original straight road had deteriorated. The descent down the hollow way is steep (Fig. 5:b), and even without traffic churning up the surface quickly becomes boggy and impassable in wet weather today. The route at the bottom of Scott Hill is speculative as contouring of the modern highway corridor, together with development in the village, has erased all traces of earlier routes. The projected route has been lined up on a linear hollow seen in the LiDAR on the other side of the river, to the south of the fort. This was identified as a possible droveway or track by RCHME (2012 D7:h), though the perpendicular ridge, visible on LiDAR, that appears to go from this track in the direction of the south gate of the fort, seems to have been considered to be part of a field system (RCHME 2012, fig 32). A recent archaeological test pitting investigation in Bainbridge discovered an almost complete later 3rd or 4th century black burnished ware jar, apparently crushed in-situ. This might have come from a cremation or burial, such as might be expected to line the roads outside a Roman settlement (YDNPA 2018, 7). The test pit where the vessel was discovered (Fig. 3:*e) is in line with the
Fig. 5, Profile of terrain along the routes in Fig. 4, and Fig. 6. A: terrain on route 1. B: terrain on route 3. C: Terrain on route D. 'fp' indicates location of floodplain and river crossing; 'F' location of fort. For route C and D '*' denotes change in direction of route. X axis height in metres above Ordnance Datum Newlyn; Y axis distance along route in metres. LiDAR data © Environment Agency copyright and/or database right 2020. All rights reserved.
The earthwork used in this route. This does perhaps suggest that this, rather than the c1.5m wide diagonal causeway, is more likely to be the Roman road approaching the fort.

None of these routes are fully convincing. The evidence does at least suggest that the modern road probably only deviates slightly from the Roman course to the point at which routes 1 and 3 diverge. It is also notable that all the projected routes cross the River Bain at about the same point, approximately 120m upstream of the modern Bain Bridge. The river here is wide and shallow, flowing over the horizontally bedded limestone bedrock, and is relatively easily accessed from the shallow banks. The river narrows and deepens and the banks are steeper both downstream and upstream of this point. This appears to be an ideal place for a ford or bridge; as indeed has already been suggested (RCHME 2012, D7).

If this point is taken as the most likely crossing, it then becomes possible to extrapolate a route between the known points that tackles the terrain in the most efficient manner while also employing the least changes of direction (Fig. 6). Having crossed the River Bain from the fort, the route heads almost due west, passing under or near the site of the present Bain House (Fig. 7:B) until, at a point south of Sycamore Hall (Fig. 7:S), it turns south-west to head up between the eastern flank of Scott Hill and the western flank of the un-named hill to its east, following this alignment without deviation until it joins the 'straight' part of Cam High Road with only a minor course correction.

Fig. 6, Suggested route of the Roman Cam High Road exploiting the slightest gradient and least changes of direction (route D, green). Where the projected line coincides with an historic boundary this is indicated with '+'; where it coincides with earthworks, 'x'. Hillshade azimuth 40°; elevation 40; vertical exaggeration 5. the road is shown ascending the causeway, though it is equally, if not more, likely it ran along the droveway. LiDAR data © Environment Agency copyright and/or database right 2020. All rights reserved
This line represents the most efficient route through the topography (Fig. 5:C); it utilises the first direct passage by which the high ground can be accessed from the vicinity of Bainbridge without encountering severe gradients (Fig. 8), unlike the direct assault on Scott Hill by the hollow way.

There is no trace of an agger on the projected route but there has been significant subsequent disturbance of the ground over much of the projected length. One field was levelled and had a series of land drains feeding a culverted channel installed, while to the north-east an associated pond in the adjacent land parcel, and the stream channel that now runs along the projected route both appear to be artificial; this may be part of a system for concentrating, and perhaps dipping, livestock (J. P. T. Gardner pers com). The construction of this system has certainly obliterated the section of the Scott Hill hollow way that once crossed it (Fig. 3:d), so will presumably also have obliterated the Roman road if it ran here. However, slightly to the north-east of this, historic mapping depicts some curious field boundaries (Fig. 9). These seem to form an hourglass or funnel shape, and include one unusually small, strangely shaped former land parcel (Fig. 9:a). Its small size and location, almost entirely on the slope of a hill, would seem to make it of limited use for agricultural
Fig. 8, 3D view of terrain with vertical exaggeration factor of 3, showing possible courses of road. Above, looking south-west from near the village; Below, looking north-east, towards the fort. Note how the undulations caused by the gills running towards Raydale are likely to have produced the deviation in the road. Also note the severely eroded track or agger (arrowed, also see Fig. 3:* ) avoiding the gills by traversing the western slope; LiDAR data © Environment Agency copyright and/or database right 2020. All rights reserved
purposes. The north-western and northern boundaries of this particular parcel run along linear earthwork terraces. These are now c.3 - 4m wide and do not appear to be metalled, though they may have been wider originally and any metalling is likely to be buried by colluvium (hill wash); even though the field is currently pasture the numerous small land slips visible in its surface indicate there is ongoing soil movement, while the current land owner was told by his father that part of the barn at the top of the slope once fell down the hill due to the unstable hill side.

These terraces seem to coincide with the line of the proposed road. The unusual boundaries that appear to form an hourglass shape (Fig. 9:b) might be a relic of a system used to funnel livestock at the end of a droveway, perhaps when moving them from the high pastures down to the village. If so it had certainly gone out of use by the 19th century, but either way its strange alignment, at odds with the general east-west grain of the settlement, seems likely to have been conditioned by earlier features. Given the evidence that seems to suggest continuity of settlement in the area, and the line of the Cam High Road surviving to be re-used when the turnpike was constructed, it is not impossible that these features could have been laid out in relation to traces of the Roman road, even if the precise course was, by this time, no longer in use.

Fig. 9, Extract from Ordnance Survey 6" to 1 statute mile map of Yorkshire, sheet 66, surveyed 1854 and published 1856. a - small land parcel on hillside. b - possible gateway with funnel shape. Projected line of route D shown in green.
It is also of interest that part of the settlement in proximity to the suggested river crossing has a rather amorphous form on historic maps, in clear contrast to the regular linear row plan (Roberts 1987, 24-9) of the medieval tofts and crofts arrayed around the village green to the north. It may be that this piece of amorphous settlement arose as a result of later expansion to the south of the planned medieval settlement. However, it does contain one candidate for the site of the medieval manor house of Bainbridge, Bain House, and is also the site of one of the mills. Though the present mill is post-medieval it may have earlier origins, since the manor of Bainbridge is recorded as having had a water mill in the medieval period (Page 1914, 200-14). Amorphous areas of settlement like this often prove, on excavation, to represent early (often pre-Norman) foci, to which more regular, planned looking (see Dyer 2002, 21-3) settlement (such as the linear tofts and crofts extending from the roads around the green at Bainbridge), may be added in the medieval period (for example at Hilton, Derbyshire: Budge and Gaunt 2017, 124-5). The possible juxtaposition of mill and manor house is also of note: mill and manor house often had close relationships, forming a 'magnate core' (Creighton and Barry 2012, 75) in many medieval settlements. Examples such as the manorial complex at West Cotton, Northamptonshire (Chapman 2010, 36), demonstrate that this relationship had already been established before the Norman conquest. Given the evidence that early medieval settlement was present in the area, centred on the fort and its environs, it seems plausible that this part of the settlement might represent an early focus, pre-dating the establishment of the planned village (which was probably laid out in the mid / late 12th century: Page 1914, 200-14). The location, adjacent
to the old Roman crossing of the River Bain and on or beside the Roman road, would be ideal for such a settlement.

Such reasoning does risk creating a circular argument, however, where the presence of the Roman road and river crossing can be used to support assertions of an early pre-Norman settlement focus, which itself can be seen to amplify the hypothesis that the Roman road and river crossing were close by, but all without archaeological proof of either!

Indeed, this leads to a final consideration: Is the Cam High Road leading out of Bainbridge actually a Roman road at all? The extensive earthworks of hollow ways and terraces (Fig. 3) indicate that people have repeatedly been accessing the high ground south-west of the village via, and around, Scott Hill, for a long time. However, it may be that these are post-Roman routes used by the villagers to get to and from the high pastures, situated above the village, rather than through routes. Warburton, actively seeking Roman roads in the early 18th century before the turnpike was constructed, mapped the stretch approaching Bainbridge as uncertain (Haken 2020). This does not seem to be the hallmark of a surviving clearly visible straight road aligned on the fort. Might we be looking for aggers in the wrong place, and instead of turning south-west in proximity to Bainbridge, could it be that the road remained on the floodplain, running westwards up the Dale for a distance before turning south-west further on, as Warburton suggested or might it have employed the very Roman looking route traversing the western slopes of the hill (fig 3:*)?

The alignment of the road on the fort in itself need not necessarily indicate a Roman date (the drumlin would, for instance, be an ideal location for an 18th century turnpike surveyor to set up to get the best all around views in proximity to Bainbridge). However, if the fort was indeed required to guard the transport network of the area from a 'disaffected and troublesome' local population (Bidwell 2012, 59) it is likely that ensuring the road was visible from the fort for as much of its length as possible was an important consideration. Due to the topography the views westwards from the fort, up the Dale, are limited. Viewshed analysis (Fig. 10) suggests that, if keeping the road in sight was an important consideration, then it could not have progressed much further west while remaining in sight. If this assumption is correct, it would provide tentative corroboration that the road probably did turn south-west somewhere around Scott Hill, and that the line of Cam High Road is probably Roman.

**CONCLUSION**

Analysis of the topography and historic boundaries has indicated that the Roman course of the Cam High Road near Bainbridge could not simply have been a straight line between the south gate of the fort and the straight part of the road on the high ground to the south west. While a probably medieval route, represented by a series of hollow ways, might broadly follow the course of the Roman road, this also seems unlikely due to the direct assault on a steep hill that it makes. The most probable route is more direct, requiring few changes of alignment. It makes use of the topography to descend to the floodplain of the Bain by the most efficient route, a route which also has the shallowest gradient of all the possibilities. It
is projected to cross the River Bain at a point where the river is today wide and shallow and easily accessible from the banks, an ideal location for a bridge or possibly a ford. That this was an existing route might help explain some otherwise unusual relict boundary features displayed on old maps. There are also tentative hints that an early, perhaps pre-Norman conquest, focus of settlement at Bainbridge may have been established on the road adjacent to the river crossing.

However, the proposed route is at present no more than a hypothesis and as such it should be tested. Only by further investigation can it be proved, or disproved. It is hoped that it may be possible, in the near future, to undertake excavation across part of the potential route.

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