



Pednormead End River Restoration Scheme Chesham, Buckinghamshire

Photographic Survey and Archaeological Watching Brief



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Summary

Wessex Archaeology was commissioned by Buckinghamshire County Council to undertake a photographic survey and archaeological watching brief prior to, and during, the restoration of a 150 m reach of the Missenden Stream at Pednormead End, Chesham, Buckinghamshire, HP5 1JW centred on National Grid Reference 495511 201338.

The works comprised a Level 2 photographic survey of the watercress beds and any associated infrastructure, particularly the two weirs (Weirs 1 and 2) as well as a short account of the watercress industry. Following the photographic survey, the groundworks, particularly the digging of a new, deeper channel, were monitored by an archaeological watching brief.

The photographic survey was undertaken on 21st December 2017 and the watching brief was carried out between 29th January and 1st February 2018.

The groundworks were very shallow and confined to the river channel. This limited the opportunity to reveal archaeological evidence, although a mortared brick surface was uncovered approximately 25 m east-north-east of Weir 1. This corresponds to a gap in the river depicted on the 1843 Tithe and later 19th century Ordnance Survey maps and is labelled as a footbridge on the 1963-64 Ordnance Survey map. In addition, unstratified burnt flint and fragments of post-medieval pottery were recovered from the field north of Weir 2 as well as modern artefacts found within the topsoil of the river channel.

Watercress production on an industrial scale began in the early 19th century and grew rapidly in the mid-19th century as railways made transportation to town markets more efficient. Photographs available online appear to show that 19th century watercress beds were initially constructed of wood, superseded by concrete structures in the 20th century.

Structures associated with watercress production include beds, bunching sheds, reservoirs for storing the fresh cress and some sites had their own rail tracks. However, no evidence of structures definitively associated with the watercress industry were found on Site during the photographic survey or watching brief.

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The fieldwork was carried out by Grace Flood and Michal Cepak. This report was written by Grace Flood. The project was managed on behalf of Wessex Archaeology by Matt Rous.



Pednornead End River Restoration Scheme Chesham, Buckinghamshire

Photographic Survey and Archaeological Watching Brief

1 INTRODUCTION

1.1 Project background

- 1.1.1 Wessex Archaeology was commissioned by Buckinghamshire County Council (BCC) to undertake a photographic survey and archaeological watching brief prior to and during the restoration of a 150 m reach of the Missenden Stream at Pednornead End, Chesham, Buckinghamshire, HP5 1JW centred on National Grid Reference (NGR) 495511 201338 (**Figure 1**).
- 1.1.2 The Missenden Stream is a tributary of the River Chess which is one of a number of chalk streams that rise in the Chiltern Hills. Historically, the river channel of the Missenden Stream in this location has been extensively modified having been widened, deepened and impounded by two concrete weirs (both of which are situated in the grounds of the Tennis Club). As a consequence, flow, when present, is sluggish and the reach acts as a sink for sediment, which overlies much of the gravel bed especially on the upstream side of the weirs and adjacent to the tennis courts, where the channel is at its widest.
- 1.1.3 The restoration work included the complete removal of Weir 2, excavation of a narrower channel between Weir 1 and Weir 2 and tree consolidation work to prevent shading of the new channel by existing trees and ensure that vegetation quickly colonises the newly created marginal areas between the two weirs.
- 1.1.4 By carrying out this restoration work it is anticipated that this section of the River Chess will be restored to a more “natural” state and allow the natural chalk stream processes to re-create habitat. Once the habitat is created there will be the opportunity for the natural flora and fauna to come back to this reach of the River Chess.
- 1.1.5 Advice from Eliza Alqassar, Archaeology Officer at BCC (AOBCC), on 04/07/17 indicated that the River Chess at Pednornead End in Chesham passes through an area of archaeological potential. A possible Roman villa site is located close to the confluence of the two river channels to the east of the tennis courts. Hundreds of fragments of Roman pottery and tile from this area suggest that a high-status Roman villa or farm was located in the vicinity. In addition, the watercress beds alongside the River Chess are of archaeological and historic interest. The watercress industry was a by-product of the coming of the railways, which allowed fresh cress to be transported rapidly to London. Watercress beds are a fragile and depleting resource along the chalk streams of the Chilterns. They were recorded as part of the Chilterns Chalk Streams Project of the Chess and Misbourne Valleys (Archaeological Services and Consultancy, 2001). An area of watercress beds covering 150 m x 50 m has been recorded alongside the River Chess at Pednornead End.
- 1.1.6 Given the archaeological and historic interest of the site, the AOBCC recommended that a photographic record and short report on the watercress industry be produced prior to groundworks. This to include a basic, Level 2 photographic survey of the watercress beds and any associated infrastructure, particularly the two weirs. In addition, the AOBCC recommended that groundworks, particularly the digging of the new channels, should be



monitored by an archaeological watching brief in order to allow for the rapid recovery and recording of archaeological material if it is uncovered.

- 1.1.7 The photographic survey and watching brief were undertaken in accordance with a written scheme of investigation (WSI) which detailed the aims, methodologies and standards to be employed (Wessex Archaeology 2017). The WSI was submitted for approval to the AOBCC prior to the commencement of fieldwork. The photographic survey was undertaken on 21st December 2017 and the watching brief between 29th January and 1st February 2018.

1.2 Scope of the report

- 1.2.1 The purpose of this report is to provide the results of the photographic survey and watching brief, to interpret the results within their local or regional context (or otherwise), and to assess their potential to address the aims outlined in the WSI, thereby making available information about the archaeological resource (a preservation by record).

1.3 Location, topography and geology

- 1.3.1 The Site comprises an approximately 150 m section of the Missenden Stream which flows through part of the Great Hundridge Manor Estate, bordering Chesham Tennis Club in Chesham, Buckinghamshire, centred on NGR 495511 201338 (**Figure 1**).
- 1.3.2 The river channel in this location has been extensively modified historically, having been widened, deepened and impounded by two concrete weirs, one of which is situated in the grounds of the Tennis Club. At the upstream end of the site, there is a small weir (Weir 1 on **Figure 1**) which may have been constructed originally to enable watercress growing in the river and the side tributary, upstream. The purpose for the construction of Weir 2 is less clear, although it may have been connected to watercress growing. Much of the modification of the river appears to have been carried out in the early 20th century, although the weirs are not labelled on any maps until 1963.
- 1.3.3 The topography of the immediate Site is relatively level due to its situation within a river valley bottom at a height of 102 m above Ordnance Datum (aOD). Away from the Site, the land to the north-east slopes gently up to 103 m aOD along Church Street (B485) and more steeply to the north-west along Drydell Lane which descends from a height of 122 m aOD. Across the Missenden Road to the south-west, the land slopes gently upwards to a height of 107 m aOD.
- 1.3.4 The underlying geology throughout the Site is mapped by the British Geological Survey as Holywell Nodular Chalk Formation and New Pit Chalk Formation formed during the Cretaceous period. The bedrock geology is overlain to the west by superficial Quaternary River Terrace Deposits Head - Clay, Silt, Sand and Gravel and to the east by Alluvium - Clay, Silt, Sand and Gravel (British Geological Survey website).

2 AIMS AND OBJECTIVES

2.1 Aims

- 2.1.1 The aims or purpose of the archaeological recording programme, in line with the ClfA Standard and guidance for archaeological investigation and recording of standing buildings or structures (ClfA 2014a) and ClfA Standard and guidance for an archaeological watching brief (ClfA 2014b) are to:
- Establish the character, history, dating, form and development of the watercress beds and associated infrastructure, particularly the weirs;



- Provide information about the watercress industry to put the Site in context, specifically its development in the local area and
- Provide a better understanding of the watercress beds and associated infrastructure on Site (where possible within the confines of the works), compile a lasting record, analyse the findings/record and then disseminate the results.
- To allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of the development or other works;
- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard; and
- To guide, not replace, any requirement for contingent excavation or preservation of possible deposits.

2.2 Objectives

2.2.1 In order to achieve the above aims, the objectives of the Level 2 photographic record, defined in the WSI (Wessex Archaeology 2017), were:

- To make a descriptive record of the watercress beds and associated infrastructure (particularly the weirs); and
- To make available the photographic survey and descriptive record via a report (and if warranted publication) and the project archive.

2.2.2 The objectives of the watching brief, also defined in the WSI (Wessex Archaeology 2017), were:

- To determine the presence or absence of archaeological features, deposits, structures, artefacts or ecofacts within the specified works area;
- To record and establish, within the constraints of the works, the extent, character, date, condition and quality of any surviving archaeological remains (a preservation by record);
- To place any identified archaeological remains within a wider historical and archaeological context in order to assess their significance; and
- To make available information about the archaeological resource on the site by preparing a report on the results of the watching brief.

2.2.3 The results of the photographic survey, descriptive record and watching brief will be presented together in this report.

3 METHODS

3.1 Introduction

3.1.1 All works were undertaken in accordance with the detailed methodology set out within the WSI (Wessex Archaeology 2017) and in general compliance with the standards outlined in ClfA guidance (ClfA 2014a and b). The methods employed are summarised below.



3.2 Level 2 Photographic Record

Documentary research

- 3.2.1 Documentary research for the Site was undertaken at the Centre for Buckinghamshire Studies and Buckinghamshire Historic Environment Record (on 13th December 2017), which held a copy of *Chilterns Chalk Streams Project of the Chess and Misbourne Valleys archaeological assessment report* (Archaeological Services and Consultancy 2001). A selection of historic mapping illustrates this report in the form of a map regression.
- 3.2.2 With the exception of historic mapping, a search for relevant material held at the Centre for Buckinghamshire Studies found no information relating to the history and development of the Site. However, an online search did uncover some useful information about the watercress industry including a journal article about watercress cultivation dated 1822 (Ker, 537-542).

Written record

- 3.2.3 This report includes a descriptive account of the watercress beds and associated infrastructure (particularly the weirs), commensurate with the requirements of a Historic England Level 2 record (Historic England 2016). This comprises:
- The Site's location (NGR and address);
 - Any statutory or non-statutory designations;
 - The date of the record, the names of the recorders and, the location of the archive;
 - Description of the visible watercress beds and associated infrastructure including materials, evidence of repair, alteration or adaptation
- 3.2.4 As recommended by the AOBCC, the report also includes information about the watercress industry, to put the site in context.

Photographic record

- 3.2.5 A photographic record was compiled of the watercress beds and associated infrastructure (particularly the weirs) and comprised:
- A general view or views of the watercress beds (where visible) in their wider setting or landscape
 - The external appearance of infrastructure associated with the watercress beds (particularly the weirs). This comprised a series of oblique views to show all external elevations of the structures (where possible), in order to give an overall impression of the size and shape of the features. Photographs were to be taken at right-angles to the plane of elevation where necessary to record complex historical information.
 - Any structural or decorative detail of the infrastructure associated with the watercress beds, which was relevant to their design, development or use and which would not show adequately on general photographs
- 3.2.6 The photographic record comprised high-quality digital format taken with a Canon EOS MkIII full frame digital camera (with 21 megapixel capability). All photography complied with Historic England guidance (Historic England 2015b and 2016).
- 3.2.7 A photographic scale of an appropriate size was included in all general and detailed views (access/health and safety concerns permitting). The location and direction of photographic views was recorded on copies of the site plan. Accompanying photographic registers



recorded, as a minimum, the direction of the view and a brief description of the subject and location.

Survey and drawn record

- 3.2.8 The site plan comprising current Ordnance Survey mapping forms the drawn record of the Site, together with metric survey plan of features recorded during the archaeological watching brief (details in section 3.3). The site plan shows the location of photographic plates used in the report.

3.3 Archaeological watching brief methodology

General

- 3.3.1 The watching brief methodology was outlined in the approved WSI (Wessex Archaeology 2017).
- 3.3.2 The archaeological watching brief consisted of the monitoring of groundworks carried out by contractors during the restoration of a 150 m reach of the Missenden Stream at Pednormead End, particularly the digging of the new channel.
- 3.3.3 As per the draft method statement for the restoration project (Beechey 2017, 5) Weir 2 was completely removed using a small 360° Excavator and a rock pecker, working from within the channel.
- 3.3.4 Concrete rubble from weir 2 was spread along a section of the left bank (when facing downstream) between the two weirs, i.e. the west bank near the tennis courts. The channel was cleared starting from a point *circa* 25 m north-east of Weir 1. Excavation within the channel was not very intrusive, ranging from 0.02 m to 0.3 m in depth.
- 3.3.5 The monitoring archaeologist monitored all mechanical excavations within the specified area. Where necessary, the surface of uncovered archaeological deposits were cleaned by hand.
- 3.3.6 Spoil derived from both machine stripping and hand-excavated archaeological deposits was visually scanned for the purposes of finds retrieval. Where found, artefacts were collected and bagged by context. All artefacts from excavated contexts were retained, although those from features of modern date (19th century or later) were recorded on site and not retained.

Recording

- 3.3.7 All exposed archaeological deposits and features were recorded using Wessex Archaeology's pro forma recording system. A complete drawn record of excavated features and deposits was made including both plans and sections drawn to appropriate scales (generally 1:20 or 1:50 for plans and 1:10 for sections), and tied to the Ordnance Survey (OS) National Grid. The Ordnance Datum (OD: Newlyn) heights of all principal features were calculated, and levels added to plans and section drawings.
- 3.3.8 A Leica GNSS connected to Leica's SmartNet service surveyed the location of archaeological features and the extent of excavated area. All survey data is recorded in OS National Grid coordinates and heights above OD (Newlyn), as defined by OSGM15 and OSTN15, with a three-dimensional accuracy of at least 50 mm.
- 3.3.9 A full photographic record was made using digital cameras equipped with an image sensor of not less than 10 megapixels. Digital images have been subject to managed quality control



and curation processes, which has embedded appropriate metadata within the image and will ensure long term accessibility of the image set.

3.4 Artefactual and environmental strategies

3.4.1 Appropriate strategies for the recovery, processing and assessment of artefacts and environmental samples were in line with those detailed in the WSI (Wessex Archaeology 2017). The treatment of artefacts and environmental remains was in general accordance with: Guidance for the collection, documentation, conservation and research of archaeological materials (ClfA 2014c) and Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (English Heritage 2011).

3.4.2 No environmental samples were collected during the watching brief and no artefacts were retained.

4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

4.1 Introduction

4.1.1 This section has been informed by the Chilterns Chalk Streams Project archaeological assessment report (Archaeological Services and Consultancy 2001). Other resources (found online), include a journal article from the Transactions of the Horticultural Society of London (Ker 1822, 537-542), historic mapping and photographs.

4.2 Summary of the development of the Site

4.2.1 There is sparse evidence of prehistoric activity in the Chess valley. Flint artefacts have been recovered from the valley bottom, and evidence of flint working found at three sites in Latimer (approximately 5.4 km south-east of the site; *Ibid.*).

4.2.2 In the Romano-British period it appears the main type of activity in the Chess valley can loosely be described as villas settlements. The Archaeology Advice from the AOBCC included information from the Buckinghamshire Historic Environment Record (HER). The project area includes or lies within the context of four heritage assets dated to this period:

- Possible Roman villa or settlement site in the vicinity of Dawes Close (HER ref. 0191600001);
- Roman pottery, Roman tile and medieval pottery found at 14 and 15 Germain's Close (HER ref. 0191300000);
- Roman rubbish pits found digging at Rackleys (HER ref. 0191500000); and
- Roman pottery found to rear of 23 Missenden Road (HER ref. 0190100000)

4.2.3 Medieval activity within the Chess valley appears to have focussed on the exploitation of water resources. Common meadows close to the floodplain of the main streams were used for pasture and water mills along the chalk streams. However, the archaeological assessment found no comprehensive study of these structures or associated topographical features including leats, mill ponds and sluice gates (*Ibid.*). The HER has identified no such features within the project area.

4.2.4 The development of irrigation systems for controlling and channelling water flow across valley grasslands was an important 17th century innovation that enabled the creation of water meadows within the Chess valley. This probably reached a peak in the mid-19th century (*Ibid.*).



- 4.2.5 In the mid-19th century, the advent of the railways provided a faster, more efficient transport system that was a catalyst for the development of the watercress production industry. In Buckinghamshire, freshly cut cress could be exported rapidly to London, where there was a large market and demand for the product (ibid).
- 4.2.6 The area of the Site is identified in the 1843 Chesham parish Tithe apportionment as 'Long Meadow'. The 1878 Ordnance Survey (OS) map shows the course of the stream with several gaps in it, some of which are labelled as F.B. (footbridge) on various later mapping. The label 'watercress beds' appears on the 1898 OS map only (**Figure 2A**), upstream approximately 180 m to the south-west of Weir 1.
- 4.2.7 In addition to the watercress beds labelled approximately 180 m upstream (south-west) of the Site, the 1898 OS map identifies more watercress beds approximately 330 m north-west of the Site on the west side of Pednor Road. A spring is also identified approximately 620 m south-west of the location of Weir 1.
- 4.2.8 The historic mapping shows that Weirs 1 and 2 are first labelled on the 1963-64 OS map as a weir and sluice respectively, which suggests they were constructed between 1925 and 1963 (**Figure 2B** and **C**). The tapered plan form of Weir 2 is evident on the map. Another weir is labelled downstream of Weir 2 in line with a plot boundary, but this structure either no longer exists or the label was in error. A gap in the stream located downstream of Weir 1 is depicted on all the OS maps consulted (1878-1963) and labelled on the 1963 OS map as a footbridge.
- 4.2.9 The 1963 OS map shows that the northern part of the Site, land immediately to the north and the watercress beds previously identified 330 m north-east of the Site had all been developed as a poultry farm with a series of small rectangular plan buildings labelled as Poultry Houses. The six structures closest to the stream, first appear on the 1960 1:10,560 OS map. while the other poultry houses appear to have been constructed between 1960 and 1963. The land 180 m upstream (south-west) of the Site previously identified as watercress beds remained undeveloped, so it is possible these beds remained in use.
- 4.2.10 As well as the weirs already mentioned, two more are labelled upstream of the Site on the 1963 and 1976-78 OS maps.

4.3 The Watercress Industry

- 4.3.1 In Buckinghamshire, the Chilterns Chalk Streams Project archaeological assessment identified 15 watercress production sites in the Chess and Misbourne Valleys, of which 14 have been abandoned. The Site lies within section 2/2 of the River Chess identified in the assessment. The historical and archaeological profile of this section is described as 'Watercress beds in evidence covering an area approximately 150 m x 50 m.' (Archaeological Services and Consultancy 2001, 44).

Establishment and method of production

- 4.3.2 The commercial cultivation of watercress rose to prominence in the 19th century, especially in and around London as there was a demand for the product in the London markets.
- 4.3.3 Although not located in Buckinghamshire, there is an early 19th century account of the cultivation of watercress approximately nine miles to the south-east at West Hyde near Rickmansworth, Hertfordshire (Ker 1822, 537-542). The watercress was grown by Mr Bradbery, who had begun to cultivate the plant in 1808 at Northfleet-Spring head, near Gravesend, Kent before moving to Hertfordshire circa 1820. Bradbery was not aware of

anyone cultivating watercress (as opposed to gathering it wild) before he began planting it in 1808. The process of cultivation is described as follows:

Young plants were placed in shallow running water with a small proportion of earth in which they grew. It was found that the plants grew better when placed in rows parallel with the course of the stream, as well as being easier to weed and harvest. The optimum space between each row varied with the depth of the water, about 18 inches apart in shallow water compared to perhaps five, six or seven feet apart in deep water. The plants were found to thrive best in shallow water 1 ½ to 3 inches deep and up to 4 or 5 inches in Winter. It was necessary to site beds in a constant current and fresh water, such as close to spring sources. Placing beds in areas that rarely froze meant watercress could continue in vegetation through the Winter.

It was necessary to clear out and replant the beds twice a year to free the cress of mud and weeds that impede its growth and negatively impact its flavour. The cleared mud was replaced by gravel or chalk. Bradbury renewed his beds between May and June and September to October. Watercress planted in May was ready to harvest in August and those planted in November were gathered in the Spring. All the rows of plants starting at the stream head were removed, then the stream was cleared of mud and rubbish (which could be used as manure). The youngest of the plants and those with most roots were selected for replanting. These were placed on the gravel in rows and weighted down with a stone to keep them in position.

The cut cress was packed and sent to London in hampers each holding eight dozen bunches of cress. This occurred six days a week, i.e. three days to Covent Garden market and three days to Newgate market. As well as the watercress beds in Rickmansworth, the article also identified two establishments for the cultivation of watercress beds in the neighbourhood of Hackney at Himmerton and Hackney Wick that had been recently planted (circa 1818-1822) and supplied Spitalfields market (ibid).

- 4.3.4 The development of the railways was an important factor in the growth of the industry as it provided a faster more efficient means of transporting the cress to market. The neighbouring county of Hertfordshire is well known for the trade where cress was grown along chalk rivers and streams such as the Rivers Colne and Gade. The watercress was transported by cart to railway stations for sale in London markets such as Covent Garden. In Hampshire, the Mid-Hants Railway, opened in 1865 between Alton and Winchester is known as the Watercress Line because it was frequently used to transport locally grown watercress to Alton and then into London (Mid-Hants Railway website).
- 4.3.5 Alongside the development of the railways, rising labour costs and competition from international market and improved refrigeration techniques, meant that British farmers were turning to the production of perishable items, such as dairy goods, or fresh fruit and vegetables that could not be frozen (Barnwell and Giles, 1997, 6). Some water meadows were converted to more profitable cress production at this time (Collins, 2000, 1684, cited in Archaeological Services and Consultancy 2001).
- 4.3.6 Some watercress beds (one identified on the Misbourne river) had their own rail track so they could transport the produce to local stations and then to London (M Stoud pers. comm. cited in Archaeological Services and Consultancy 2001). However, it is not known whether this was a common feature of watercress production. Cartographic evidence available online shows no evidence of a railway track on Site (1843 Chesham Tithe map and Ordnance Survey (OS) maps dated 1878, 1898, 1925 and 1963).

- 4.3.7 The watercress industry was not solely confined to the area around London. For example, farms in Dorset operated by the Watercress Company have grown watercress since the 1850s. Their website includes photographs of Doddings Farm, Bere Regis dated 1900-1960 and audio description by William Jesty, who was part of the Bedford and Jesty Company that produced the watercress. One photo shows new watercress beds *circa* 1900 constructed with timber piles and boards, filled with clay and gravel to contain spring water extracted from artesian boreholes. In a separate spring water washing gully, watercress was washed trimmed and packed into ‘flats’ (flat wicker baskets) to be transported overnight by rail to northern markets, particularly Liverpool and Manchester. Another photo at Doddings Farm dated to the early 20th century depicts an 18-inch gauge railway, which was built to transport the harvested watercress from the beds to bunching sheds; this task previously carried out by horse and wagons. After the Second World War, a fleet of vehicles replaced the horse and carts that had previously been used to transport the watercress to the railway station. A 1950s photo shows the first harvest of the year when the crop was trimmed in the field before it was washed, further trimmed and sorted into bunches in the bunching shed. The baskets of bunched watercress were then ejected through holes in the shed walls into a concrete reservoir of flowing spring water and left there until required for loading. By 1961, the timber walls of the watercress beds at Doddings Farm had been replaced by concrete ones.
- 4.3.8 Other historic images of watercress production available online include 1930s photos of watercress being gathered from timber-walled beds at Park Street, Sopwell in St Albans, Hertfordshire (Sopwell memories website) and at Rye House, near Hoddeston in Hertfordshire. These show timber boards on piles that appear to be walkways and people gathering the cress knelt on planks suspended between the bed walls (Hertfordshire genealogy website). 1955 photographs of watercress beds in Riverside Road, Sopwell (Sopwell memories website) and at East Hyde, Bedfordshire (Harpenden history website) show a similar arrangement of timber pile and plank walkways. There are also undated photos of timber-walled watercress beds at Cassiobury Park, Watford and Croxley Hall Farm, Rickmansworth (Hertfordshire genealogy website). The latter shows men planting watercress cuttings while balancing on planks suspended between timber walkways.
- 4.3.9 Photographs of active watercress beds at Ewelme, Oxfordshire show the beds subdivided into pools/reservoirs by a series of concrete dams fitted with sluice gates at intervals to control the flow and depth of water (Wattle and daub blog, Visit Midsomer, The Chilterns AONB websites). A 2012 photo of watercress beds at Alresford, Hampshire depicts curving concrete block walls around the edge of a bed with a sluice fitted in a gap to control the flow of water (Geograph website).

Industry decline

- 4.3.10 The condition of the watercress is highly dependent on the quality of the water it grows in, so rising pollution levels (such as from increasing numbers of road vehicles) were a problem. For example, an article from the Hemel Hempstead Gazette dated 16 May 1914 describes watercress beds allegedly damaged by tar washed from the roads (Hertford Genealogy website). In another example, watercress industry along the Wandle had expanded slowly during the latter half of the 19th century, but by the 1950s only a few beds remained. Its reputation was damaged by a 1930s typhoid outbreak in Croydon, where a lot of the cress was sold. Also, as the suburbs around London (and presumably other towns and cities) grew, there was more profit to be made by draining the land for housing developments (London Borough of Sutton website).
- 4.3.11 It appears that watercress beds to the north-east, and possibly those south-west of the Site were abandoned by the 1960s in favour of poultry farming, with poultry houses and

enclosures depicted on the 1963 OS map. The reason for this change of use is uncertain; perhaps poultry farming was a more profitable use of the land.

5 PHOTOGRAPHIC SURVEY

5.1 Introduction

5.1.1 The photographic survey was carried out on 21st December 2017, at which time the Missenden Stream was dry (**Plates 1-3**). Although the weirs were largely free of vegetation, some parts were covered by moss and other ground-cover plants. Some of this vegetation was pulled away to ascertain the extent of the structures, but it was not possible and beyond the scope of the survey to remove this vegetation in its entirety. Therefore, some parts of the weir structures remained obscured. It is possible that more of the structures will be revealed during the archaeological watching brief, particularly Weir 2 which is to be removed.

5.1.2 Description

5.1.3 Apart from the two weirs, no other structures potentially associated with watercress production were positively identified. However, watercress production favours wide, shallow streams near to fresh spring water and where the depth of water can be controlled. The stream on Site (when not dry) meets these criteria (note **Plate 2**) and it is possible that the stream was landscaped to improve conditions for watercress production.

5.1.4 As previously stated, historic mapping indicates that Weir 1 and 2 appear to have been constructed at some point between 1925 and 1963 and their form, fabric and appearance is consistent with a mid-20th century date.

5.1.5 Weir 1, centred on NGR 495435, 201275, was a linear structure orientated approximately north-west to south-east (**Plates 4-6**). It was constructed of shuttered concrete aggregate with stone and brick building rubble inclusions (**Plate 6**). Also, a bent, iron nail was noted protruding from the west face of the structure. On the downstream (north-east) side of the weir was a sloping concrete apron. Parts of the weir had been damaged where lumps of aggregate had weakened and broken off, so the surfaces and edges of the weir were uneven and worn. The extent of Weir 1 (visible at the time of the photographic survey) measured 8.7 m in length by 0.54 m in width and 0.46 m in height. The concrete apron measured 0.3 m wide and joined the main body of the weir at a point 0.4 m from its top.

5.1.6 Weir 2, centred on NGR 495541, 201343, was a linear concrete structure orientated north-east to south-west, with a brick and concrete wing wall that extended upstream on the south-west bank (**Plates 7-11**). The main body of the Weir tapered towards its centre where there was a gap with wider slot, probably for a small sluice gate (not present; **Plate 10**). Vertical grooves within the gap, downstream of the slot suggested there was formerly a secondary gate (again not present). Inside the gap, the weir stepped down to the south-east (downstream; **Plate 11**)

5.1.7 The main body of Weir 2 measured 8.4 m in length and 0.49 m in height. The central gap measured 0.36 m to 0.56 m. Either side of the gap the width of the main body increased from 0.74 m to 1.76 m.

5.1.8 The wing wall of Weir 2 was substantially obscured by vegetation (**Plate 9**). It comprised two sections. The section that joined the main body of the weir was constructed of red brick and measured 4.75 m in length, 0.37 m in width and 0.4 m in height, with five courses of brickwork visible. Due to vegetation cover, it was not possible to see if the bricks were laid



in a specific bonding pattern. The second section of the wing wall continued on the same alignment as the brickwork, but was constructed of concrete. This concrete section measured 1.5 m in length, 0.1 m in width and 0.18 m in height. Therefore, the total length of the wing wall is 6.25 m.

- 5.1.9 Weir 2 was demolished on 29-30th January 2017. The concrete comprising the main body was very hard and full of flint inclusions. The foundation of the main body was estimated as 0.3-0.4 m in depth.

6 ARCHAEOLOGICAL RESULTS

6.1 Introduction

- 6.1.1 Information about Weir 2 recorded during the archaeological watching brief has been incorporated into the description above (section 5).
- 6.1.2 As previously stated, excavation within the river channel was limited and shallow in nature. Artefacts found within the topsoil of the channel were modern and not retained.
- 6.1.3 The only archaeological feature observed was a brick surface (context 104) of probable early 19th century date revealed within the channel approximately 25 m east-north-east (downstream) of Weir 1. Its location appears to correspond to a gap in the stream depicted on the 1843 Tithe map and later Ordnance Survey (OS) maps of 19th and 20th century date. The gap is labelled as a footbridge (F.B.) on the 1963 OS map.

6.2 Soil sequence and natural deposits

- 6.2.1 Groundworks were confined to the river channel and its banks between the two weirs (**Figure 3**). This included cleaning the channel of vegetation and the excavation of a shallow strip in the centre of the river course, identified as Trench 1. Excavations were undertaken by a 1.5 tonne mini-digger with toothless bucket.
- 6.2.2 Following the course of the stream, Trench 1 formed an irregular 'S'-shape in plan that extended from Weir 2 in the north-east, almost all of the way to Weir 1 to the south-west, **Figure 3** and **Plate 12**. It measured approximately 118 m in length and typically 1.45 to 2 m in width. Part of the trench was widened out to 5.5 m to form a pond centred on OS NGR 495495, 201324. The majority of the trench was very shallow measuring approximately 0.02 to 0.05 m in depth, extending to 0.3 m within the pond feature.
- 6.2.3 A representative section detailing a majority of the deposits recorded within the trench is presented on **Figure 4**. Its location is marked on **Figure 3**. The stratigraphic sequence within the trench is as follows:
- 6.2.4 A 0.12 m layer of organic topsoil matter (context **101**), highly disturbed by root and worm activity. It comprises a grey black silty clay, loosely compacted with sparse sub-rounded flint inclusions less than 0.05 m in size. It contained a large amount of modern rubbish material, including drinks cans, a fragment of corrugated plastic pipe and a metal spoon (perforated at one end, as if part of a camping set). These items were recorded on Site and not retained.
- 6.2.5 The subsoil layer (102) consists of a dark grey silt with a little clay, loosely to moderately compacted and with sub-rounded flint inclusions similar to the topsoil. Like the topsoil, it is heavily disturbed by root action.
- 6.2.6 The presumed natural chalk river gravel (103) was encountered at 0.23 m deep, composed of approximately 50% sub-rounded flint pebbles, 25% chalk and 25% silt loosely compacted.



6.2.7 A brickwork surface (104; described in section 6.3) was revealed at the south end of the trench between the subsoil and natural layers.

6.3 Brick surface

6.3.1 As mentioned, a mortared brickwork surface (context 104) was partially revealed within the channel approximately 25 m east-north-east (downstream) of Weir 1 (**Figure 3**) The revealed extent of the structure was recorded in plan and has been left in-situ with no physical intervention into its fabric. As the structure was left in-situ and unexcavated, its full extent has not been confirmed.

6.3.2 The revealed structure (**Plates 14-15**) measured approximately 2.91 m by 2.36 m (approximately 7¾ ft x 9½ ft), orientated roughly west-east on its long axis and covering an area approximately 6.6 m². It was constructed of handmade unfrogged red bricks that measure approximately 0.23 m x 0.1 m x 0.07 m (9" x 4" x 2¾") and is bonded with lime-based yellow-white mortar.

6.3.3 The majority of the structure was constructed of brick on edge with header course defining the south and north edges. No header courses were found to the west and east of the structure as these edges were more ephemeral. The centre of the structure was less intact with many damaged and missing bricks suggesting extensive wear and tear. At least five courses of the central brickwork survived adjoining the southern edge of the structure. Due to the poor preservation of the feature, the bonding pattern could not be clearly determined, although the majority of the bricks appeared to be laid in stretcher bond. The poor preservation and loss of fabric in the centre of the structure suggest it is likely to be only be one brick deep.

6.3.4 The location of the brick surface appears to correspond to a gap in the river depicted on the 1843 Tithe map and OS maps from 1878 onwards. On the 1963 OS map the gap is labelled as a footbridge (F.B.).

6.3.5 The map evidence and size and appearance of the brickwork suggests that the structure may date to the mid-late 19th century. It is possible that the surface represents the upper deck of a bridge, as is suggested by the 1963 OS map, with the remaining structure below-ground, although the channel would have to have been considerably deeper than at present to allow water to flow underneath it. Rather than a bridge, the feature most likely represents the strengthening of a recognised crossing/fording point between the fields to the north and south in order to improve the surface for pedestrians and livestock, which would otherwise quickly deteriorate to mire in wet conditions. It may be associated with the watercress industry if frequent horse and cart access was needed to access the area. Crossing the stream on a deck of bricks would likely disturb less sediment and therefore help maintain the clarity of water essential for the production of watercress.

7 ARTEFACTUAL EVIDENCE

7.1.1 Excavation of the centre strip within the river channel revealed a few modern artefacts. These were recorded on Site but not retained and included a metal spoon, drinks can and section of corrugated plastic pipe.

7.1.2 Unstratified artefacts, consisting of four fragments of pottery and two pieces of burnt flint was collected from the field north of Weir 2. All the pottery was post-medieval red ware. One was slip decorated, which can be dated to the 17th to 18th century. Another appeared burnt or overfired, so may be a waster from a firing process (pers. comm. Lorraine Mephram 09/02/2018).

7.1.3 All recorded artefacts were discarded.



8 DISCUSSION

8.1 Summary

- 8.1.1 Groundworks monitored during the watching brief were very shallow in nature and confined to the river channel. Consequently, the potential to discover archaeological remains was limited.
- 8.1.2 No archaeological remains related to the Romano-British period were uncovered, despite the potential and presence of known heritage assets in the vicinity identified in the Buckinghamshire HER, although this may be due to the minor nature of the excavations rather than an absence of evidence.
- 8.1.3 The two weirs were recorded during the photographic survey. They are first depicted and labelled on the 1963-64 OS map as weir and sluice respectively and their construction appears consistent with a mid-20th century date. Both are built of shuttered concrete, however Weir 2 had a more complex tapered form with a central gap for a sluice gate and included a brick and concrete wing wall on one side. Vertical grooves within the gap suggest there were two sluice gates, although these were missing at the time of the survey. Conversely, Weir 1 is a simple linear structure with an apron on the downstream side.
- 8.1.4 The demolition of Weir 2 was monitored during the watching brief. Weir 1 remains in-situ.
- 8.1.5 Watercress beds are labelled south-east of the Site on the 1898 OS map only. Watercress production requires clear, flowing water and is more efficient in shallow water where the space between plants can be reduced. The wide, shallow nature of the Missenden stream on Site appears beneficial for watercress production and may have been landscaped for that purpose.
- 8.1.6 Watercress production on an industrial scale began in the early 19th century and grew rapidly in the mid-19th century as railways made transportation of the cress to town markets more efficient. Photographs available online appear to show that the watercress beds were initially constructed of wood, superseded by concrete structures in the 20th century. Weir 2 is similar to structures seen in active watercress beds, such as at Ewelme, Oxfordshire. The two weirs may have been constructed to facilitate watercress production, however by 1963 when the weirs were first mapped, the area appears to have been in use as a poultry farm. Therefore, the weirs may have been constructed for water management unrelated to the watercress industry.
- 8.1.7 Structures associated with watercress production include beds, bunching sheds, reservoirs for storing the fresh cress and some sites had their own rail tracks. However, no evidence of structures definitively associated with the water cress industry were found on Site.
- 8.1.8 The watching brief revealed a brick surface located approximately 25 m east-north-east of Weir 1. This corresponds to a gap in the river depicted on the 1843 Tithe and later OS maps and is labelled as a footbridge on the 1963-64 OS map. The structure is constructed of unfrosted red bricks set within a lime-based mortar. The size and appearance of the brickwork, together with the cartographic evidence, suggests it is probably of mid-late 19th century date. The structure was left unexcavated in-situ, so only its partial extent in plan was visible. Although marked as a footbridge on the 1963-64 OS map, this structure may represent the surface of a ford to allow access between the fields either side of the stream without disturbing the stream bed.
- 8.1.9 Unstratified burnt flint and fragments of post-medieval pottery were recovered from the field north of Weir 2 as well as modern artefacts found within the topsoil of the river channel. No artefacts have been retained.



8.2 Conclusion

- 8.2.1 The results of the photographic survey and watching brief found no definitive evidence of watercress production as indicated on the 1898 OS map. However, the revealed brick-surfaced crossing point of mid-late 19th date and presence of two mid-20th century weirs provides evidence of increased traffic and water management of the Missenden Stream which may be associated with the watercress industry.
- 8.2.2 The watching brief was able to confirm the accuracy of the Tithe and later OS maps which depict a gap in the stream that corresponds to the probable mid-late 19th century brick structure 104.
- 8.2.3 The results of the photographic survey and watching brief are informative for the local historic environment resource, but are unlikely to be of interest in a wider regional or national context.

9 ARCHIVE STORAGE AND CURATION

9.1 Museum

- 9.1.1 The archive resulting from the watching brief is currently held at the offices of Wessex Archaeology in Salisbury. It is recommended that the project archive resulting from the watching brief be deposited with Buckinghamshire County Museum. The museum has been notified of the project, prior to fieldwork commencing, and the accession number is confirmed as AYBCM: 2018.18. No finds were retained.

9.2 Preparation of the archive

- 9.2.1 The archive, which includes paper records, graphics and digital data, will be prepared following the standard conditions for the acceptance of excavated archaeological material by Buckinghamshire County Museum, and in general following nationally recommended guidelines (SMA 1995; ClfA 2014c; Brown 2011; ADS 2013).
- 9.2.2 All archive elements are marked with the site/accession code, and a full index will be prepared. The physical archive currently comprises the following:
- 01 files/document cases of paper records and A3/A4 graphics;

9.3 Selection policy

- 9.3.1 Wessex Archaeology follows national guidelines on selection and retention (SMA 1993; Brown 2011, section 4). In accordance with these, and any specific guidance prepared by the museum, a process of selection and retention will be followed so that only those artefacts or ecofacts that are considered to have potential for future study will be retained. The selection policy will be agreed with the museum, and is fully documented in the project archive.

9.4 Security copy

- 9.4.1 In line with current best practice (eg, Brown 2011), on completion of the project a security copy of the written records will be prepared, in the form of a digital PDF/A file. PDF/A is an ISO-standardised version of the Portable Document Format (PDF) designed for the digital preservation of electronic documents through omission of features ill-suited to long-term archiving.

9.5 OASIS

- 9.5.1 An OASIS online record (<http://oasis.ac.uk/pages/wiki/Main>) will be initiated, with key fields and a .pdf version of the final report submitted. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and



national records and published through the Archaeology Data Service ArchSearch catalogue.

10 COPYRIGHT

10.1 Archive and report copyright

10.1.1 The full copyright of the written/illustrative/digital archive relating to the project will be retained by Wessex Archaeology under the Copyright, Designs and Patents Act 1988 with all rights reserved. The client will be licenced to use each report for the purposes that it was produced in relation to the project as described in the specification. The museum, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the Copyright and Related Rights Regulations 2003. In some instances, certain regional museums may require absolute transfer of copyright, rather than a licence; this should be dealt with on a case-by-case basis.

10.1.2 Information relating to the project will be deposited with the Historic Environment Record (HER) where it can be freely copied without reference to Wessex Archaeology for the purposes of archaeological research or development control within the planning process.

10.2 Third party data copyright

10.2.1 This document and the project archive may contain material that is non-Wessex Archaeology copyright (eg, Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 with regard to multiple copying and electronic dissemination of such material.



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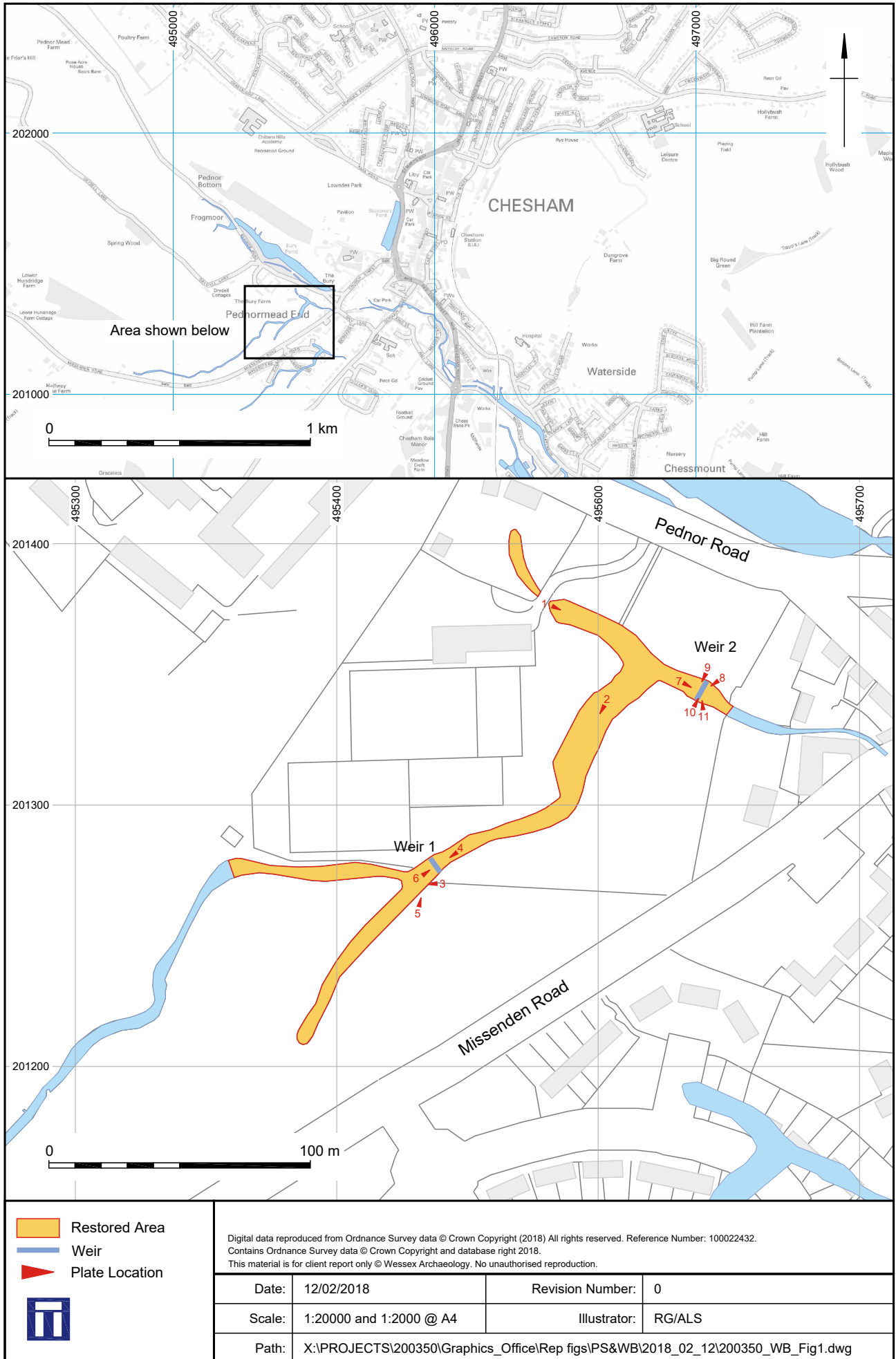
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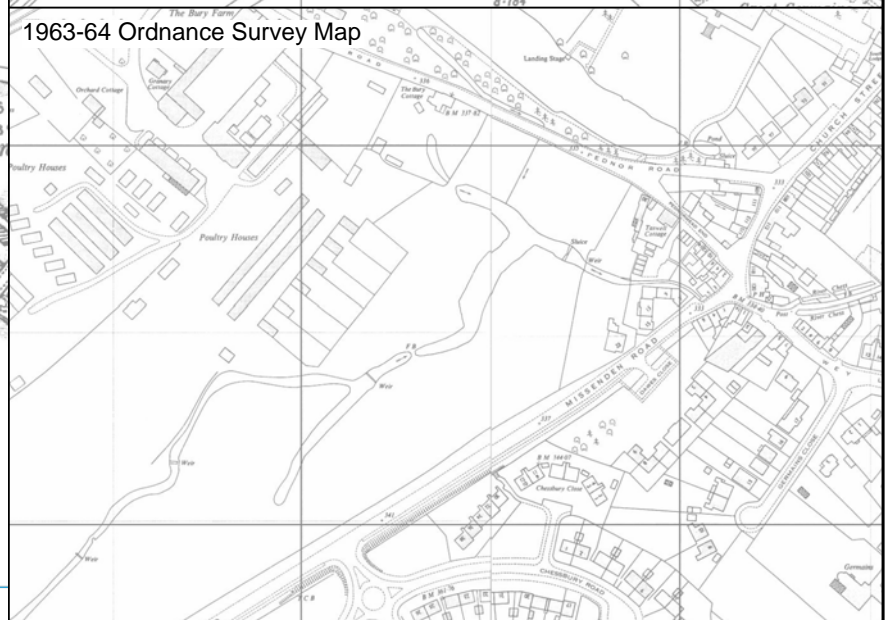
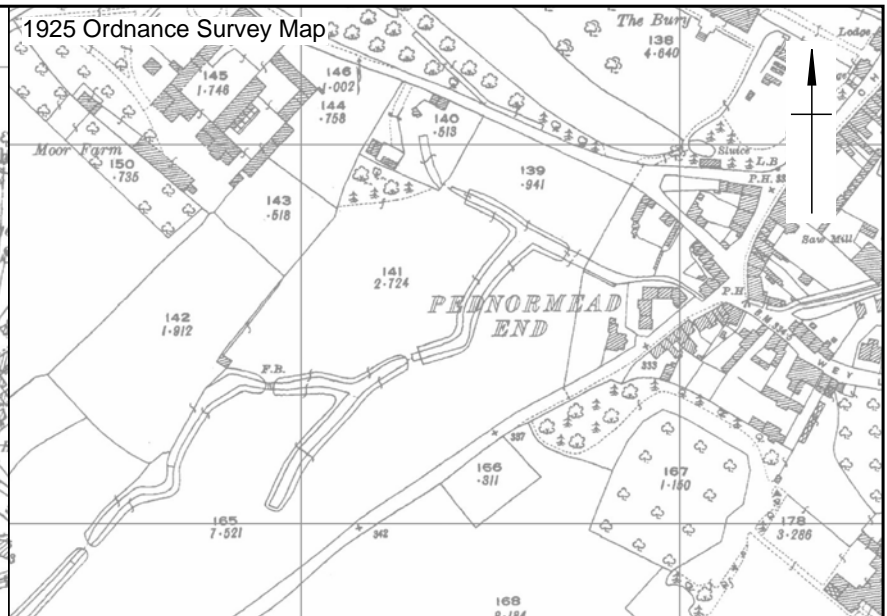
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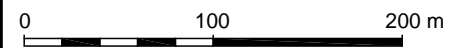


Site location showing the extent of the survey and plate locations

Figure 1



Approximate Site Location

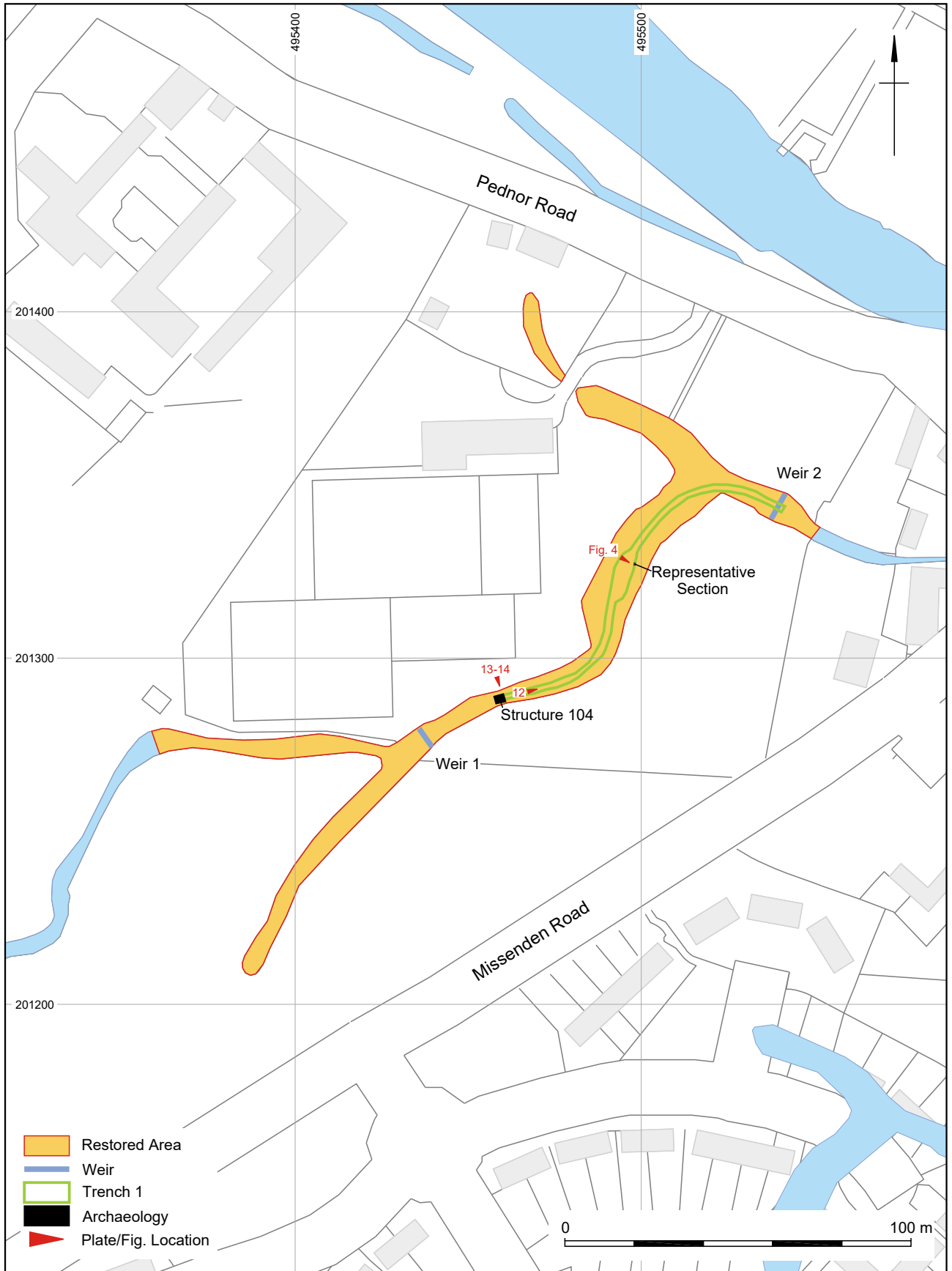


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Map Regression

Figure 2



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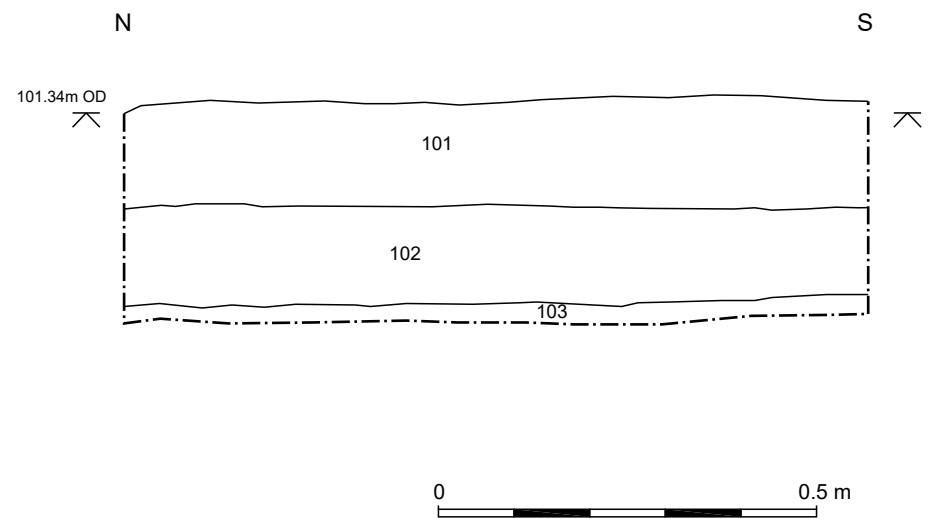
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Representative section of Trench 1, facing west



Coordinate system:
OSGB36
(OSTN15/OSGM15)

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Plate 1: The Missenden stream bed, north-west of Weir 2, viewed from the north-west



Plate 2: The Missenden stream bed, between Weirs 1 and 2, viewed from the north-east


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Plate 3: The Missenden stream, upstream (west) of Weir 1, viewed from the east



Plate 4: Weir 1, viewed from the north-east


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Plate 5: Weir 1, viewed from the south



Plate 6: Detail of the fabric of Weir 1, viewed from the south-west


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Plate 7: Weir 2 viewed from the north-west



Plate 8: Weir 2, viewed from the north-east


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Plate 9: The wing wall of Weir 2 viewed from the north-east



Plate 10: The central gap in Weir 2 viewed from above. The wider slot and vertical grooves to the right of it likely indicate the position of sluice gates to control the flow of water.


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Plate 11: The central gap in Weir 2 viewed from the south-east, showing the change in level and vertical grooves inside it.



Plate 12: Excavation of Trench 1 within the stream bed, viewed from the south-west



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Plate 13: Brick structure 104, likely the surface of a ford, viewed from the north



Plate 14: Detail of brick structure 104

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