BOWNESS-ON-SOLWAY PUMPING STATION, BOWNESS-ON-SOLWAY, CUMBRIA

WATCHING BRIEF REPORT

CP. NO: 870/09

02/11/2009

NORTH PENNINES ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

NORTH PENNINES ARCHAEOLOGY LTD

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Quality Assurance

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	01
PREPARED BY:	David Jackson
POSITION:	Assistant Supervisor
DATE:	26/10/09
EDITED BY:	Matt Town
POSITION:	Project Manager
DATE:	26/10/09
APPROVED BY:	Frank Giecco
POSITION:	Technical Director
DATE:	02/11/09

CONTENTS

ILLUSTRATIONS

FIGURES (APPENDIX 2)

PLATES

SUMMARY

North Pennines Archaeology Ltd were commissioned by United Utilities to undertake an archaeological watching brief close to the projected line of Hadrian's Wall at Bowness-on-Solway, Cumbria (NGR NY 2270 6260), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. Hadrian's Wall and much of the surrounding land is protected as a Scheduled Monument (SM no 26121). The proposed works were within the buffer zone of the Hadrian's Wall World Heritage Site. As a result, Mike Collins, Hadrian's Wall Archaeologist for English Heritage, recommended that a programme of archaeological works be undertaken in accordance with a written scheme of investigation submitted to and approved by the aforementioned. The work involved the monitoring of all ground reduction within the Hadrian's Wall buffer zone as specified in United Utilities drawing Y15519-01, which was supplied to both North Pennines Archaeology Ltd and Mike Collins of English Heritage.

The Archaeological Watching Brief was undertaken over three days between the 24th August and the 3rd September 2009. The watching brief monitored the excavation of three trenches associated with the Bowness-on-Solway pumping station within the immediate vicinity of the Hadrian's Wall World Heritage Site. No archaeological finds or obvious archaeological remains were observed during the watching brief, the trenches largely being comprised of naturally forming substrates and topsoils. However, a 1.5m deposit of dark brown silty clay was observed within Trench 2 and the southern end of Trench 1 which contrasted markedly against the surrounding natural substrates. The possibility that the deposit relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. Given the location of the trenches to Hadrian's Wall and its defensive features, it was deemed appropriate to retain environmental samples of this deposit.

Unfortunately, the environmental analysis was largely equivocal. The analysis revealed tentative evidence to suggest that the deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions could be reached as to when this occurred, or whether it was a long-term process, or one which occurred over a short period of a few years.

As this archaeological watching brief was conducted as part of a recommendation to observe groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station, no further work is deemed necessary. However, given the high archaeological potential of the area, it is recommended that any future work be subject to a programme of archaeological investigation.

ACKNOWLEDGEMENTS

North Pennines Archaeology Ltd would like to thank Bruce Pilling of United Utilities. Thanks are also due to Mike Collins of English Heritage. NPA Ltd would also like to thank the staff of United Utilities and Bethell Power Services for all their assistance throughout the project.

The archaeological watching brief was undertaken by David Jackson and Angus Clark, and the environmental analysis was undertaken by Don O' Meara, Environmental Assistant for NPA Ltd. The report was written by David Jackson, who also produced the drawngs. The project was managed by Frank Giecco, Technical Director of NPA Ltd. The report was edited by Matt Town, Project Manager for NPA Ltd.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In August 2009, North Pennines Archaeology were invited by Bruce Pilling of United Utilities to maintain an archaeological watching brief at Bowness-on-Solway, Cumbria (NGR NY 2270 6260, Figure 1), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. The proposed works lie within the immediate vicinity of Hadrian's Wall (SM no 26121) and its associated features which are classified as a World Heritage Site. As a result, Mike Collins of English Heritage (Hadrian's Wall Archaeologist) requested that all ground reduction be subject to a programme of archaeological observation and investigation. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16).

1.1.2 All groundworks associated with the new electricity supply had to be excavated under full archaeological supervision and all stages of the archaeological work were undertaken following approved statutory guidelines (IfA 2008), and were consistent with the specification provided by NPA Ltd (Giecco 2009) and generally accepted best practice.

1.1.3 This report outlines the monitoring works undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works.

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by North Pennines Archaeology Ltd in response to a request by Bruce Pilling of United Utilities, for an archaeological watching brief of the study area. Following acceptance of the project design by Mike Collins of English Heritage, North Pennines Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA), and generally accepted best practice.

2.2 THE WATCHING BRIEF

2.2.1 The works involved a structured watching brief to observe, record and excavate any archaeological deposits from the development site. A watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons, on a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed (IfA 2008).

2.2.2 The aims and principal methodology of the watching brief can be summarised as follows:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record them;
- to carry out further excavation and recording work in adequate time, if intact archaeological remains are uncovered during the project;
- to accurately tie the area watched by the archaeologist into the National Grid at an appropriate scale, with any archaeological deposits and features adequately levelled;
- to sample environmental deposits encountered as required, in line with English Heritage (2002a) guidelines;
- to produce a photographic record of all contexts using colour digital, 35mm colour print and monochrome formats as applicable, each photograph including a graduated metric scale;
- to recover artefactual material, especially that useful of dating purposes;

- to produce a site archive in accordance with MAP2 (English Heritage 1991) and MoRPHE standards (English Heritage 2006).

2.2.3 Archaeological monitoring and supervision of groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station was undertaken intermittently over three days between the 24th August and the 3rd September 2009. A summary of the findings of the watching brief is included within this report.

2.3 THE ARCHIVE

2.3.1 A full professional archive has been compiled in accordance with the specification, and in line with current UKIC (1990) and English Heritage Guidelines (1991) and according to the Archaeological Archives Forum recommendations (Brown 2007). The archive will be deposited within the Senhouse Museum, Maryport, with copies of the report sent to the County Historic Environment Record at Kendal, available upon request. The archive can be accessed under the unique project identifier **NPA09**, **BOS-A**, **CP/870/09**.

2.3.2 North Pennines Archaeology, and English Heritage, support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by North Pennines Archaeology, as a part of this national project.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The study area is located at the eastern edge of Bowness-on-Solway, approximately 21km west of Carlisle, Cumbria (NY 2270 6260). The site is situated within a green field on the south shore of the Solway Firth, at a height of approximately 10m OD (Figure 2).

3.1.2 The broader area of the site is known as the Solway Basin and is a broad, lowland plain landscape fringed by the low, rugged, relatively remote coastline of the Solway Firth and Irish Sea (Countryside Commission 1998). The Solway Plain is open and exposed to the prevailing southwesterly winds and tree cover is limited. This area is characterised by dairy cattle grazing on fields of improved pasture, which are variously defined by drainage ditches, small streams, low wind-sheared hedgerows and stone-faced hedgebanks or 'kests'. The area to the east of the site includes flat marshland where the rivers Eden, Esk and Lyne flow into the Solway (*ibid*).

3.1.3 The underlying geology of the study area is mainly comprised of mudstones and sandstones of Permo-Triassic age ('New Red Sandstone'). A small pocket of poorly exposed Liassic mudstones and limestones of Jurassic age overlie the Permo-Triassic rocks to the southeast, and Coal Measures, mudstones, sandstones and a few coals of Carboniferous age lie beneath the Permo-Triassic rocks, forming a restricted belt along the southern margin of the Solway Basin (Countryside Commission 1998). The underlying geology of the area is largely covered by large quantities of boulder clay, sand and gravel, deposited by thick ice-sheets and glacial meltwaters during the last glaciation (*ibid*).

3.2 HISTORICAL CONTEXT

3.2.1 This section is intended as a brief summary only, detailing the main periods of occupation within the immediate area of the site.

3.2.2 Hadrian's Wall was designated as a World Heritage Site in 1987 and forms the most complex and best preserved of the frontiers of the Roman Empire. (English Heritage 2002b). The World Heritage Site (WHS) comprises a visual envelope between 1km and 6km from the site in order to serve as a buffer zone to protect the site and its immediate landscape from development detrimental to the visual amenity of the site (*ibid*).

3.2.3 The WHS is centred on the military installations constructed from AD 122 on the orders of the Emperor Hadrian. The WHS also includes other Roman sites and structures which predate Hadrian's Wall, such as the arrangement of forts along the Cumbrian Coast between Bowness-on-Solway and Ravenglass, and incorporates a wealth of pre-Roman and post-Roman sites and landscapes (*op.cit.*). Hadrian's Wall was constructed in the early 2nd century on a line connecting the Tyne and the Solway and represented at various times the northern frontier of Roman Britain.

3.2.4 The Wall was a composite military barrier, which in its final form comprised several separate elements; a stone wall fronted by a V-shaped ditch, and a number of purpose-built stone garrison fortifications such as forts, milecastles and turrets, a large earthwork and ditch, built parallel with and to the south of the Wall, known as the Vallum, and a metalled supply road linking the garrison forts, which is known as the 'Roman Military Way'. The Wall begins in the east at Wallsend in Tyneside and continues to the west, terminating at Bowness-on-Solway, immediately west of the study area, a distance of 80 Roman miles (73.5 English miles or 117 kilometres). The Wall, conceived by Hadrian was to be ten feet wide and about fifteen feet high. The front face of the wall most likely sported a crenulated parapet, behind which the soldiers patrolled along a paved rampart-walk (Bedoyere 1998). The more detailed history of Hadrian's Wall is well documented and is summarised in numerous publications (Breeze and Dobson 2000; Daniels 1978 and Birley 1961).

3.2.5 The fort at Bowness-on-Solway, known as *Maia*, guarded the strategic final fording point on the Solway and formed the western terminus of Hadrian's Wall. The stone-built fort was probably constructed in the late 2nd-early 3rd centuries AD, and was the second largest fort on Hadrian's Wall after Stanwix, occupying over six acres. As elsewhere on the western sector of the wall, the stone fort was preceded by an earlier, presumably Hadrianic, turf and timber fort, about which very little is known. Previous excavations and casual finds suggest that the fort was in use from the Hadrianic period (*c*.120's AD) to the 4th century (Giecco *et al* 2001).

3.3 PREVIOUS WORK

3.3.1 The main programmes of archaeological investigation at Bowness-on-Solway took place in 1930, 1955, 1967, 1973 and 1975, during which the western ramparts, the west gate and intervallum road, and adjacent barrack blocks of the fort were located.

3.3.2 More recent work in the village includes;

- a limited programme of archaeological work carried out by Carlisle Archaeology Ltd in the grounds of Maia House. No trace of the outer fort or ditch was found, but a medieval ditch was recorded (Zant 1996);
- a topographical and partial geophysical survey carried out by Manchester University at Demesne field, confirming the position of the southern road out of the fort and the presence of intensive settlement activity on either side of the road;
- a watching brief and programme of archaeological recording which involved the recording of 26 trenches of variable size. This demonstrated that, within the village, few Roman deposits survived beneath the modern roads, although south of the fort deposits including organic remains, woodwork, leatherwork and other artefacts were found within deposits up to 3m deep (Giecco *et al* 2000);
- an archaeological investigation undertaken in 2000 by Carlisle Archaeology Ltd which involved a watching brief of 131 trenches within the village. This investigation found the line of the eastern defences of the stone fort, and possibly part of the turf and timber fort, as well as possible post-Roman use of the fort (Giecco *et al* 2001);
- and an archaeological evaluation conducted by North Pennines Archaeology Ltd in 2004 within Demesne field, immediately south of the fort. The evaluation revealed significant Roman remains at a depth of 0.25m below the surface, including a substantial Roman strip building with surviving occupation layers, and demolition deposits of probable late Roman date (Giecco and Crompton 2004).

4 ARCHAEOLOGICAL WATCHING BRIEF

4.1 INTRODUCTION

4.1.1 The archaeological watching brief took place intermittently between the 24th August and the 3rd September 2009, and comprised the observation and investigation of all groundworks associated with the a new power supply for the Bowness-on-Solway pumping station. A total of three trenches were excavated with a JCB 8060 mechanical excavator using a *c*.0.5m wide toothed bucket. The results of the watching brief are summarised below.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located at the western edge of field number 7970, *c*.12m north of the field's southern boundary (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.95m in length and *c*.0.6m in width. Trench 1 was excavated to an average depth of 0.8m and was largely comprised of over 0.6m of grey/orange sandy clay **(103)**, below a *c*.0.12m deposit of mid-brown sandy clay subsoil **(102)** and a *c*.0.1m deposit of dark brown sandy clay topsoil **(100)**. However, within the southern most *c*.7m of the trench, the grey/orange sandy clay **(103)** was replaced by a deposit of dark brown/grey silty clay **(104)** below the subsoil **(102)** and topsoil **(100)** (Plate 1), which measured over 0.6m in depth. The possibility that the deposit **(104)** relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, has been considered. Unfortunately, the sudden change between the grey/orange sandy clay **(103)** and the dark brown/grey silty clay **(104)** could not be thoroughly investigated due to the flooding of Trench 1 from surface water during excavation (Plate 2), although no clear cut which might suggest a ditch or similar feature was observed. However, samples of the silty clay deposit **(104)** were taken for environmental sampling (see Section 5 below).

4.2.2 ***Trench 2:*** Trench 2 was located at the southern end of Trench 1 within field number 7970 (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.2m in length and *c*.1.8m in width. Trench 2 was excavated to a depth of *c*.1.8m exposing *c*.1.5m of the dark brown/grey silty clay **(104)** below *c*.0.2m of subsoil **(102)** and topsoil **(100)**, although any discreet changes at the bottom of the trench would not have been noted at this depth (Plate 3).

Plate 1: View north-northeast of Trench 1

Plate 2: East facing section of Trench 1

Plate 3: North facing section of Trench 2 showing deposit ***(104)***

Plate 4: South facing section of Trench 3

4.2.3 ***Trench 3:*** Trench 3 was located within field number 7055, immediately south of the field's northern boundary (Figure 2). The trench was aligned east to west and measured *c*.15m in length and *c*.0.5m in width in order to earth and existing electricity pole (No. 010808). Trench 3 was excavated to a maximum depth of 1.2m revealing *c*.0.3m of natural orange/grey boulder clay **(101)** below *c*.0.85m of grey/orange sandy clay **(103)** and *c*.0.06m of dark brown sandy clay topsoil **(100)** (Plate 4).

4.3 ARCHAEOLOGICAL FINDS

4.3.1 No archaeological finds were recovered during the groundworks associated with the Bowness-on-Solway pumping station.

5 ENVIRONMENTAL ANALYSES

5.1 INTRODUCTION

5.1.1 During the course of the archaeological watching brief at Bowness-on-Solway it was recognised that contexts bearing the archaeobotanical remains of past human activity may be encountered.

5.1.2 One context was considered worth sampling. This was sample **(104) <1>**.

5.1.3 The methodology employed required that the whole earth samples be broken down and split into their various different components. Both samples were fully processed by being manually floated and sieved through a 'Siraf' style flotation tank.

5.1.4 The residue from each sample was retained, described and scanned using a magnet for ferrous fragments. The flot was dried slowly and scanned at x40 magnification for charred and uncharred botanical remains. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at North Pennines Archaeology. Plant taxonomic nomenclature follows Stace (1997).

5.1.5 The retent, like the residue from wet sieving, will contain any larger items of bone, heavy (e.g. waterlogged) ecofacts or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage was done to allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. The retent samples were also scanned with a hand magnet to retrieve forms of magnetic material.

5.1.6 Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information, in respect of the depositional environment of the material, thus enabling assessment of anthropogenic activity, seasonality and climate and elements of the economy associated with the features from which the samples are removed.

5.1.7 Sample numbers appear in brackets thus < >, whilst context numbers appear in brackets thus ( ) for all analysis and discussion below. Results will be presented by Plot number numerically. Reference to seeds in the text is made using the richness scale of 1 = present, 2 = frequent and 3 = abundant, as seen in the tabular results attached.

5.2 RESULTS

5.2.1 Sample **(104) <1>** was taken from a deposit of silty clay. A 20litre sample was taken as it was hoped recovered plant remains might lend support to the theory that the context was connected to activity near the Roman defensive ditch which ran near the site.

5.2.2 The heavy residue material produced low amounts of magnetic material, all of which appears to be naturally occurring haematite. No material which would suggest cultural activity was recovered from this sample.

5.2.3 The flot material consisted of small amounts of charcoal but was mainly leaf-litter material. The origin of the charcoal is unknown at this point, and it occurred in quantities too small for radiometric dating to be undertaken. The leaf litter, however, does suggest that this sample came from a possible feature which was able to act as a basin of deposition which captured this material. The heavy clay may have created an anaerobic environment sufficient to prevent full organic decomposition of this material.

5.3 CONCLUSION

5.3.1 The deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of the partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions can be reached when this occurred, or whether this was a long-term process, or one which occurred over a short period of a few years.

5.3.2 It is not recommended that further work be undertaken on this sample as it does not allow conclusions to be drawn regarding human activity around the area of Bowness-on-Solway, Cumbria.

TABLE 1: ENVIRONMENTAL ANALYSIS FOR: CP870, Bowness-on-Solway, Cumbria

Sample	1
Context	104
Volume processed (litres)	20
Volume of retent(ml)	1500
Volume of flot (ml)	50
Samples suitable for radiocarbon dating	-
Residue contents (relative abundance)	
Bone/teeth, burnt bone	-
Charcoal	-
Flint/chert	-
Magnetic Residue	1
Stones/gravel	3
Flot matrix (relative abundance)	
Charcoal	2
Leaf litter	2

(c: cereal types, x: wide niche) Relative abundance is based on a scale from 1 (lowest) to 3 (highest) where 0 is not present.

Table 1: Details of environmental analysis

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 The archaeological watching brief monitored the excavation of all groundworks associated with the Bowness-on Solway pumping station. No archaeological finds or obvious archaeological remains were noted during the watching brief. However, the possibility that a single deposit related to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. As such, it was deemed appropriate to retain samples of the deposit for environmental sampling.

6.1.2 The environmental analysis of the retained samples was largely equivocal. Although the analysis revealed tentative evidence to suggest that the deposit from which the sample was taken may have appeared as an open ditch at one stage, no conclusions could be reached as to when, and under what circumstances deposition occurred.

6.2 RECOMMENDATIONS

6.2.1 As this watching brief was conducted as a condition of groundworks associated with the development of the Bowness-on-Solway pumping station, no further archaeological work is deemed necessary. However, given the site's location in relation to the Hadrian's Wall World Heritage Site, it is recommended that any work conducted in the future be subject to a similar programme of archaeological investigation.

7 BIBLIOGRAPHY

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APPENDIX 1: CONTEXT TABLE

Context Number	Context Type	Description
100	Deposit	Topsoil
101	Geological	Natural Substrate
102	Deposit	Subsoil
103	Deposit	Orange/Grey Sandy Clay
104	Deposit	Dark Brown/Grey Silty/Sandy Clay

Table 2: List of Contexts issued during Watching Brief

APPENDIX 2: FIGURES

BOWNESS-ON-SOLWAY PUMPING STATION, BOWNESS-ON-SOLWAY, CUMBRIA

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NORTH PENNINES ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

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Unfortunately, the environmental analysis was largely equivocal. The analysis revealed tentative evidence to suggest that the deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions could be reached as to when this occurred, or whether it was a long-term process, or one which occurred over a short period of a few years.

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1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In August 2009, North Pennines Archaeology were invited by Bruce Pilling of United Utilities to maintain an archaeological watching brief at Bowness-on-Solway, Cumbria (NGR NY 2270 6260, Figure 1), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. The proposed works lie within the immediate vicinity of Hadrian's Wall (SM no 26121) and its associated features which are classified as a World Heritage Site. As a result, Mike Collins of English Heritage (Hadrian's Wall Archaeologist) requested that all ground reduction be subject to a programme of archaeological observation and investigation. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16).

1.1.2 All groundworks associated with the new electricity supply had to be excavated under full archaeological supervision and all stages of the archaeological work were undertaken following approved statutory guidelines (IfA 2008), and were consistent with the specification provided by NPA Ltd (Giecco 2009) and generally accepted best practice.

1.1.3 This report outlines the monitoring works undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works.

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by North Pennines Archaeology Ltd in response to a request by Bruce Pilling of United Utilities, for an archaeological watching brief of the study area. Following acceptance of the project design by Mike Collins of English Heritage, North Pennines Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA), and generally accepted best practice.

2.2 THE WATCHING BRIEF

2.2.1 The works involved a structured watching brief to observe, record and excavate any archaeological deposits from the development site. A watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons, on a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed (IfA 2008).

2.2.2 The aims and principal methodology of the watching brief can be summarised as follows:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record them;
- to carry out further excavation and recording work in adequate time, if intact archaeological remains are uncovered during the project;
- to accurately tie the area watched by the archaeologist into the National Grid at an appropriate scale, with any archaeological deposits and features adequately levelled;
- to sample environmental deposits encountered as required, in line with English Heritage (2002a) guidelines;
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- to recover artefactual material, especially that useful of dating purposes;

- to produce a site archive in accordance with MAP2 (English Heritage 1991) and MoRPHE standards (English Heritage 2006).

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2.3.1 A full professional archive has been compiled in accordance with the specification, and in line with current UKIC (1990) and English Heritage Guidelines (1991) and according to the Archaeological Archives Forum recommendations (Brown 2007). The archive will be deposited within the Senhouse Museum, Maryport, with copies of the report sent to the County Historic Environment Record at Kendal, available upon request. The archive can be accessed under the unique project identifier **NPA09**, **BOS-A**, **CP/870/09**.

2.3.2 North Pennines Archaeology, and English Heritage, support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by North Pennines Archaeology, as a part of this national project.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The study area is located at the eastern edge of Bowness-on-Solway, approximately 21km west of Carlisle, Cumbria (NY 2270 6260). The site is situated within a green field on the south shore of the Solway Firth, at a height of approximately 10m OD (Figure 2).

3.1.2 The broader area of the site is known as the Solway Basin and is a broad, lowland plain landscape fringed by the low, rugged, relatively remote coastline of the Solway Firth and Irish Sea (Countryside Commission 1998). The Solway Plain is open and exposed to the prevailing southwesterly winds and tree cover is limited. This area is characterised by dairy cattle grazing on fields of improved pasture, which are variously defined by drainage ditches, small streams, low wind-sheared hedgerows and stone-faced hedgebanks or 'kests'. The area to the east of the site includes flat marshland where the rivers Eden, Esk and Lyne flow into the Solway (*ibid*).

3.1.3 The underlying geology of the study area is mainly comprised of mudstones and sandstones of Permo-Triassic age ('New Red Sandstone'). A small pocket of poorly exposed Liassic mudstones and limestones of Jurassic age overlie the Permo-Triassic rocks to the southeast, and Coal Measures, mudstones, sandstones and a few coals of Carboniferous age lie beneath the Permo-Triassic rocks, forming a restricted belt along the southern margin of the Solway Basin (Countryside Commission 1998). The underlying geology of the area is largely covered by large quantities of boulder clay, sand and gravel, deposited by thick ice-sheets and glacial meltwaters during the last glaciation (*ibid*).

3.2 HISTORICAL CONTEXT

3.2.1 This section is intended as a brief summary only, detailing the main periods of occupation within the immediate area of the site.

3.2.2 Hadrian's Wall was designated as a World Heritage Site in 1987 and forms the most complex and best preserved of the frontiers of the Roman Empire. (English Heritage 2002b). The World Heritage Site (WHS) comprises a visual envelope between 1km and 6km from the site in order to serve as a buffer zone to protect the site and its immediate landscape from development detrimental to the visual amenity of the site (*ibid*).

3.2.3 The WHS is centred on the military installations constructed from AD 122 on the orders of the Emperor Hadrian. The WHS also includes other Roman sites and structures which predate Hadrian's Wall, such as the arrangement of forts along the Cumbrian Coast between Bowness-on-Solway and Ravenglass, and incorporates a wealth of pre-Roman and post-Roman sites and landscapes (*op.cit.*). Hadrian's Wall was constructed in the early 2nd century on a line connecting the Tyne and the Solway and represented at various times the northern frontier of Roman Britain.

3.2.4 The Wall was a composite military barrier, which in its final form comprised several separate elements; a stone wall fronted by a V-shaped ditch, and a number of purpose-built stone garrison fortifications such as forts, milecastles and turrets, a large earthwork and ditch, built parallel with and to the south of the Wall, known as the Vallum, and a metalled supply road linking the garrison forts, which is known as the 'Roman Military Way'. The Wall begins in the east at Wallsend in Tyneside and continues to the west, terminating at Bowness-on-Solway, immediately west of the study area, a distance of 80 Roman miles (73.5 English miles or 117 kilometres). The Wall, conceived by Hadrian was to be ten feet wide and about fifteen feet high. The front face of the wall most likely sported a crenulated parapet, behind which the soldiers patrolled along a paved rampart-walk (Bedoyere 1998). The more detailed history of Hadrian's Wall is well documented and is summarised in numerous publications (Breeze and Dobson 2000; Daniels 1978 and Birley 1961).

3.2.5 The fort at Bowness-on-Solway, known as *Maia*, guarded the strategic final fording point on the Solway and formed the western terminus of Hadrian's Wall. The stone-built fort was probably constructed in the late 2nd-early 3rd centuries AD, and was the second largest fort on Hadrian's Wall after Stanwix, occupying over six acres. As elsewhere on the western sector of the wall, the stone fort was preceded by an earlier, presumably Hadrianic, turf and timber fort, about which very little is known. Previous excavations and casual finds suggest that the fort was in use from the Hadrianic period (*c*.120's AD) to the 4th century (Giecco *et al* 2001).

3.3 PREVIOUS WORK

3.3.1 The main programmes of archaeological investigation at Bowness-on-Solway took place in 1930, 1955, 1967, 1973 and 1975, during which the western ramparts, the west gate and intervallum road, and adjacent barrack blocks of the fort were located.

3.3.2 More recent work in the village includes;

- a limited programme of archaeological work carried out by Carlisle Archaeology Ltd in the grounds of Maia House. No trace of the outer fort or ditch was found, but a medieval ditch was recorded (Zant 1996);
- a topographical and partial geophysical survey carried out by Manchester University at Demesne field, confirming the position of the southern road out of the fort and the presence of intensive settlement activity on either side of the road;
- a watching brief and programme of archaeological recording which involved the recording of 26 trenches of variable size. This demonstrated that, within the village, few Roman deposits survived beneath the modern roads, although south of the fort deposits including organic remains, woodwork, leatherwork and other artefacts were found within deposits up to 3m deep (Giecco *et al* 2000);
- an archaeological investigation undertaken in 2000 by Carlisle Archaeology Ltd which involved a watching brief of 131 trenches within the village. This investigation found the line of the eastern defences of the stone fort, and possibly part of the turf and timber fort, as well as possible post-Roman use of the fort (Giecco *et al* 2001);
- and an archaeological evaluation conducted by North Pennines Archaeology Ltd in 2004 within Demesne field, immediately south of the fort. The evaluation revealed significant Roman remains at a depth of 0.25m below the surface, including a substantial Roman strip building with surviving occupation layers, and demolition deposits of probable late Roman date (Giecco and Crompton 2004).

4 ARCHAEOLOGICAL WATCHING BRIEF

4.1 INTRODUCTION

4.1.1 The archaeological watching brief took place intermittently between the 24th August and the 3rd September 2009, and comprised the observation and investigation of all groundworks associated with the a new power supply for the Bowness-on-Solway pumping station. A total of three trenches were excavated with a JCB 8060 mechanical excavator using a *c*.0.5m wide toothed bucket. The results of the watching brief are summarised below.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located at the western edge of field number 7970, *c*.12m north of the field's southern boundary (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.95m in length and *c*.0.6m in width. Trench 1 was excavated to an average depth of 0.8m and was largely comprised of over 0.6m of grey/orange sandy clay **(103)**, below a *c*.0.12m deposit of mid-brown sandy clay subsoil **(102)** and a *c*.0.1m deposit of dark brown sandy clay topsoil **(100)**. However, within the southern most *c*.7m of the trench, the grey/orange sandy clay **(103)** was replaced by a deposit of dark brown/grey silty clay **(104)** below the subsoil **(102)** and topsoil **(100)** (Plate 1), which measured over 0.6m in depth. The possibility that the deposit **(104)** relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, has been considered. Unfortunately, the sudden change between the grey/orange sandy clay **(103)** and the dark brown/grey silty clay **(104)** could not be thoroughly investigated due to the flooding of Trench 1 from surface water during excavation (Plate 2), although no clear cut which might suggest a ditch or similar feature was observed. However, samples of the silty clay deposit **(104)** were taken for environmental sampling (see Section 5 below).

4.2.2 ***Trench 2:*** Trench 2 was located at the southern end of Trench 1 within field number 7970 (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.2m in length and *c*.1.8m in width. Trench 2 was excavated to a depth of *c*.1.8m exposing *c*.1.5m of the dark brown/grey silty clay **(104)** below *c*.0.2m of subsoil **(102)** and topsoil **(100)**, although any discreet changes at the bottom of the trench would not have been noted at this depth (Plate 3).

Plate 1: View north-northeast of Trench 1

Plate 2: East facing section of Trench 1

Plate 3: North facing section of Trench 2 showing deposit ***(104)***

Plate 4: South facing section of Trench 3

4.2.3 ***Trench 3:*** Trench 3 was located within field number 7055, immediately south of the field's northern boundary (Figure 2). The trench was aligned east to west and measured *c*.15m in length and *c*.0.5m in width in order to earth and existing electricity pole (No. 010808). Trench 3 was excavated to a maximum depth of 1.2m revealing *c*.0.3m of natural orange/grey boulder clay **(101)** below *c*.0.85m of grey/orange sandy clay **(103)** and *c*.0.06m of dark brown sandy clay topsoil **(100)** (Plate 4).

4.3 ARCHAEOLOGICAL FINDS

4.3.1 No archaeological finds were recovered during the groundworks associated with the Bowness-on-Solway pumping station.

5 ENVIRONMENTAL ANALYSES

5.1 INTRODUCTION

5.1.1 During the course of the archaeological watching brief at Bowness-on-Solway it was recognised that contexts bearing the archaeobotanical remains of past human activity may be encountered.

5.1.2 One context was considered worth sampling. This was sample **(104) <1>**.

5.1.3 The methodology employed required that the whole earth samples be broken down and split into their various different components. Both samples were fully processed by being manually floated and sieved through a 'Siraf' style flotation tank.

5.1.4 The residue from each sample was retained, described and scanned using a magnet for ferrous fragments. The flot was dried slowly and scanned at x40 magnification for charred and uncharred botanical remains. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at North Pennines Archaeology. Plant taxonomic nomenclature follows Stace (1997).

5.1.5 The retent, like the residue from wet sieving, will contain any larger items of bone, heavy (e.g. waterlogged) ecofacts or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage was done to allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. The retent samples were also scanned with a hand magnet to retrieve forms of magnetic material.

5.1.6 Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information, in respect of the depositional environment of the material, thus enabling assessment of anthropogenic activity, seasonality and climate and elements of the economy associated with the features from which the samples are removed.

5.1.7 Sample numbers appear in brackets thus < >, whilst context numbers appear in brackets thus ( ) for all analysis and discussion below. Results will be presented by Plot number numerically. Reference to seeds in the text is made using the richness scale of 1 = present, 2 = frequent and 3 = abundant, as seen in the tabular results attached.

5.2 RESULTS

5.2.1 Sample **(104) <1>** was taken from a deposit of silty clay. A 20litre sample was taken as it was hoped recovered plant remains might lend support to the theory that the context was connected to activity near the Roman defensive ditch which ran near the site.

5.2.2 The heavy residue material produced low amounts of magnetic material, all of which appears to be naturally occurring haematite. No material which would suggest cultural activity was recovered from this sample.

5.2.3 The flot material consisted of small amounts of charcoal but was mainly leaf-litter material. The origin of the charcoal is unknown at this point, and it occurred in quantities too small for radiometric dating to be undertaken. The leaf litter, however, does suggest that this sample came from a possible feature which was able to act as a basin of deposition which captured this material. The heavy clay may have created an anaerobic environment sufficient to prevent full organic decomposition of this material.

5.3 CONCLUSION

5.3.1 The deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of the partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions can be reached when this occurred, or whether this was a long-term process, or one which occurred over a short period of a few years.

5.3.2 It is not recommended that further work be undertaken on this sample as it does not allow conclusions to be drawn regarding human activity around the area of Bowness-on-Solway, Cumbria.

TABLE 1: ENVIRONMENTAL ANALYSIS FOR: CP870, Bowness-on-Solway, Cumbria

Sample	1
Context	104
Volume processed (litres)	20
Volume of retent(ml)	1500
Volume of flot (ml)	50
Samples suitable for radiocarbon dating	-
Residue contents (relative abundance)	
Bone/teeth, burnt bone	-
Charcoal	-
Flint/chert	-
Magnetic Residue	1
Stones/gravel	3
Flot matrix (relative abundance)	
Charcoal	2
Leaf litter	2

(c: cereal types, x: wide niche) Relative abundance is based on a scale from 1 (lowest) to 3 (highest) where 0 is not present.

Table 1: Details of environmental analysis

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 The archaeological watching brief monitored the excavation of all groundworks associated with the Bowness-on Solway pumping station. No archaeological finds or obvious archaeological remains were noted during the watching brief. However, the possibility that a single deposit related to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. As such, it was deemed appropriate to retain samples of the deposit for environmental sampling.

6.1.2 The environmental analysis of the retained samples was largely equivocal. Although the analysis revealed tentative evidence to suggest that the deposit from which the sample was taken may have appeared as an open ditch at one stage, no conclusions could be reached as to when, and under what circumstances deposition occurred.

6.2 RECOMMENDATIONS

6.2.1 As this watching brief was conducted as a condition of groundworks associated with the development of the Bowness-on-Solway pumping station, no further archaeological work is deemed necessary. However, given the site's location in relation to the Hadrian's Wall World Heritage Site, it is recommended that any work conducted in the future be subject to a similar programme of archaeological investigation.

7 BIBLIOGRAPHY

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APPENDIX 1: CONTEXT TABLE

Context Number	Context Type	Description
100	Deposit	Topsoil
101	Geological	Natural Substrate
102	Deposit	Subsoil
103	Deposit	Orange/Grey Sandy Clay
104	Deposit	Dark Brown/Grey Silty/Sandy Clay

Table 2: List of Contexts issued during Watching Brief

APPENDIX 2: FIGURES

BOWNESS-ON-SOLWAY PUMPING STATION, BOWNESS-ON-SOLWAY, CUMBRIA

WATCHING BRIEF REPORT

CP. NO: 870/09

02/11/2009

NORTH PENNINES ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

NORTH PENNINES ARCHAEOLOGY LTD

DOCUMENT TITLE:	Bowness-on-Solway Pumping Station, Bowness-on-Solway, Cumbria
DOCUMENT TYPE:	Watching Brief Report
CLIENT:	United Utilities
CP NUMBER:	870/09
SITE CODE:	BOS/A
PLANNING APP. NO:	' – '
OASIS REFERENCE:	northpen3-66259
PRINT DATE:	02/11/2009
GRID REFERENCE:	NY 2270 6260

Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by North Pennines Archaeology Ltd on the preparation of reports.

	01
PREPARED BY:	David Jackson
POSITION:	Assistant Supervisor
DATE:	26/10/09
EDITED BY:	Matt Town
POSITION:	Project Manager
DATE:	26/10/09
APPROVED BY:	Frank Giecco
POSITION:	Technical Director
DATE:	02/11/09

CONTENTS

ILLUSTRATIONS

FIGURES (APPENDIX 2)

PLATES

SUMMARY

North Pennines Archaeology Ltd were commissioned by United Utilities to undertake an archaeological watching brief close to the projected line of Hadrian's Wall at Bowness-on-Solway, Cumbria (NGR NY 2270 6260), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. Hadrian's Wall and much of the surrounding land is protected as a Scheduled Monument (SM no 26121). The proposed works were within the buffer zone of the Hadrian's Wall World Heritage Site. As a result, Mike Collins, Hadrian's Wall Archaeologist for English Heritage, recommended that a programme of archaeological works be undertaken in accordance with a written scheme of investigation submitted to and approved by the aforementioned. The work involved the monitoring of all ground reduction within the Hadrian's Wall buffer zone as specified in United Utilities drawing Y15519-01, which was supplied to both North Pennines Archaeology Ltd and Mike Collins of English Heritage.

The Archaeological Watching Brief was undertaken over three days between the 24th August and the 3rd September 2009. The watching brief monitored the excavation of three trenches associated with the Bowness-on-Solway pumping station within the immediate vicinity of the Hadrian's Wall World Heritage Site. No archaeological finds or obvious archaeological remains were observed during the watching brief, the trenches largely being comprised of naturally forming substrates and topsoils. However, a 1.5m deposit of dark brown silty clay was observed within Trench 2 and the southern end of Trench 1 which contrasted markedly against the surrounding natural substrates. The possibility that the deposit relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. Given the location of the trenches to Hadrian's Wall and its defensive features, it was deemed appropriate to retain environmental samples of this deposit.

Unfortunately, the environmental analysis was largely equivocal. The analysis revealed tentative evidence to suggest that the deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions could be reached as to when this occurred, or whether it was a long-term process, or one which occurred over a short period of a few years.

As this archaeological watching brief was conducted as part of a recommendation to observe groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station, no further work is deemed necessary. However, given the high archaeological potential of the area, it is recommended that any future work be subject to a programme of archaeological investigation.

ACKNOWLEDGEMENTS

North Pennines Archaeology Ltd would like to thank Bruce Pilling of United Utilities. Thanks are also due to Mike Collins of English Heritage. NPA Ltd would also like to thank the staff of United Utilities and Bethell Power Services for all their assistance throughout the project.

The archaeological watching brief was undertaken by David Jackson and Angus Clark, and the environmental analysis was undertaken by Don O' Meara, Environmental Assistant for NPA Ltd. The report was written by David Jackson, who also produced the drawngs. The project was managed by Frank Giecco, Technical Director of NPA Ltd. The report was edited by Matt Town, Project Manager for NPA Ltd.

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3.1.1 The study area is located at the eastern edge of Bowness-on-Solway, approximately 21km west of Carlisle, Cumbria (NY 2270 6260). The site is situated within a green field on the south shore of the Solway Firth, at a height of approximately 10m OD (Figure 2).

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3.1.3 The underlying geology of the study area is mainly comprised of mudstones and sandstones of Permo-Triassic age ('New Red Sandstone'). A small pocket of poorly exposed Liassic mudstones and limestones of Jurassic age overlie the Permo-Triassic rocks to the southeast, and Coal Measures, mudstones, sandstones and a few coals of Carboniferous age lie beneath the Permo-Triassic rocks, forming a restricted belt along the southern margin of the Solway Basin (Countryside Commission 1998). The underlying geology of the area is largely covered by large quantities of boulder clay, sand and gravel, deposited by thick ice-sheets and glacial meltwaters during the last glaciation (*ibid*).

3.2 HISTORICAL CONTEXT

3.2.1 This section is intended as a brief summary only, detailing the main periods of occupation within the immediate area of the site.

3.2.2 Hadrian's Wall was designated as a World Heritage Site in 1987 and forms the most complex and best preserved of the frontiers of the Roman Empire. (English Heritage 2002b). The World Heritage Site (WHS) comprises a visual envelope between 1km and 6km from the site in order to serve as a buffer zone to protect the site and its immediate landscape from development detrimental to the visual amenity of the site (*ibid*).

3.2.3 The WHS is centred on the military installations constructed from AD 122 on the orders of the Emperor Hadrian. The WHS also includes other Roman sites and structures which predate Hadrian's Wall, such as the arrangement of forts along the Cumbrian Coast between Bowness-on-Solway and Ravenglass, and incorporates a wealth of pre-Roman and post-Roman sites and landscapes (*op.cit.*). Hadrian's Wall was constructed in the early 2nd century on a line connecting the Tyne and the Solway and represented at various times the northern frontier of Roman Britain.

3.2.4 The Wall was a composite military barrier, which in its final form comprised several separate elements; a stone wall fronted by a V-shaped ditch, and a number of purpose-built stone garrison fortifications such as forts, milecastles and turrets, a large earthwork and ditch, built parallel with and to the south of the Wall, known as the Vallum, and a metalled supply road linking the garrison forts, which is known as the 'Roman Military Way'. The Wall begins in the east at Wallsend in Tyneside and continues to the west, terminating at Bowness-on-Solway, immediately west of the study area, a distance of 80 Roman miles (73.5 English miles or 117 kilometres). The Wall, conceived by Hadrian was to be ten feet wide and about fifteen feet high. The front face of the wall most likely sported a crenulated parapet, behind which the soldiers patrolled along a paved rampart-walk (Bedoyere 1998). The more detailed history of Hadrian's Wall is well documented and is summarised in numerous publications (Breeze and Dobson 2000; Daniels 1978 and Birley 1961).

3.2.5 The fort at Bowness-on-Solway, known as *Maia*, guarded the strategic final fording point on the Solway and formed the western terminus of Hadrian's Wall. The stone-built fort was probably constructed in the late 2nd-early 3rd centuries AD, and was the second largest fort on Hadrian's Wall after Stanwix, occupying over six acres. As elsewhere on the western sector of the wall, the stone fort was preceded by an earlier, presumably Hadrianic, turf and timber fort, about which very little is known. Previous excavations and casual finds suggest that the fort was in use from the Hadrianic period (*c*.120's AD) to the 4th century (Giecco *et al* 2001).

3.3 PREVIOUS WORK

3.3.1 The main programmes of archaeological investigation at Bowness-on-Solway took place in 1930, 1955, 1967, 1973 and 1975, during which the western ramparts, the west gate and intervallum road, and adjacent barrack blocks of the fort were located.

3.3.2 More recent work in the village includes;

- a limited programme of archaeological work carried out by Carlisle Archaeology Ltd in the grounds of Maia House. No trace of the outer fort or ditch was found, but a medieval ditch was recorded (Zant 1996);
- a topographical and partial geophysical survey carried out by Manchester University at Demesne field, confirming the position of the southern road out of the fort and the presence of intensive settlement activity on either side of the road;
- a watching brief and programme of archaeological recording which involved the recording of 26 trenches of variable size. This demonstrated that, within the village, few Roman deposits survived beneath the modern roads, although south of the fort deposits including organic remains, woodwork, leatherwork and other artefacts were found within deposits up to 3m deep (Giecco *et al* 2000);
- an archaeological investigation undertaken in 2000 by Carlisle Archaeology Ltd which involved a watching brief of 131 trenches within the village. This investigation found the line of the eastern defences of the stone fort, and possibly part of the turf and timber fort, as well as possible post-Roman use of the fort (Giecco *et al* 2001);
- and an archaeological evaluation conducted by North Pennines Archaeology Ltd in 2004 within Demesne field, immediately south of the fort. The evaluation revealed significant Roman remains at a depth of 0.25m below the surface, including a substantial Roman strip building with surviving occupation layers, and demolition deposits of probable late Roman date (Giecco and Crompton 2004).

4 ARCHAEOLOGICAL WATCHING BRIEF

4.1 INTRODUCTION

4.1.1 The archaeological watching brief took place intermittently between the 24th August and the 3rd September 2009, and comprised the observation and investigation of all groundworks associated with the a new power supply for the Bowness-on-Solway pumping station. A total of three trenches were excavated with a JCB 8060 mechanical excavator using a *c*.0.5m wide toothed bucket. The results of the watching brief are summarised below.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located at the western edge of field number 7970, *c*.12m north of the field's southern boundary (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.95m in length and *c*.0.6m in width. Trench 1 was excavated to an average depth of 0.8m and was largely comprised of over 0.6m of grey/orange sandy clay **(103)**, below a *c*.0.12m deposit of mid-brown sandy clay subsoil **(102)** and a *c*.0.1m deposit of dark brown sandy clay topsoil **(100)**. However, within the southern most *c*.7m of the trench, the grey/orange sandy clay **(103)** was replaced by a deposit of dark brown/grey silty clay **(104)** below the subsoil **(102)** and topsoil **(100)** (Plate 1), which measured over 0.6m in depth. The possibility that the deposit **(104)** relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, has been considered. Unfortunately, the sudden change between the grey/orange sandy clay **(103)** and the dark brown/grey silty clay **(104)** could not be thoroughly investigated due to the flooding of Trench 1 from surface water during excavation (Plate 2), although no clear cut which might suggest a ditch or similar feature was observed. However, samples of the silty clay deposit **(104)** were taken for environmental sampling (see Section 5 below).

4.2.2 ***Trench 2:*** Trench 2 was located at the southern end of Trench 1 within field number 7970 (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.2m in length and *c*.1.8m in width. Trench 2 was excavated to a depth of *c*.1.8m exposing *c*.1.5m of the dark brown/grey silty clay **(104)** below *c*.0.2m of subsoil **(102)** and topsoil **(100)**, although any discreet changes at the bottom of the trench would not have been noted at this depth (Plate 3).

Plate 1: View north-northeast of Trench 1

Plate 2: East facing section of Trench 1

Plate 3: North facing section of Trench 2 showing deposit ***(104)***

Plate 4: South facing section of Trench 3

4.2.3 ***Trench 3:*** Trench 3 was located within field number 7055, immediately south of the field's northern boundary (Figure 2). The trench was aligned east to west and measured *c*.15m in length and *c*.0.5m in width in order to earth and existing electricity pole (No. 010808). Trench 3 was excavated to a maximum depth of 1.2m revealing *c*.0.3m of natural orange/grey boulder clay **(101)** below *c*.0.85m of grey/orange sandy clay **(103)** and *c*.0.06m of dark brown sandy clay topsoil **(100)** (Plate 4).

4.3 ARCHAEOLOGICAL FINDS

4.3.1 No archaeological finds were recovered during the groundworks associated with the Bowness-on-Solway pumping station.

5 ENVIRONMENTAL ANALYSES

5.1 INTRODUCTION

5.1.1 During the course of the archaeological watching brief at Bowness-on-Solway it was recognised that contexts bearing the archaeobotanical remains of past human activity may be encountered.

5.1.2 One context was considered worth sampling. This was sample **(104) <1>**.

5.1.3 The methodology employed required that the whole earth samples be broken down and split into their various different components. Both samples were fully processed by being manually floated and sieved through a 'Siraf' style flotation tank.

5.1.4 The residue from each sample was retained, described and scanned using a magnet for ferrous fragments. The flot was dried slowly and scanned at x40 magnification for charred and uncharred botanical remains. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at North Pennines Archaeology. Plant taxonomic nomenclature follows Stace (1997).

5.1.5 The retent, like the residue from wet sieving, will contain any larger items of bone, heavy (e.g. waterlogged) ecofacts or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage was done to allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. The retent samples were also scanned with a hand magnet to retrieve forms of magnetic material.

5.1.6 Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information, in respect of the depositional environment of the material, thus enabling assessment of anthropogenic activity, seasonality and climate and elements of the economy associated with the features from which the samples are removed.

5.1.7 Sample numbers appear in brackets thus < >, whilst context numbers appear in brackets thus ( ) for all analysis and discussion below. Results will be presented by Plot number numerically. Reference to seeds in the text is made using the richness scale of 1 = present, 2 = frequent and 3 = abundant, as seen in the tabular results attached.

5.2 RESULTS

5.2.1 Sample **(104) <1>** was taken from a deposit of silty clay. A 20litre sample was taken as it was hoped recovered plant remains might lend support to the theory that the context was connected to activity near the Roman defensive ditch which ran near the site.

5.2.2 The heavy residue material produced low amounts of magnetic material, all of which appears to be naturally occurring haematite. No material which would suggest cultural activity was recovered from this sample.

5.2.3 The flot material consisted of small amounts of charcoal but was mainly leaf-litter material. The origin of the charcoal is unknown at this point, and it occurred in quantities too small for radiometric dating to be undertaken. The leaf litter, however, does suggest that this sample came from a possible feature which was able to act as a basin of deposition which captured this material. The heavy clay may have created an anaerobic environment sufficient to prevent full organic decomposition of this material.

5.3 CONCLUSION

5.3.1 The deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of the partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions can be reached when this occurred, or whether this was a long-term process, or one which occurred over a short period of a few years.

5.3.2 It is not recommended that further work be undertaken on this sample as it does not allow conclusions to be drawn regarding human activity around the area of Bowness-on-Solway, Cumbria.

TABLE 1: ENVIRONMENTAL ANALYSIS FOR: CP870, Bowness-on-Solway, Cumbria

Sample	1
Context	104
Volume processed (litres)	20
Volume of retent(ml)	1500
Volume of flot (ml)	50
Samples suitable for radiocarbon dating	-
Residue contents (relative abundance)	
Bone/teeth, burnt bone	-
Charcoal	-
Flint/chert	-
Magnetic Residue	1
Stones/gravel	3
Flot matrix (relative abundance)	
Charcoal	2
Leaf litter	2

(c: cereal types, x: wide niche) Relative abundance is based on a scale from 1 (lowest) to 3 (highest) where 0 is not present.

Table 1: Details of environmental analysis

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 The archaeological watching brief monitored the excavation of all groundworks associated with the Bowness-on Solway pumping station. No archaeological finds or obvious archaeological remains were noted during the watching brief. However, the possibility that a single deposit related to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. As such, it was deemed appropriate to retain samples of the deposit for environmental sampling.

6.1.2 The environmental analysis of the retained samples was largely equivocal. Although the analysis revealed tentative evidence to suggest that the deposit from which the sample was taken may have appeared as an open ditch at one stage, no conclusions could be reached as to when, and under what circumstances deposition occurred.

6.2 RECOMMENDATIONS

6.2.1 As this watching brief was conducted as a condition of groundworks associated with the development of the Bowness-on-Solway pumping station, no further archaeological work is deemed necessary. However, given the site's location in relation to the Hadrian's Wall World Heritage Site, it is recommended that any work conducted in the future be subject to a similar programme of archaeological investigation.

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APPENDIX 1: CONTEXT TABLE

Context Number	Context Type	Description
100	Deposit	Topsoil
101	Geological	Natural Substrate
102	Deposit	Subsoil
103	Deposit	Orange/Grey Sandy Clay
104	Deposit	Dark Brown/Grey Silty/Sandy Clay

Table 2: List of Contexts issued during Watching Brief

APPENDIX 2: FIGURES

BOWNESS-ON-SOLWAY PUMPING STATION, BOWNESS-ON-SOLWAY, CUMBRIA

WATCHING BRIEF REPORT

CP. NO: 870/09

02/11/2009

NORTH PENNINES ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

NORTH PENNINES ARCHAEOLOGY LTD

DOCUMENT TITLE:	Bowness-on-Solway Pumping Station, Bowness-on-Solway, Cumbria
DOCUMENT TYPE:	Watching Brief Report
CLIENT:	United Utilities
CP NUMBER:	870/09
SITE CODE:	BOS/A
PLANNING APP. NO:	' – '
OASIS REFERENCE:	northpen3-66259
PRINT DATE:	02/11/2009
GRID REFERENCE:	NY 2270 6260

Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by North Pennines Archaeology Ltd on the preparation of reports.

	01
PREPARED BY:	David Jackson
POSITION:	Assistant Supervisor
DATE:	26/10/09
EDITED BY:	Matt Town
POSITION:	Project Manager
DATE:	26/10/09
APPROVED BY:	Frank Giecco
POSITION:	Technical Director
DATE:	02/11/09

CONTENTS

ILLUSTRATIONS

FIGURES (APPENDIX 2)

PLATES

SUMMARY

North Pennines Archaeology Ltd were commissioned by United Utilities to undertake an archaeological watching brief close to the projected line of Hadrian's Wall at Bowness-on-Solway, Cumbria (NGR NY 2270 6260), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. Hadrian's Wall and much of the surrounding land is protected as a Scheduled Monument (SM no 26121). The proposed works were within the buffer zone of the Hadrian's Wall World Heritage Site. As a result, Mike Collins, Hadrian's Wall Archaeologist for English Heritage, recommended that a programme of archaeological works be undertaken in accordance with a written scheme of investigation submitted to and approved by the aforementioned. The work involved the monitoring of all ground reduction within the Hadrian's Wall buffer zone as specified in United Utilities drawing Y15519-01, which was supplied to both North Pennines Archaeology Ltd and Mike Collins of English Heritage.

The Archaeological Watching Brief was undertaken over three days between the 24th August and the 3rd September 2009. The watching brief monitored the excavation of three trenches associated with the Bowness-on-Solway pumping station within the immediate vicinity of the Hadrian's Wall World Heritage Site. No archaeological finds or obvious archaeological remains were observed during the watching brief, the trenches largely being comprised of naturally forming substrates and topsoils. However, a 1.5m deposit of dark brown silty clay was observed within Trench 2 and the southern end of Trench 1 which contrasted markedly against the surrounding natural substrates. The possibility that the deposit relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. Given the location of the trenches to Hadrian's Wall and its defensive features, it was deemed appropriate to retain environmental samples of this deposit.

Unfortunately, the environmental analysis was largely equivocal. The analysis revealed tentative evidence to suggest that the deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions could be reached as to when this occurred, or whether it was a long-term process, or one which occurred over a short period of a few years.

As this archaeological watching brief was conducted as part of a recommendation to observe groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station, no further work is deemed necessary. However, given the high archaeological potential of the area, it is recommended that any future work be subject to a programme of archaeological investigation.

ACKNOWLEDGEMENTS

North Pennines Archaeology Ltd would like to thank Bruce Pilling of United Utilities. Thanks are also due to Mike Collins of English Heritage. NPA Ltd would also like to thank the staff of United Utilities and Bethell Power Services for all their assistance throughout the project.

The archaeological watching brief was undertaken by David Jackson and Angus Clark, and the environmental analysis was undertaken by Don O' Meara, Environmental Assistant for NPA Ltd. The report was written by David Jackson, who also produced the drawngs. The project was managed by Frank Giecco, Technical Director of NPA Ltd. The report was edited by Matt Town, Project Manager for NPA Ltd.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In August 2009, North Pennines Archaeology were invited by Bruce Pilling of United Utilities to maintain an archaeological watching brief at Bowness-on-Solway, Cumbria (NGR NY 2270 6260, Figure 1), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. The proposed works lie within the immediate vicinity of Hadrian's Wall (SM no 26121) and its associated features which are classified as a World Heritage Site. As a result, Mike Collins of English Heritage (Hadrian's Wall Archaeologist) requested that all ground reduction be subject to a programme of archaeological observation and investigation. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16).

1.1.2 All groundworks associated with the new electricity supply had to be excavated under full archaeological supervision and all stages of the archaeological work were undertaken following approved statutory guidelines (IfA 2008), and were consistent with the specification provided by NPA Ltd (Giecco 2009) and generally accepted best practice.

1.1.3 This report outlines the monitoring works undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works.

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by North Pennines Archaeology Ltd in response to a request by Bruce Pilling of United Utilities, for an archaeological watching brief of the study area. Following acceptance of the project design by Mike Collins of English Heritage, North Pennines Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA), and generally accepted best practice.

2.2 THE WATCHING BRIEF

2.2.1 The works involved a structured watching brief to observe, record and excavate any archaeological deposits from the development site. A watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons, on a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed (IfA 2008).

2.2.2 The aims and principal methodology of the watching brief can be summarised as follows:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record them;
- to carry out further excavation and recording work in adequate time, if intact archaeological remains are uncovered during the project;
- to accurately tie the area watched by the archaeologist into the National Grid at an appropriate scale, with any archaeological deposits and features adequately levelled;
- to sample environmental deposits encountered as required, in line with English Heritage (2002a) guidelines;
- to produce a photographic record of all contexts using colour digital, 35mm colour print and monochrome formats as applicable, each photograph including a graduated metric scale;
- to recover artefactual material, especially that useful of dating purposes;

- to produce a site archive in accordance with MAP2 (English Heritage 1991) and MoRPHE standards (English Heritage 2006).

2.2.3 Archaeological monitoring and supervision of groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station was undertaken intermittently over three days between the 24th August and the 3rd September 2009. A summary of the findings of the watching brief is included within this report.

2.3 THE ARCHIVE

2.3.1 A full professional archive has been compiled in accordance with the specification, and in line with current UKIC (1990) and English Heritage Guidelines (1991) and according to the Archaeological Archives Forum recommendations (Brown 2007). The archive will be deposited within the Senhouse Museum, Maryport, with copies of the report sent to the County Historic Environment Record at Kendal, available upon request. The archive can be accessed under the unique project identifier **NPA09**, **BOS-A**, **CP/870/09**.

2.3.2 North Pennines Archaeology, and English Heritage, support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by North Pennines Archaeology, as a part of this national project.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The study area is located at the eastern edge of Bowness-on-Solway, approximately 21km west of Carlisle, Cumbria (NY 2270 6260). The site is situated within a green field on the south shore of the Solway Firth, at a height of approximately 10m OD (Figure 2).

3.1.2 The broader area of the site is known as the Solway Basin and is a broad, lowland plain landscape fringed by the low, rugged, relatively remote coastline of the Solway Firth and Irish Sea (Countryside Commission 1998). The Solway Plain is open and exposed to the prevailing southwesterly winds and tree cover is limited. This area is characterised by dairy cattle grazing on fields of improved pasture, which are variously defined by drainage ditches, small streams, low wind-sheared hedgerows and stone-faced hedgebanks or 'kests'. The area to the east of the site includes flat marshland where the rivers Eden, Esk and Lyne flow into the Solway (*ibid*).

3.1.3 The underlying geology of the study area is mainly comprised of mudstones and sandstones of Permo-Triassic age ('New Red Sandstone'). A small pocket of poorly exposed Liassic mudstones and limestones of Jurassic age overlie the Permo-Triassic rocks to the southeast, and Coal Measures, mudstones, sandstones and a few coals of Carboniferous age lie beneath the Permo-Triassic rocks, forming a restricted belt along the southern margin of the Solway Basin (Countryside Commission 1998). The underlying geology of the area is largely covered by large quantities of boulder clay, sand and gravel, deposited by thick ice-sheets and glacial meltwaters during the last glaciation (*ibid*).

3.2 HISTORICAL CONTEXT

3.2.1 This section is intended as a brief summary only, detailing the main periods of occupation within the immediate area of the site.

3.2.2 Hadrian's Wall was designated as a World Heritage Site in 1987 and forms the most complex and best preserved of the frontiers of the Roman Empire. (English Heritage 2002b). The World Heritage Site (WHS) comprises a visual envelope between 1km and 6km from the site in order to serve as a buffer zone to protect the site and its immediate landscape from development detrimental to the visual amenity of the site (*ibid*).

3.2.3 The WHS is centred on the military installations constructed from AD 122 on the orders of the Emperor Hadrian. The WHS also includes other Roman sites and structures which predate Hadrian's Wall, such as the arrangement of forts along the Cumbrian Coast between Bowness-on-Solway and Ravenglass, and incorporates a wealth of pre-Roman and post-Roman sites and landscapes (*op.cit.*). Hadrian's Wall was constructed in the early 2nd century on a line connecting the Tyne and the Solway and represented at various times the northern frontier of Roman Britain.

3.2.4 The Wall was a composite military barrier, which in its final form comprised several separate elements; a stone wall fronted by a V-shaped ditch, and a number of purpose-built stone garrison fortifications such as forts, milecastles and turrets, a large earthwork and ditch, built parallel with and to the south of the Wall, known as the Vallum, and a metalled supply road linking the garrison forts, which is known as the 'Roman Military Way'. The Wall begins in the east at Wallsend in Tyneside and continues to the west, terminating at Bowness-on-Solway, immediately west of the study area, a distance of 80 Roman miles (73.5 English miles or 117 kilometres). The Wall, conceived by Hadrian was to be ten feet wide and about fifteen feet high. The front face of the wall most likely sported a crenulated parapet, behind which the soldiers patrolled along a paved rampart-walk (Bedoyere 1998). The more detailed history of Hadrian's Wall is well documented and is summarised in numerous publications (Breeze and Dobson 2000; Daniels 1978 and Birley 1961).

3.2.5 The fort at Bowness-on-Solway, known as *Maia*, guarded the strategic final fording point on the Solway and formed the western terminus of Hadrian's Wall. The stone-built fort was probably constructed in the late 2nd-early 3rd centuries AD, and was the second largest fort on Hadrian's Wall after Stanwix, occupying over six acres. As elsewhere on the western sector of the wall, the stone fort was preceded by an earlier, presumably Hadrianic, turf and timber fort, about which very little is known. Previous excavations and casual finds suggest that the fort was in use from the Hadrianic period (*c*.120's AD) to the 4th century (Giecco *et al* 2001).

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3.3.1 The main programmes of archaeological investigation at Bowness-on-Solway took place in 1930, 1955, 1967, 1973 and 1975, during which the western ramparts, the west gate and intervallum road, and adjacent barrack blocks of the fort were located.

3.3.2 More recent work in the village includes;

- a limited programme of archaeological work carried out by Carlisle Archaeology Ltd in the grounds of Maia House. No trace of the outer fort or ditch was found, but a medieval ditch was recorded (Zant 1996);
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- a watching brief and programme of archaeological recording which involved the recording of 26 trenches of variable size. This demonstrated that, within the village, few Roman deposits survived beneath the modern roads, although south of the fort deposits including organic remains, woodwork, leatherwork and other artefacts were found within deposits up to 3m deep (Giecco *et al* 2000);
- an archaeological investigation undertaken in 2000 by Carlisle Archaeology Ltd which involved a watching brief of 131 trenches within the village. This investigation found the line of the eastern defences of the stone fort, and possibly part of the turf and timber fort, as well as possible post-Roman use of the fort (Giecco *et al* 2001);
- and an archaeological evaluation conducted by North Pennines Archaeology Ltd in 2004 within Demesne field, immediately south of the fort. The evaluation revealed significant Roman remains at a depth of 0.25m below the surface, including a substantial Roman strip building with surviving occupation layers, and demolition deposits of probable late Roman date (Giecco and Crompton 2004).

4 ARCHAEOLOGICAL WATCHING BRIEF

4.1 INTRODUCTION

4.1.1 The archaeological watching brief took place intermittently between the 24th August and the 3rd September 2009, and comprised the observation and investigation of all groundworks associated with the a new power supply for the Bowness-on-Solway pumping station. A total of three trenches were excavated with a JCB 8060 mechanical excavator using a *c*.0.5m wide toothed bucket. The results of the watching brief are summarised below.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located at the western edge of field number 7970, *c*.12m north of the field's southern boundary (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.95m in length and *c*.0.6m in width. Trench 1 was excavated to an average depth of 0.8m and was largely comprised of over 0.6m of grey/orange sandy clay **(103)**, below a *c*.0.12m deposit of mid-brown sandy clay subsoil **(102)** and a *c*.0.1m deposit of dark brown sandy clay topsoil **(100)**. However, within the southern most *c*.7m of the trench, the grey/orange sandy clay **(103)** was replaced by a deposit of dark brown/grey silty clay **(104)** below the subsoil **(102)** and topsoil **(100)** (Plate 1), which measured over 0.6m in depth. The possibility that the deposit **(104)** relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, has been considered. Unfortunately, the sudden change between the grey/orange sandy clay **(103)** and the dark brown/grey silty clay **(104)** could not be thoroughly investigated due to the flooding of Trench 1 from surface water during excavation (Plate 2), although no clear cut which might suggest a ditch or similar feature was observed. However, samples of the silty clay deposit **(104)** were taken for environmental sampling (see Section 5 below).

4.2.2 ***Trench 2:*** Trench 2 was located at the southern end of Trench 1 within field number 7970 (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.2m in length and *c*.1.8m in width. Trench 2 was excavated to a depth of *c*.1.8m exposing *c*.1.5m of the dark brown/grey silty clay **(104)** below *c*.0.2m of subsoil **(102)** and topsoil **(100)**, although any discreet changes at the bottom of the trench would not have been noted at this depth (Plate 3).

Plate 1: View north-northeast of Trench 1

Plate 2: East facing section of Trench 1

Plate 3: North facing section of Trench 2 showing deposit ***(104)***

Plate 4: South facing section of Trench 3

4.2.3 ***Trench 3:*** Trench 3 was located within field number 7055, immediately south of the field's northern boundary (Figure 2). The trench was aligned east to west and measured *c*.15m in length and *c*.0.5m in width in order to earth and existing electricity pole (No. 010808). Trench 3 was excavated to a maximum depth of 1.2m revealing *c*.0.3m of natural orange/grey boulder clay **(101)** below *c*.0.85m of grey/orange sandy clay **(103)** and *c*.0.06m of dark brown sandy clay topsoil **(100)** (Plate 4).

4.3 ARCHAEOLOGICAL FINDS

4.3.1 No archaeological finds were recovered during the groundworks associated with the Bowness-on-Solway pumping station.

5 ENVIRONMENTAL ANALYSES

5.1 INTRODUCTION

5.1.1 During the course of the archaeological watching brief at Bowness-on-Solway it was recognised that contexts bearing the archaeobotanical remains of past human activity may be encountered.

5.1.2 One context was considered worth sampling. This was sample **(104) <1>**.

5.1.3 The methodology employed required that the whole earth samples be broken down and split into their various different components. Both samples were fully processed by being manually floated and sieved through a 'Siraf' style flotation tank.

5.1.4 The residue from each sample was retained, described and scanned using a magnet for ferrous fragments. The flot was dried slowly and scanned at x40 magnification for charred and uncharred botanical remains. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at North Pennines Archaeology. Plant taxonomic nomenclature follows Stace (1997).

5.1.5 The retent, like the residue from wet sieving, will contain any larger items of bone, heavy (e.g. waterlogged) ecofacts or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage was done to allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. The retent samples were also scanned with a hand magnet to retrieve forms of magnetic material.

5.1.6 Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information, in respect of the depositional environment of the material, thus enabling assessment of anthropogenic activity, seasonality and climate and elements of the economy associated with the features from which the samples are removed.

5.1.7 Sample numbers appear in brackets thus < >, whilst context numbers appear in brackets thus ( ) for all analysis and discussion below. Results will be presented by Plot number numerically. Reference to seeds in the text is made using the richness scale of 1 = present, 2 = frequent and 3 = abundant, as seen in the tabular results attached.

5.2 RESULTS

5.2.1 Sample **(104) <1>** was taken from a deposit of silty clay. A 20litre sample was taken as it was hoped recovered plant remains might lend support to the theory that the context was connected to activity near the Roman defensive ditch which ran near the site.

5.2.2 The heavy residue material produced low amounts of magnetic material, all of which appears to be naturally occurring haematite. No material which would suggest cultural activity was recovered from this sample.

5.2.3 The flot material consisted of small amounts of charcoal but was mainly leaf-litter material. The origin of the charcoal is unknown at this point, and it occurred in quantities too small for radiometric dating to be undertaken. The leaf litter, however, does suggest that this sample came from a possible feature which was able to act as a basin of deposition which captured this material. The heavy clay may have created an anaerobic environment sufficient to prevent full organic decomposition of this material.

5.3 CONCLUSION

5.3.1 The deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of the partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions can be reached when this occurred, or whether this was a long-term process, or one which occurred over a short period of a few years.

5.3.2 It is not recommended that further work be undertaken on this sample as it does not allow conclusions to be drawn regarding human activity around the area of Bowness-on-Solway, Cumbria.

TABLE 1: ENVIRONMENTAL ANALYSIS FOR: CP870, Bowness-on-Solway, Cumbria

Sample	1
Context	104
Volume processed (litres)	20
Volume of retent(ml)	1500
Volume of flot (ml)	50
Samples suitable for radiocarbon dating	-
Residue contents (relative abundance)	
Bone/teeth, burnt bone	-
Charcoal	-
Flint/chert	-
Magnetic Residue	1
Stones/gravel	3
Flot matrix (relative abundance)	
Charcoal	2
Leaf litter	2

(c: cereal types, x: wide niche) Relative abundance is based on a scale from 1 (lowest) to 3 (highest) where 0 is not present.

Table 1: Details of environmental analysis

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 The archaeological watching brief monitored the excavation of all groundworks associated with the Bowness-on Solway pumping station. No archaeological finds or obvious archaeological remains were noted during the watching brief. However, the possibility that a single deposit related to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. As such, it was deemed appropriate to retain samples of the deposit for environmental sampling.

6.1.2 The environmental analysis of the retained samples was largely equivocal. Although the analysis revealed tentative evidence to suggest that the deposit from which the sample was taken may have appeared as an open ditch at one stage, no conclusions could be reached as to when, and under what circumstances deposition occurred.

6.2 RECOMMENDATIONS

6.2.1 As this watching brief was conducted as a condition of groundworks associated with the development of the Bowness-on-Solway pumping station, no further archaeological work is deemed necessary. However, given the site's location in relation to the Hadrian's Wall World Heritage Site, it is recommended that any work conducted in the future be subject to a similar programme of archaeological investigation.

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APPENDIX 1: CONTEXT TABLE

Context Number	Context Type	Description
100	Deposit	Topsoil
101	Geological	Natural Substrate
102	Deposit	Subsoil
103	Deposit	Orange/Grey Sandy Clay
104	Deposit	Dark Brown/Grey Silty/Sandy Clay

Table 2: List of Contexts issued during Watching Brief

APPENDIX 2: FIGURES

BOWNESS-ON-SOLWAY PUMPING STATION, BOWNESS-ON-SOLWAY, CUMBRIA

WATCHING BRIEF REPORT

CP. NO: 870/09

02/11/2009

NORTH PENNINES ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

NORTH PENNINES ARCHAEOLOGY LTD

DOCUMENT TITLE:	Bowness-on-Solway Pumping Station, Bowness-on-Solway, Cumbria
DOCUMENT TYPE:	Watching Brief Report
CLIENT:	United Utilities
CP NUMBER:	870/09
SITE CODE:	BOS/A
PLANNING APP. NO:	' – '
OASIS REFERENCE:	northpen3-66259
PRINT DATE:	02/11/2009
GRID REFERENCE:	NY 2270 6260

Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by North Pennines Archaeology Ltd on the preparation of reports.

	01
PREPARED BY:	David Jackson
POSITION:	Assistant Supervisor
DATE:	26/10/09
EDITED BY:	Matt Town
POSITION:	Project Manager
DATE:	26/10/09
APPROVED BY:	Frank Giecco
POSITION:	Technical Director
DATE:	02/11/09

CONTENTS

ILLUSTRATIONS

FIGURES (APPENDIX 2)

PLATES

SUMMARY

North Pennines Archaeology Ltd were commissioned by United Utilities to undertake an archaeological watching brief close to the projected line of Hadrian's Wall at Bowness-on-Solway, Cumbria (NGR NY 2270 6260), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. Hadrian's Wall and much of the surrounding land is protected as a Scheduled Monument (SM no 26121). The proposed works were within the buffer zone of the Hadrian's Wall World Heritage Site. As a result, Mike Collins, Hadrian's Wall Archaeologist for English Heritage, recommended that a programme of archaeological works be undertaken in accordance with a written scheme of investigation submitted to and approved by the aforementioned. The work involved the monitoring of all ground reduction within the Hadrian's Wall buffer zone as specified in United Utilities drawing Y15519-01, which was supplied to both North Pennines Archaeology Ltd and Mike Collins of English Heritage.

The Archaeological Watching Brief was undertaken over three days between the 24th August and the 3rd September 2009. The watching brief monitored the excavation of three trenches associated with the Bowness-on-Solway pumping station within the immediate vicinity of the Hadrian's Wall World Heritage Site. No archaeological finds or obvious archaeological remains were observed during the watching brief, the trenches largely being comprised of naturally forming substrates and topsoils. However, a 1.5m deposit of dark brown silty clay was observed within Trench 2 and the southern end of Trench 1 which contrasted markedly against the surrounding natural substrates. The possibility that the deposit relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. Given the location of the trenches to Hadrian's Wall and its defensive features, it was deemed appropriate to retain environmental samples of this deposit.

Unfortunately, the environmental analysis was largely equivocal. The analysis revealed tentative evidence to suggest that the deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions could be reached as to when this occurred, or whether it was a long-term process, or one which occurred over a short period of a few years.

As this archaeological watching brief was conducted as part of a recommendation to observe groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station, no further work is deemed necessary. However, given the high archaeological potential of the area, it is recommended that any future work be subject to a programme of archaeological investigation.

ACKNOWLEDGEMENTS

North Pennines Archaeology Ltd would like to thank Bruce Pilling of United Utilities. Thanks are also due to Mike Collins of English Heritage. NPA Ltd would also like to thank the staff of United Utilities and Bethell Power Services for all their assistance throughout the project.

The archaeological watching brief was undertaken by David Jackson and Angus Clark, and the environmental analysis was undertaken by Don O' Meara, Environmental Assistant for NPA Ltd. The report was written by David Jackson, who also produced the drawngs. The project was managed by Frank Giecco, Technical Director of NPA Ltd. The report was edited by Matt Town, Project Manager for NPA Ltd.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In August 2009, North Pennines Archaeology were invited by Bruce Pilling of United Utilities to maintain an archaeological watching brief at Bowness-on-Solway, Cumbria (NGR NY 2270 6260, Figure 1), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. The proposed works lie within the immediate vicinity of Hadrian's Wall (SM no 26121) and its associated features which are classified as a World Heritage Site. As a result, Mike Collins of English Heritage (Hadrian's Wall Archaeologist) requested that all ground reduction be subject to a programme of archaeological observation and investigation. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16).

1.1.2 All groundworks associated with the new electricity supply had to be excavated under full archaeological supervision and all stages of the archaeological work were undertaken following approved statutory guidelines (IfA 2008), and were consistent with the specification provided by NPA Ltd (Giecco 2009) and generally accepted best practice.

1.1.3 This report outlines the monitoring works undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works.

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by North Pennines Archaeology Ltd in response to a request by Bruce Pilling of United Utilities, for an archaeological watching brief of the study area. Following acceptance of the project design by Mike Collins of English Heritage, North Pennines Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA), and generally accepted best practice.

2.2 THE WATCHING BRIEF

2.2.1 The works involved a structured watching brief to observe, record and excavate any archaeological deposits from the development site. A watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons, on a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed (IfA 2008).

2.2.2 The aims and principal methodology of the watching brief can be summarised as follows:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record them;
- to carry out further excavation and recording work in adequate time, if intact archaeological remains are uncovered during the project;
- to accurately tie the area watched by the archaeologist into the National Grid at an appropriate scale, with any archaeological deposits and features adequately levelled;
- to sample environmental deposits encountered as required, in line with English Heritage (2002a) guidelines;
- to produce a photographic record of all contexts using colour digital, 35mm colour print and monochrome formats as applicable, each photograph including a graduated metric scale;
- to recover artefactual material, especially that useful of dating purposes;

- to produce a site archive in accordance with MAP2 (English Heritage 1991) and MoRPHE standards (English Heritage 2006).

2.2.3 Archaeological monitoring and supervision of groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station was undertaken intermittently over three days between the 24th August and the 3rd September 2009. A summary of the findings of the watching brief is included within this report.

2.3 THE ARCHIVE

2.3.1 A full professional archive has been compiled in accordance with the specification, and in line with current UKIC (1990) and English Heritage Guidelines (1991) and according to the Archaeological Archives Forum recommendations (Brown 2007). The archive will be deposited within the Senhouse Museum, Maryport, with copies of the report sent to the County Historic Environment Record at Kendal, available upon request. The archive can be accessed under the unique project identifier **NPA09**, **BOS-A**, **CP/870/09**.

2.3.2 North Pennines Archaeology, and English Heritage, support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by North Pennines Archaeology, as a part of this national project.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The study area is located at the eastern edge of Bowness-on-Solway, approximately 21km west of Carlisle, Cumbria (NY 2270 6260). The site is situated within a green field on the south shore of the Solway Firth, at a height of approximately 10m OD (Figure 2).

3.1.2 The broader area of the site is known as the Solway Basin and is a broad, lowland plain landscape fringed by the low, rugged, relatively remote coastline of the Solway Firth and Irish Sea (Countryside Commission 1998). The Solway Plain is open and exposed to the prevailing southwesterly winds and tree cover is limited. This area is characterised by dairy cattle grazing on fields of improved pasture, which are variously defined by drainage ditches, small streams, low wind-sheared hedgerows and stone-faced hedgebanks or 'kests'. The area to the east of the site includes flat marshland where the rivers Eden, Esk and Lyne flow into the Solway (*ibid*).

3.1.3 The underlying geology of the study area is mainly comprised of mudstones and sandstones of Permo-Triassic age ('New Red Sandstone'). A small pocket of poorly exposed Liassic mudstones and limestones of Jurassic age overlie the Permo-Triassic rocks to the southeast, and Coal Measures, mudstones, sandstones and a few coals of Carboniferous age lie beneath the Permo-Triassic rocks, forming a restricted belt along the southern margin of the Solway Basin (Countryside Commission 1998). The underlying geology of the area is largely covered by large quantities of boulder clay, sand and gravel, deposited by thick ice-sheets and glacial meltwaters during the last glaciation (*ibid*).

3.2 HISTORICAL CONTEXT

3.2.1 This section is intended as a brief summary only, detailing the main periods of occupation within the immediate area of the site.

3.2.2 Hadrian's Wall was designated as a World Heritage Site in 1987 and forms the most complex and best preserved of the frontiers of the Roman Empire. (English Heritage 2002b). The World Heritage Site (WHS) comprises a visual envelope between 1km and 6km from the site in order to serve as a buffer zone to protect the site and its immediate landscape from development detrimental to the visual amenity of the site (*ibid*).

3.2.3 The WHS is centred on the military installations constructed from AD 122 on the orders of the Emperor Hadrian. The WHS also includes other Roman sites and structures which predate Hadrian's Wall, such as the arrangement of forts along the Cumbrian Coast between Bowness-on-Solway and Ravenglass, and incorporates a wealth of pre-Roman and post-Roman sites and landscapes (*op.cit.*). Hadrian's Wall was constructed in the early 2nd century on a line connecting the Tyne and the Solway and represented at various times the northern frontier of Roman Britain.

3.2.4 The Wall was a composite military barrier, which in its final form comprised several separate elements; a stone wall fronted by a V-shaped ditch, and a number of purpose-built stone garrison fortifications such as forts, milecastles and turrets, a large earthwork and ditch, built parallel with and to the south of the Wall, known as the Vallum, and a metalled supply road linking the garrison forts, which is known as the 'Roman Military Way'. The Wall begins in the east at Wallsend in Tyneside and continues to the west, terminating at Bowness-on-Solway, immediately west of the study area, a distance of 80 Roman miles (73.5 English miles or 117 kilometres). The Wall, conceived by Hadrian was to be ten feet wide and about fifteen feet high. The front face of the wall most likely sported a crenulated parapet, behind which the soldiers patrolled along a paved rampart-walk (Bedoyere 1998). The more detailed history of Hadrian's Wall is well documented and is summarised in numerous publications (Breeze and Dobson 2000; Daniels 1978 and Birley 1961).

3.2.5 The fort at Bowness-on-Solway, known as *Maia*, guarded the strategic final fording point on the Solway and formed the western terminus of Hadrian's Wall. The stone-built fort was probably constructed in the late 2nd-early 3rd centuries AD, and was the second largest fort on Hadrian's Wall after Stanwix, occupying over six acres. As elsewhere on the western sector of the wall, the stone fort was preceded by an earlier, presumably Hadrianic, turf and timber fort, about which very little is known. Previous excavations and casual finds suggest that the fort was in use from the Hadrianic period (*c*.120's AD) to the 4th century (Giecco *et al* 2001).

3.3 PREVIOUS WORK

3.3.1 The main programmes of archaeological investigation at Bowness-on-Solway took place in 1930, 1955, 1967, 1973 and 1975, during which the western ramparts, the west gate and intervallum road, and adjacent barrack blocks of the fort were located.

3.3.2 More recent work in the village includes;

- a limited programme of archaeological work carried out by Carlisle Archaeology Ltd in the grounds of Maia House. No trace of the outer fort or ditch was found, but a medieval ditch was recorded (Zant 1996);
- a topographical and partial geophysical survey carried out by Manchester University at Demesne field, confirming the position of the southern road out of the fort and the presence of intensive settlement activity on either side of the road;
- a watching brief and programme of archaeological recording which involved the recording of 26 trenches of variable size. This demonstrated that, within the village, few Roman deposits survived beneath the modern roads, although south of the fort deposits including organic remains, woodwork, leatherwork and other artefacts were found within deposits up to 3m deep (Giecco *et al* 2000);
- an archaeological investigation undertaken in 2000 by Carlisle Archaeology Ltd which involved a watching brief of 131 trenches within the village. This investigation found the line of the eastern defences of the stone fort, and possibly part of the turf and timber fort, as well as possible post-Roman use of the fort (Giecco *et al* 2001);
- and an archaeological evaluation conducted by North Pennines Archaeology Ltd in 2004 within Demesne field, immediately south of the fort. The evaluation revealed significant Roman remains at a depth of 0.25m below the surface, including a substantial Roman strip building with surviving occupation layers, and demolition deposits of probable late Roman date (Giecco and Crompton 2004).

4 ARCHAEOLOGICAL WATCHING BRIEF

4.1 INTRODUCTION

4.1.1 The archaeological watching brief took place intermittently between the 24th August and the 3rd September 2009, and comprised the observation and investigation of all groundworks associated with the a new power supply for the Bowness-on-Solway pumping station. A total of three trenches were excavated with a JCB 8060 mechanical excavator using a *c*.0.5m wide toothed bucket. The results of the watching brief are summarised below.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located at the western edge of field number 7970, *c*.12m north of the field's southern boundary (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.95m in length and *c*.0.6m in width. Trench 1 was excavated to an average depth of 0.8m and was largely comprised of over 0.6m of grey/orange sandy clay **(103)**, below a *c*.0.12m deposit of mid-brown sandy clay subsoil **(102)** and a *c*.0.1m deposit of dark brown sandy clay topsoil **(100)**. However, within the southern most *c*.7m of the trench, the grey/orange sandy clay **(103)** was replaced by a deposit of dark brown/grey silty clay **(104)** below the subsoil **(102)** and topsoil **(100)** (Plate 1), which measured over 0.6m in depth. The possibility that the deposit **(104)** relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, has been considered. Unfortunately, the sudden change between the grey/orange sandy clay **(103)** and the dark brown/grey silty clay **(104)** could not be thoroughly investigated due to the flooding of Trench 1 from surface water during excavation (Plate 2), although no clear cut which might suggest a ditch or similar feature was observed. However, samples of the silty clay deposit **(104)** were taken for environmental sampling (see Section 5 below).

4.2.2 ***Trench 2:*** Trench 2 was located at the southern end of Trench 1 within field number 7970 (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.2m in length and *c*.1.8m in width. Trench 2 was excavated to a depth of *c*.1.8m exposing *c*.1.5m of the dark brown/grey silty clay **(104)** below *c*.0.2m of subsoil **(102)** and topsoil **(100)**, although any discreet changes at the bottom of the trench would not have been noted at this depth (Plate 3).

Plate 1: View north-northeast of Trench 1

Plate 2: East facing section of Trench 1

Plate 3: North facing section of Trench 2 showing deposit ***(104)***

Plate 4: South facing section of Trench 3

4.2.3 ***Trench 3:*** Trench 3 was located within field number 7055, immediately south of the field's northern boundary (Figure 2). The trench was aligned east to west and measured *c*.15m in length and *c*.0.5m in width in order to earth and existing electricity pole (No. 010808). Trench 3 was excavated to a maximum depth of 1.2m revealing *c*.0.3m of natural orange/grey boulder clay **(101)** below *c*.0.85m of grey/orange sandy clay **(103)** and *c*.0.06m of dark brown sandy clay topsoil **(100)** (Plate 4).

4.3 ARCHAEOLOGICAL FINDS

4.3.1 No archaeological finds were recovered during the groundworks associated with the Bowness-on-Solway pumping station.

5 ENVIRONMENTAL ANALYSES

5.1 INTRODUCTION

5.1.1 During the course of the archaeological watching brief at Bowness-on-Solway it was recognised that contexts bearing the archaeobotanical remains of past human activity may be encountered.

5.1.2 One context was considered worth sampling. This was sample **(104) <1>**.

5.1.3 The methodology employed required that the whole earth samples be broken down and split into their various different components. Both samples were fully processed by being manually floated and sieved through a 'Siraf' style flotation tank.

5.1.4 The residue from each sample was retained, described and scanned using a magnet for ferrous fragments. The flot was dried slowly and scanned at x40 magnification for charred and uncharred botanical remains. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at North Pennines Archaeology. Plant taxonomic nomenclature follows Stace (1997).

5.1.5 The retent, like the residue from wet sieving, will contain any larger items of bone, heavy (e.g. waterlogged) ecofacts or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage was done to allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. The retent samples were also scanned with a hand magnet to retrieve forms of magnetic material.

5.1.6 Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information, in respect of the depositional environment of the material, thus enabling assessment of anthropogenic activity, seasonality and climate and elements of the economy associated with the features from which the samples are removed.

5.1.7 Sample numbers appear in brackets thus < >, whilst context numbers appear in brackets thus ( ) for all analysis and discussion below. Results will be presented by Plot number numerically. Reference to seeds in the text is made using the richness scale of 1 = present, 2 = frequent and 3 = abundant, as seen in the tabular results attached.

5.2 RESULTS

5.2.1 Sample **(104) <1>** was taken from a deposit of silty clay. A 20litre sample was taken as it was hoped recovered plant remains might lend support to the theory that the context was connected to activity near the Roman defensive ditch which ran near the site.

5.2.2 The heavy residue material produced low amounts of magnetic material, all of which appears to be naturally occurring haematite. No material which would suggest cultural activity was recovered from this sample.

5.2.3 The flot material consisted of small amounts of charcoal but was mainly leaf-litter material. The origin of the charcoal is unknown at this point, and it occurred in quantities too small for radiometric dating to be undertaken. The leaf litter, however, does suggest that this sample came from a possible feature which was able to act as a basin of deposition which captured this material. The heavy clay may have created an anaerobic environment sufficient to prevent full organic decomposition of this material.

5.3 CONCLUSION

5.3.1 The deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of the partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions can be reached when this occurred, or whether this was a long-term process, or one which occurred over a short period of a few years.

5.3.2 It is not recommended that further work be undertaken on this sample as it does not allow conclusions to be drawn regarding human activity around the area of Bowness-on-Solway, Cumbria.

TABLE 1: ENVIRONMENTAL ANALYSIS FOR: CP870, Bowness-on-Solway, Cumbria

Sample	1
Context	104
Volume processed (litres)	20
Volume of retent(ml)	1500
Volume of flot (ml)	50
Samples suitable for radiocarbon dating	-
Residue contents (relative abundance)	
Bone/teeth, burnt bone	-
Charcoal	-
Flint/chert	-
Magnetic Residue	1
Stones/gravel	3
Flot matrix (relative abundance)	
Charcoal	2
Leaf litter	2

(c: cereal types, x: wide niche) Relative abundance is based on a scale from 1 (lowest) to 3 (highest) where 0 is not present.

Table 1: Details of environmental analysis

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 The archaeological watching brief monitored the excavation of all groundworks associated with the Bowness-on Solway pumping station. No archaeological finds or obvious archaeological remains were noted during the watching brief. However, the possibility that a single deposit related to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. As such, it was deemed appropriate to retain samples of the deposit for environmental sampling.

6.1.2 The environmental analysis of the retained samples was largely equivocal. Although the analysis revealed tentative evidence to suggest that the deposit from which the sample was taken may have appeared as an open ditch at one stage, no conclusions could be reached as to when, and under what circumstances deposition occurred.

6.2 RECOMMENDATIONS

6.2.1 As this watching brief was conducted as a condition of groundworks associated with the development of the Bowness-on-Solway pumping station, no further archaeological work is deemed necessary. However, given the site's location in relation to the Hadrian's Wall World Heritage Site, it is recommended that any work conducted in the future be subject to a similar programme of archaeological investigation.

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APPENDIX 1: CONTEXT TABLE

Context Number	Context Type	Description
100	Deposit	Topsoil
101	Geological	Natural Substrate
102	Deposit	Subsoil
103	Deposit	Orange/Grey Sandy Clay
104	Deposit	Dark Brown/Grey Silty/Sandy Clay

Table 2: List of Contexts issued during Watching Brief

APPENDIX 2: FIGURES

BOWNESS-ON-SOLWAY PUMPING STATION, BOWNESS-ON-SOLWAY, CUMBRIA

WATCHING BRIEF REPORT

CP. NO: 870/09

02/11/2009

NORTH PENNINES ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

NORTH PENNINES ARCHAEOLOGY LTD

DOCUMENT TITLE:	Bowness-on-Solway Pumping Station, Bowness-on-Solway, Cumbria
DOCUMENT TYPE:	Watching Brief Report
CLIENT:	United Utilities
CP NUMBER:	870/09
SITE CODE:	BOS/A
PLANNING APP. NO:	' – '
OASIS REFERENCE:	northpen3-66259
PRINT DATE:	02/11/2009
GRID REFERENCE:	NY 2270 6260

Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by North Pennines Archaeology Ltd on the preparation of reports.

	01
PREPARED BY:	David Jackson
POSITION:	Assistant Supervisor
DATE:	26/10/09
EDITED BY:	Matt Town
POSITION:	Project Manager
DATE:	26/10/09
APPROVED BY:	Frank Giecco
POSITION:	Technical Director
DATE:	02/11/09

CONTENTS

ILLUSTRATIONS

FIGURES (APPENDIX 2)

PLATES

SUMMARY

North Pennines Archaeology Ltd were commissioned by United Utilities to undertake an archaeological watching brief close to the projected line of Hadrian's Wall at Bowness-on-Solway, Cumbria (NGR NY 2270 6260), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. Hadrian's Wall and much of the surrounding land is protected as a Scheduled Monument (SM no 26121). The proposed works were within the buffer zone of the Hadrian's Wall World Heritage Site. As a result, Mike Collins, Hadrian's Wall Archaeologist for English Heritage, recommended that a programme of archaeological works be undertaken in accordance with a written scheme of investigation submitted to and approved by the aforementioned. The work involved the monitoring of all ground reduction within the Hadrian's Wall buffer zone as specified in United Utilities drawing Y15519-01, which was supplied to both North Pennines Archaeology Ltd and Mike Collins of English Heritage.

The Archaeological Watching Brief was undertaken over three days between the 24th August and the 3rd September 2009. The watching brief monitored the excavation of three trenches associated with the Bowness-on-Solway pumping station within the immediate vicinity of the Hadrian's Wall World Heritage Site. No archaeological finds or obvious archaeological remains were observed during the watching brief, the trenches largely being comprised of naturally forming substrates and topsoils. However, a 1.5m deposit of dark brown silty clay was observed within Trench 2 and the southern end of Trench 1 which contrasted markedly against the surrounding natural substrates. The possibility that the deposit relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. Given the location of the trenches to Hadrian's Wall and its defensive features, it was deemed appropriate to retain environmental samples of this deposit.

Unfortunately, the environmental analysis was largely equivocal. The analysis revealed tentative evidence to suggest that the deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions could be reached as to when this occurred, or whether it was a long-term process, or one which occurred over a short period of a few years.

As this archaeological watching brief was conducted as part of a recommendation to observe groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station, no further work is deemed necessary. However, given the high archaeological potential of the area, it is recommended that any future work be subject to a programme of archaeological investigation.

ACKNOWLEDGEMENTS

North Pennines Archaeology Ltd would like to thank Bruce Pilling of United Utilities. Thanks are also due to Mike Collins of English Heritage. NPA Ltd would also like to thank the staff of United Utilities and Bethell Power Services for all their assistance throughout the project.

The archaeological watching brief was undertaken by David Jackson and Angus Clark, and the environmental analysis was undertaken by Don O' Meara, Environmental Assistant for NPA Ltd. The report was written by David Jackson, who also produced the drawngs. The project was managed by Frank Giecco, Technical Director of NPA Ltd. The report was edited by Matt Town, Project Manager for NPA Ltd.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In August 2009, North Pennines Archaeology were invited by Bruce Pilling of United Utilities to maintain an archaeological watching brief at Bowness-on-Solway, Cumbria (NGR NY 2270 6260, Figure 1), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. The proposed works lie within the immediate vicinity of Hadrian's Wall (SM no 26121) and its associated features which are classified as a World Heritage Site. As a result, Mike Collins of English Heritage (Hadrian's Wall Archaeologist) requested that all ground reduction be subject to a programme of archaeological observation and investigation. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16).

1.1.2 All groundworks associated with the new electricity supply had to be excavated under full archaeological supervision and all stages of the archaeological work were undertaken following approved statutory guidelines (IfA 2008), and were consistent with the specification provided by NPA Ltd (Giecco 2009) and generally accepted best practice.

1.1.3 This report outlines the monitoring works undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works.

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by North Pennines Archaeology Ltd in response to a request by Bruce Pilling of United Utilities, for an archaeological watching brief of the study area. Following acceptance of the project design by Mike Collins of English Heritage, North Pennines Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA), and generally accepted best practice.

2.2 THE WATCHING BRIEF

2.2.1 The works involved a structured watching brief to observe, record and excavate any archaeological deposits from the development site. A watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons, on a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed (IfA 2008).

2.2.2 The aims and principal methodology of the watching brief can be summarised as follows:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record them;
- to carry out further excavation and recording work in adequate time, if intact archaeological remains are uncovered during the project;
- to accurately tie the area watched by the archaeologist into the National Grid at an appropriate scale, with any archaeological deposits and features adequately levelled;
- to sample environmental deposits encountered as required, in line with English Heritage (2002a) guidelines;
- to produce a photographic record of all contexts using colour digital, 35mm colour print and monochrome formats as applicable, each photograph including a graduated metric scale;
- to recover artefactual material, especially that useful of dating purposes;

- to produce a site archive in accordance with MAP2 (English Heritage 1991) and MoRPHE standards (English Heritage 2006).

2.2.3 Archaeological monitoring and supervision of groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station was undertaken intermittently over three days between the 24th August and the 3rd September 2009. A summary of the findings of the watching brief is included within this report.

2.3 THE ARCHIVE

2.3.1 A full professional archive has been compiled in accordance with the specification, and in line with current UKIC (1990) and English Heritage Guidelines (1991) and according to the Archaeological Archives Forum recommendations (Brown 2007). The archive will be deposited within the Senhouse Museum, Maryport, with copies of the report sent to the County Historic Environment Record at Kendal, available upon request. The archive can be accessed under the unique project identifier **NPA09**, **BOS-A**, **CP/870/09**.

2.3.2 North Pennines Archaeology, and English Heritage, support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by North Pennines Archaeology, as a part of this national project.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The study area is located at the eastern edge of Bowness-on-Solway, approximately 21km west of Carlisle, Cumbria (NY 2270 6260). The site is situated within a green field on the south shore of the Solway Firth, at a height of approximately 10m OD (Figure 2).

3.1.2 The broader area of the site is known as the Solway Basin and is a broad, lowland plain landscape fringed by the low, rugged, relatively remote coastline of the Solway Firth and Irish Sea (Countryside Commission 1998). The Solway Plain is open and exposed to the prevailing southwesterly winds and tree cover is limited. This area is characterised by dairy cattle grazing on fields of improved pasture, which are variously defined by drainage ditches, small streams, low wind-sheared hedgerows and stone-faced hedgebanks or 'kests'. The area to the east of the site includes flat marshland where the rivers Eden, Esk and Lyne flow into the Solway (*ibid*).

3.1.3 The underlying geology of the study area is mainly comprised of mudstones and sandstones of Permo-Triassic age ('New Red Sandstone'). A small pocket of poorly exposed Liassic mudstones and limestones of Jurassic age overlie the Permo-Triassic rocks to the southeast, and Coal Measures, mudstones, sandstones and a few coals of Carboniferous age lie beneath the Permo-Triassic rocks, forming a restricted belt along the southern margin of the Solway Basin (Countryside Commission 1998). The underlying geology of the area is largely covered by large quantities of boulder clay, sand and gravel, deposited by thick ice-sheets and glacial meltwaters during the last glaciation (*ibid*).

3.2 HISTORICAL CONTEXT

3.2.1 This section is intended as a brief summary only, detailing the main periods of occupation within the immediate area of the site.

3.2.2 Hadrian's Wall was designated as a World Heritage Site in 1987 and forms the most complex and best preserved of the frontiers of the Roman Empire. (English Heritage 2002b). The World Heritage Site (WHS) comprises a visual envelope between 1km and 6km from the site in order to serve as a buffer zone to protect the site and its immediate landscape from development detrimental to the visual amenity of the site (*ibid*).

3.2.3 The WHS is centred on the military installations constructed from AD 122 on the orders of the Emperor Hadrian. The WHS also includes other Roman sites and structures which predate Hadrian's Wall, such as the arrangement of forts along the Cumbrian Coast between Bowness-on-Solway and Ravenglass, and incorporates a wealth of pre-Roman and post-Roman sites and landscapes (*op.cit.*). Hadrian's Wall was constructed in the early 2nd century on a line connecting the Tyne and the Solway and represented at various times the northern frontier of Roman Britain.

3.2.4 The Wall was a composite military barrier, which in its final form comprised several separate elements; a stone wall fronted by a V-shaped ditch, and a number of purpose-built stone garrison fortifications such as forts, milecastles and turrets, a large earthwork and ditch, built parallel with and to the south of the Wall, known as the Vallum, and a metalled supply road linking the garrison forts, which is known as the 'Roman Military Way'. The Wall begins in the east at Wallsend in Tyneside and continues to the west, terminating at Bowness-on-Solway, immediately west of the study area, a distance of 80 Roman miles (73.5 English miles or 117 kilometres). The Wall, conceived by Hadrian was to be ten feet wide and about fifteen feet high. The front face of the wall most likely sported a crenulated parapet, behind which the soldiers patrolled along a paved rampart-walk (Bedoyere 1998). The more detailed history of Hadrian's Wall is well documented and is summarised in numerous publications (Breeze and Dobson 2000; Daniels 1978 and Birley 1961).

3.2.5 The fort at Bowness-on-Solway, known as *Maia*, guarded the strategic final fording point on the Solway and formed the western terminus of Hadrian's Wall. The stone-built fort was probably constructed in the late 2nd-early 3rd centuries AD, and was the second largest fort on Hadrian's Wall after Stanwix, occupying over six acres. As elsewhere on the western sector of the wall, the stone fort was preceded by an earlier, presumably Hadrianic, turf and timber fort, about which very little is known. Previous excavations and casual finds suggest that the fort was in use from the Hadrianic period (*c*.120's AD) to the 4th century (Giecco *et al* 2001).

3.3 PREVIOUS WORK

3.3.1 The main programmes of archaeological investigation at Bowness-on-Solway took place in 1930, 1955, 1967, 1973 and 1975, during which the western ramparts, the west gate and intervallum road, and adjacent barrack blocks of the fort were located.

3.3.2 More recent work in the village includes;

- a limited programme of archaeological work carried out by Carlisle Archaeology Ltd in the grounds of Maia House. No trace of the outer fort or ditch was found, but a medieval ditch was recorded (Zant 1996);
- a topographical and partial geophysical survey carried out by Manchester University at Demesne field, confirming the position of the southern road out of the fort and the presence of intensive settlement activity on either side of the road;
- a watching brief and programme of archaeological recording which involved the recording of 26 trenches of variable size. This demonstrated that, within the village, few Roman deposits survived beneath the modern roads, although south of the fort deposits including organic remains, woodwork, leatherwork and other artefacts were found within deposits up to 3m deep (Giecco *et al* 2000);
- an archaeological investigation undertaken in 2000 by Carlisle Archaeology Ltd which involved a watching brief of 131 trenches within the village. This investigation found the line of the eastern defences of the stone fort, and possibly part of the turf and timber fort, as well as possible post-Roman use of the fort (Giecco *et al* 2001);
- and an archaeological evaluation conducted by North Pennines Archaeology Ltd in 2004 within Demesne field, immediately south of the fort. The evaluation revealed significant Roman remains at a depth of 0.25m below the surface, including a substantial Roman strip building with surviving occupation layers, and demolition deposits of probable late Roman date (Giecco and Crompton 2004).

4 ARCHAEOLOGICAL WATCHING BRIEF

4.1 INTRODUCTION

4.1.1 The archaeological watching brief took place intermittently between the 24th August and the 3rd September 2009, and comprised the observation and investigation of all groundworks associated with the a new power supply for the Bowness-on-Solway pumping station. A total of three trenches were excavated with a JCB 8060 mechanical excavator using a *c*.0.5m wide toothed bucket. The results of the watching brief are summarised below.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located at the western edge of field number 7970, *c*.12m north of the field's southern boundary (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.95m in length and *c*.0.6m in width. Trench 1 was excavated to an average depth of 0.8m and was largely comprised of over 0.6m of grey/orange sandy clay **(103)**, below a *c*.0.12m deposit of mid-brown sandy clay subsoil **(102)** and a *c*.0.1m deposit of dark brown sandy clay topsoil **(100)**. However, within the southern most *c*.7m of the trench, the grey/orange sandy clay **(103)** was replaced by a deposit of dark brown/grey silty clay **(104)** below the subsoil **(102)** and topsoil **(100)** (Plate 1), which measured over 0.6m in depth. The possibility that the deposit **(104)** relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, has been considered. Unfortunately, the sudden change between the grey/orange sandy clay **(103)** and the dark brown/grey silty clay **(104)** could not be thoroughly investigated due to the flooding of Trench 1 from surface water during excavation (Plate 2), although no clear cut which might suggest a ditch or similar feature was observed. However, samples of the silty clay deposit **(104)** were taken for environmental sampling (see Section 5 below).

4.2.2 ***Trench 2:*** Trench 2 was located at the southern end of Trench 1 within field number 7970 (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.2m in length and *c*.1.8m in width. Trench 2 was excavated to a depth of *c*.1.8m exposing *c*.1.5m of the dark brown/grey silty clay **(104)** below *c*.0.2m of subsoil **(102)** and topsoil **(100)**, although any discreet changes at the bottom of the trench would not have been noted at this depth (Plate 3).

Plate 1: View north-northeast of Trench 1

Plate 2: East facing section of Trench 1

Plate 3: North facing section of Trench 2 showing deposit ***(104)***

Plate 4: South facing section of Trench 3

4.2.3 ***Trench 3:*** Trench 3 was located within field number 7055, immediately south of the field's northern boundary (Figure 2). The trench was aligned east to west and measured *c*.15m in length and *c*.0.5m in width in order to earth and existing electricity pole (No. 010808). Trench 3 was excavated to a maximum depth of 1.2m revealing *c*.0.3m of natural orange/grey boulder clay **(101)** below *c*.0.85m of grey/orange sandy clay **(103)** and *c*.0.06m of dark brown sandy clay topsoil **(100)** (Plate 4).

4.3 ARCHAEOLOGICAL FINDS

4.3.1 No archaeological finds were recovered during the groundworks associated with the Bowness-on-Solway pumping station.

5 ENVIRONMENTAL ANALYSES

5.1 INTRODUCTION

5.1.1 During the course of the archaeological watching brief at Bowness-on-Solway it was recognised that contexts bearing the archaeobotanical remains of past human activity may be encountered.

5.1.2 One context was considered worth sampling. This was sample **(104) <1>**.

5.1.3 The methodology employed required that the whole earth samples be broken down and split into their various different components. Both samples were fully processed by being manually floated and sieved through a 'Siraf' style flotation tank.

5.1.4 The residue from each sample was retained, described and scanned using a magnet for ferrous fragments. The flot was dried slowly and scanned at x40 magnification for charred and uncharred botanical remains. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at North Pennines Archaeology. Plant taxonomic nomenclature follows Stace (1997).

5.1.5 The retent, like the residue from wet sieving, will contain any larger items of bone, heavy (e.g. waterlogged) ecofacts or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage was done to allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. The retent samples were also scanned with a hand magnet to retrieve forms of magnetic material.

5.1.6 Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information, in respect of the depositional environment of the material, thus enabling assessment of anthropogenic activity, seasonality and climate and elements of the economy associated with the features from which the samples are removed.

5.1.7 Sample numbers appear in brackets thus < >, whilst context numbers appear in brackets thus ( ) for all analysis and discussion below. Results will be presented by Plot number numerically. Reference to seeds in the text is made using the richness scale of 1 = present, 2 = frequent and 3 = abundant, as seen in the tabular results attached.

5.2 RESULTS

5.2.1 Sample **(104) <1>** was taken from a deposit of silty clay. A 20litre sample was taken as it was hoped recovered plant remains might lend support to the theory that the context was connected to activity near the Roman defensive ditch which ran near the site.

5.2.2 The heavy residue material produced low amounts of magnetic material, all of which appears to be naturally occurring haematite. No material which would suggest cultural activity was recovered from this sample.

5.2.3 The flot material consisted of small amounts of charcoal but was mainly leaf-litter material. The origin of the charcoal is unknown at this point, and it occurred in quantities too small for radiometric dating to be undertaken. The leaf litter, however, does suggest that this sample came from a possible feature which was able to act as a basin of deposition which captured this material. The heavy clay may have created an anaerobic environment sufficient to prevent full organic decomposition of this material.

5.3 CONCLUSION

5.3.1 The deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of the partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions can be reached when this occurred, or whether this was a long-term process, or one which occurred over a short period of a few years.

5.3.2 It is not recommended that further work be undertaken on this sample as it does not allow conclusions to be drawn regarding human activity around the area of Bowness-on-Solway, Cumbria.

TABLE 1: ENVIRONMENTAL ANALYSIS FOR: CP870, Bowness-on-Solway, Cumbria

Sample	1
Context	104
Volume processed (litres)	20
Volume of retent(ml)	1500
Volume of flot (ml)	50
Samples suitable for radiocarbon dating	-
Residue contents (relative abundance)	
Bone/teeth, burnt bone	-
Charcoal	-
Flint/chert	-
Magnetic Residue	1
Stones/gravel	3
Flot matrix (relative abundance)	
Charcoal	2
Leaf litter	2

(c: cereal types, x: wide niche) Relative abundance is based on a scale from 1 (lowest) to 3 (highest) where 0 is not present.

Table 1: Details of environmental analysis

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 The archaeological watching brief monitored the excavation of all groundworks associated with the Bowness-on Solway pumping station. No archaeological finds or obvious archaeological remains were noted during the watching brief. However, the possibility that a single deposit related to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. As such, it was deemed appropriate to retain samples of the deposit for environmental sampling.

6.1.2 The environmental analysis of the retained samples was largely equivocal. Although the analysis revealed tentative evidence to suggest that the deposit from which the sample was taken may have appeared as an open ditch at one stage, no conclusions could be reached as to when, and under what circumstances deposition occurred.

6.2 RECOMMENDATIONS

6.2.1 As this watching brief was conducted as a condition of groundworks associated with the development of the Bowness-on-Solway pumping station, no further archaeological work is deemed necessary. However, given the site's location in relation to the Hadrian's Wall World Heritage Site, it is recommended that any work conducted in the future be subject to a similar programme of archaeological investigation.

7 BIBLIOGRAPHY

7.1 SECONDARY SOURCES

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APPENDIX 1: CONTEXT TABLE

Context Number	Context Type	Description
100	Deposit	Topsoil
101	Geological	Natural Substrate
102	Deposit	Subsoil
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104	Deposit	Dark Brown/Grey Silty/Sandy Clay

Table 2: List of Contexts issued during Watching Brief

APPENDIX 2: FIGURES

BOWNESS-ON-SOLWAY PUMPING STATION, BOWNESS-ON-SOLWAY, CUMBRIA

WATCHING BRIEF REPORT

CP. NO: 870/09

02/11/2009

NORTH PENNINES ARCHAEOLOGY LTD
NENTHEAD MINES HERITAGE CENTRE,
NENTHEAD,
ALSTON,
CUMBRIA,
CA9 3PD
TEL/FAX: (01434) 382045/043
WWW.NPARCHAEOLOGY.CO.UK

NORTH PENNINES ARCHAEOLOGY LTD

DOCUMENT TITLE:	Bowness-on-Solway Pumping Station, Bowness-on-Solway, Cumbria
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GRID REFERENCE:	NY 2270 6260

Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by North Pennines Archaeology Ltd on the preparation of reports.

	01
PREPARED BY:	David Jackson
POSITION:	Assistant Supervisor
DATE:	26/10/09
EDITED BY:	Matt Town
POSITION:	Project Manager
DATE:	26/10/09
APPROVED BY:	Frank Giecco
POSITION:	Technical Director
DATE:	02/11/09

CONTENTS

ILLUSTRATIONS

FIGURES (APPENDIX 2)

PLATES

SUMMARY

North Pennines Archaeology Ltd were commissioned by United Utilities to undertake an archaeological watching brief close to the projected line of Hadrian's Wall at Bowness-on-Solway, Cumbria (NGR NY 2270 6260), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. Hadrian's Wall and much of the surrounding land is protected as a Scheduled Monument (SM no 26121). The proposed works were within the buffer zone of the Hadrian's Wall World Heritage Site. As a result, Mike Collins, Hadrian's Wall Archaeologist for English Heritage, recommended that a programme of archaeological works be undertaken in accordance with a written scheme of investigation submitted to and approved by the aforementioned. The work involved the monitoring of all ground reduction within the Hadrian's Wall buffer zone as specified in United Utilities drawing Y15519-01, which was supplied to both North Pennines Archaeology Ltd and Mike Collins of English Heritage.

The Archaeological Watching Brief was undertaken over three days between the 24th August and the 3rd September 2009. The watching brief monitored the excavation of three trenches associated with the Bowness-on-Solway pumping station within the immediate vicinity of the Hadrian's Wall World Heritage Site. No archaeological finds or obvious archaeological remains were observed during the watching brief, the trenches largely being comprised of naturally forming substrates and topsoils. However, a 1.5m deposit of dark brown silty clay was observed within Trench 2 and the southern end of Trench 1 which contrasted markedly against the surrounding natural substrates. The possibility that the deposit relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. Given the location of the trenches to Hadrian's Wall and its defensive features, it was deemed appropriate to retain environmental samples of this deposit.

Unfortunately, the environmental analysis was largely equivocal. The analysis revealed tentative evidence to suggest that the deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions could be reached as to when this occurred, or whether it was a long-term process, or one which occurred over a short period of a few years.

As this archaeological watching brief was conducted as part of a recommendation to observe groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station, no further work is deemed necessary. However, given the high archaeological potential of the area, it is recommended that any future work be subject to a programme of archaeological investigation.

ACKNOWLEDGEMENTS

North Pennines Archaeology Ltd would like to thank Bruce Pilling of United Utilities. Thanks are also due to Mike Collins of English Heritage. NPA Ltd would also like to thank the staff of United Utilities and Bethell Power Services for all their assistance throughout the project.

The archaeological watching brief was undertaken by David Jackson and Angus Clark, and the environmental analysis was undertaken by Don O' Meara, Environmental Assistant for NPA Ltd. The report was written by David Jackson, who also produced the drawngs. The project was managed by Frank Giecco, Technical Director of NPA Ltd. The report was edited by Matt Town, Project Manager for NPA Ltd.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 In August 2009, North Pennines Archaeology were invited by Bruce Pilling of United Utilities to maintain an archaeological watching brief at Bowness-on-Solway, Cumbria (NGR NY 2270 6260, Figure 1), during groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station. The proposed works lie within the immediate vicinity of Hadrian's Wall (SM no 26121) and its associated features which are classified as a World Heritage Site. As a result, Mike Collins of English Heritage (Hadrian's Wall Archaeologist) requested that all ground reduction be subject to a programme of archaeological observation and investigation. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16).

1.1.2 All groundworks associated with the new electricity supply had to be excavated under full archaeological supervision and all stages of the archaeological work were undertaken following approved statutory guidelines (IfA 2008), and were consistent with the specification provided by NPA Ltd (Giecco 2009) and generally accepted best practice.

1.1.3 This report outlines the monitoring works undertaken on-site, the subsequent programme of post-fieldwork analysis, and the results of this scheme of archaeological works.

2 METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design was submitted by North Pennines Archaeology Ltd in response to a request by Bruce Pilling of United Utilities, for an archaeological watching brief of the study area. Following acceptance of the project design by Mike Collins of English Heritage, North Pennines Archaeology Ltd was commissioned by the client to undertake the work. The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA), and generally accepted best practice.

2.2 THE WATCHING BRIEF

2.2.1 The works involved a structured watching brief to observe, record and excavate any archaeological deposits from the development site. A watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons, on a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed (IfA 2008).

2.2.2 The aims and principal methodology of the watching brief can be summarised as follows:

- to establish the presence/absence, nature, extent and state of preservation of archaeological remains and to record them;
- to carry out further excavation and recording work in adequate time, if intact archaeological remains are uncovered during the project;
- to accurately tie the area watched by the archaeologist into the National Grid at an appropriate scale, with any archaeological deposits and features adequately levelled;
- to sample environmental deposits encountered as required, in line with English Heritage (2002a) guidelines;
- to produce a photographic record of all contexts using colour digital, 35mm colour print and monochrome formats as applicable, each photograph including a graduated metric scale;
- to recover artefactual material, especially that useful of dating purposes;

- to produce a site archive in accordance with MAP2 (English Heritage 1991) and MoRPHE standards (English Heritage 2006).

2.2.3 Archaeological monitoring and supervision of groundworks associated with a new electricity supply to the Bowness-on-Solway pumping station was undertaken intermittently over three days between the 24th August and the 3rd September 2009. A summary of the findings of the watching brief is included within this report.

2.3 THE ARCHIVE

2.3.1 A full professional archive has been compiled in accordance with the specification, and in line with current UKIC (1990) and English Heritage Guidelines (1991) and according to the Archaeological Archives Forum recommendations (Brown 2007). The archive will be deposited within the Senhouse Museum, Maryport, with copies of the report sent to the County Historic Environment Record at Kendal, available upon request. The archive can be accessed under the unique project identifier **NPA09**, **BOS-A**, **CP/870/09**.

2.3.2 North Pennines Archaeology, and English Heritage, support the **O**nline **A**cces**S** to the **I**ndex of Archaeological Investigation**S** (**OASIS**) project. This project aims to provide an on-line index and access to the extensive and expanding body of grey literature, created as a result of developer-funded archaeological work. As a result, details of the results of this project will be made available by North Pennines Archaeology, as a part of this national project.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 The study area is located at the eastern edge of Bowness-on-Solway, approximately 21km west of Carlisle, Cumbria (NY 2270 6260). The site is situated within a green field on the south shore of the Solway Firth, at a height of approximately 10m OD (Figure 2).

3.1.2 The broader area of the site is known as the Solway Basin and is a broad, lowland plain landscape fringed by the low, rugged, relatively remote coastline of the Solway Firth and Irish Sea (Countryside Commission 1998). The Solway Plain is open and exposed to the prevailing southwesterly winds and tree cover is limited. This area is characterised by dairy cattle grazing on fields of improved pasture, which are variously defined by drainage ditches, small streams, low wind-sheared hedgerows and stone-faced hedgebanks or 'kests'. The area to the east of the site includes flat marshland where the rivers Eden, Esk and Lyne flow into the Solway (*ibid*).

3.1.3 The underlying geology of the study area is mainly comprised of mudstones and sandstones of Permo-Triassic age ('New Red Sandstone'). A small pocket of poorly exposed Liassic mudstones and limestones of Jurassic age overlie the Permo-Triassic rocks to the southeast, and Coal Measures, mudstones, sandstones and a few coals of Carboniferous age lie beneath the Permo-Triassic rocks, forming a restricted belt along the southern margin of the Solway Basin (Countryside Commission 1998). The underlying geology of the area is largely covered by large quantities of boulder clay, sand and gravel, deposited by thick ice-sheets and glacial meltwaters during the last glaciation (*ibid*).

3.2 HISTORICAL CONTEXT

3.2.1 This section is intended as a brief summary only, detailing the main periods of occupation within the immediate area of the site.

3.2.2 Hadrian's Wall was designated as a World Heritage Site in 1987 and forms the most complex and best preserved of the frontiers of the Roman Empire. (English Heritage 2002b). The World Heritage Site (WHS) comprises a visual envelope between 1km and 6km from the site in order to serve as a buffer zone to protect the site and its immediate landscape from development detrimental to the visual amenity of the site (*ibid*).

3.2.3 The WHS is centred on the military installations constructed from AD 122 on the orders of the Emperor Hadrian. The WHS also includes other Roman sites and structures which predate Hadrian's Wall, such as the arrangement of forts along the Cumbrian Coast between Bowness-on-Solway and Ravenglass, and incorporates a wealth of pre-Roman and post-Roman sites and landscapes (*op.cit.*). Hadrian's Wall was constructed in the early 2nd century on a line connecting the Tyne and the Solway and represented at various times the northern frontier of Roman Britain.

3.2.4 The Wall was a composite military barrier, which in its final form comprised several separate elements; a stone wall fronted by a V-shaped ditch, and a number of purpose-built stone garrison fortifications such as forts, milecastles and turrets, a large earthwork and ditch, built parallel with and to the south of the Wall, known as the Vallum, and a metalled supply road linking the garrison forts, which is known as the 'Roman Military Way'. The Wall begins in the east at Wallsend in Tyneside and continues to the west, terminating at Bowness-on-Solway, immediately west of the study area, a distance of 80 Roman miles (73.5 English miles or 117 kilometres). The Wall, conceived by Hadrian was to be ten feet wide and about fifteen feet high. The front face of the wall most likely sported a crenulated parapet, behind which the soldiers patrolled along a paved rampart-walk (Bedoyere 1998). The more detailed history of Hadrian's Wall is well documented and is summarised in numerous publications (Breeze and Dobson 2000; Daniels 1978 and Birley 1961).

3.2.5 The fort at Bowness-on-Solway, known as *Maia*, guarded the strategic final fording point on the Solway and formed the western terminus of Hadrian's Wall. The stone-built fort was probably constructed in the late 2nd-early 3rd centuries AD, and was the second largest fort on Hadrian's Wall after Stanwix, occupying over six acres. As elsewhere on the western sector of the wall, the stone fort was preceded by an earlier, presumably Hadrianic, turf and timber fort, about which very little is known. Previous excavations and casual finds suggest that the fort was in use from the Hadrianic period (*c*.120's AD) to the 4th century (Giecco *et al* 2001).

3.3 PREVIOUS WORK

3.3.1 The main programmes of archaeological investigation at Bowness-on-Solway took place in 1930, 1955, 1967, 1973 and 1975, during which the western ramparts, the west gate and intervallum road, and adjacent barrack blocks of the fort were located.

3.3.2 More recent work in the village includes;

- a limited programme of archaeological work carried out by Carlisle Archaeology Ltd in the grounds of Maia House. No trace of the outer fort or ditch was found, but a medieval ditch was recorded (Zant 1996);
- a topographical and partial geophysical survey carried out by Manchester University at Demesne field, confirming the position of the southern road out of the fort and the presence of intensive settlement activity on either side of the road;
- a watching brief and programme of archaeological recording which involved the recording of 26 trenches of variable size. This demonstrated that, within the village, few Roman deposits survived beneath the modern roads, although south of the fort deposits including organic remains, woodwork, leatherwork and other artefacts were found within deposits up to 3m deep (Giecco *et al* 2000);
- an archaeological investigation undertaken in 2000 by Carlisle Archaeology Ltd which involved a watching brief of 131 trenches within the village. This investigation found the line of the eastern defences of the stone fort, and possibly part of the turf and timber fort, as well as possible post-Roman use of the fort (Giecco *et al* 2001);
- and an archaeological evaluation conducted by North Pennines Archaeology Ltd in 2004 within Demesne field, immediately south of the fort. The evaluation revealed significant Roman remains at a depth of 0.25m below the surface, including a substantial Roman strip building with surviving occupation layers, and demolition deposits of probable late Roman date (Giecco and Crompton 2004).

4 ARCHAEOLOGICAL WATCHING BRIEF

4.1 INTRODUCTION

4.1.1 The archaeological watching brief took place intermittently between the 24th August and the 3rd September 2009, and comprised the observation and investigation of all groundworks associated with the a new power supply for the Bowness-on-Solway pumping station. A total of three trenches were excavated with a JCB 8060 mechanical excavator using a *c*.0.5m wide toothed bucket. The results of the watching brief are summarised below.

4.2 RESULTS

4.2.1 ***Trench 1:*** Trench 1 was located at the western edge of field number 7970, *c*.12m north of the field's southern boundary (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.95m in length and *c*.0.6m in width. Trench 1 was excavated to an average depth of 0.8m and was largely comprised of over 0.6m of grey/orange sandy clay **(103)**, below a *c*.0.12m deposit of mid-brown sandy clay subsoil **(102)** and a *c*.0.1m deposit of dark brown sandy clay topsoil **(100)**. However, within the southern most *c*.7m of the trench, the grey/orange sandy clay **(103)** was replaced by a deposit of dark brown/grey silty clay **(104)** below the subsoil **(102)** and topsoil **(100)** (Plate 1), which measured over 0.6m in depth. The possibility that the deposit **(104)** relates to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, has been considered. Unfortunately, the sudden change between the grey/orange sandy clay **(103)** and the dark brown/grey silty clay **(104)** could not be thoroughly investigated due to the flooding of Trench 1 from surface water during excavation (Plate 2), although no clear cut which might suggest a ditch or similar feature was observed. However, samples of the silty clay deposit **(104)** were taken for environmental sampling (see Section 5 below).

4.2.2 ***Trench 2:*** Trench 2 was located at the southern end of Trench 1 within field number 7970 (Figure 2). The trench was aligned north-northeast to south-southwest and measured *c*.2m in length and *c*.1.8m in width. Trench 2 was excavated to a depth of *c*.1.8m exposing *c*.1.5m of the dark brown/grey silty clay **(104)** below *c*.0.2m of subsoil **(102)** and topsoil **(100)**, although any discreet changes at the bottom of the trench would not have been noted at this depth (Plate 3).

Plate 1: View north-northeast of Trench 1

Plate 2: East facing section of Trench 1

Plate 3: North facing section of Trench 2 showing deposit ***(104)***

Plate 4: South facing section of Trench 3

4.2.3 ***Trench 3:*** Trench 3 was located within field number 7055, immediately south of the field's northern boundary (Figure 2). The trench was aligned east to west and measured *c*.15m in length and *c*.0.5m in width in order to earth and existing electricity pole (No. 010808). Trench 3 was excavated to a maximum depth of 1.2m revealing *c*.0.3m of natural orange/grey boulder clay **(101)** below *c*.0.85m of grey/orange sandy clay **(103)** and *c*.0.06m of dark brown sandy clay topsoil **(100)** (Plate 4).

4.3 ARCHAEOLOGICAL FINDS

4.3.1 No archaeological finds were recovered during the groundworks associated with the Bowness-on-Solway pumping station.

5 ENVIRONMENTAL ANALYSES

5.1 INTRODUCTION

5.1.1 During the course of the archaeological watching brief at Bowness-on-Solway it was recognised that contexts bearing the archaeobotanical remains of past human activity may be encountered.

5.1.2 One context was considered worth sampling. This was sample **(104) <1>**.

5.1.3 The methodology employed required that the whole earth samples be broken down and split into their various different components. Both samples were fully processed by being manually floated and sieved through a 'Siraf' style flotation tank.

5.1.4 The residue from each sample was retained, described and scanned using a magnet for ferrous fragments. The flot was dried slowly and scanned at x40 magnification for charred and uncharred botanical remains. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at North Pennines Archaeology. Plant taxonomic nomenclature follows Stace (1997).

5.1.5 The retent, like the residue from wet sieving, will contain any larger items of bone, heavy (e.g. waterlogged) ecofacts or artefacts. The flot or floating fraction will generally contain organic material such as plant matter, fine bones, cloth, leather and insect remains. A rapid scan at this stage was done to allow further recommendations to be made as to the potential for further study by entomologists or palaeobotanists, with a view to retrieving vital economic information from the samples. The retent samples were also scanned with a hand magnet to retrieve forms of magnetic material.

5.1.6 Favourable preservation conditions can lead to the retrieval of organic remains that may produce a valuable suite of information, in respect of the depositional environment of the material, thus enabling assessment of anthropogenic activity, seasonality and climate and elements of the economy associated with the features from which the samples are removed.

5.1.7 Sample numbers appear in brackets thus < >, whilst context numbers appear in brackets thus ( ) for all analysis and discussion below. Results will be presented by Plot number numerically. Reference to seeds in the text is made using the richness scale of 1 = present, 2 = frequent and 3 = abundant, as seen in the tabular results attached.

5.2 RESULTS

5.2.1 Sample **(104) <1>** was taken from a deposit of silty clay. A 20litre sample was taken as it was hoped recovered plant remains might lend support to the theory that the context was connected to activity near the Roman defensive ditch which ran near the site.

5.2.2 The heavy residue material produced low amounts of magnetic material, all of which appears to be naturally occurring haematite. No material which would suggest cultural activity was recovered from this sample.

5.2.3 The flot material consisted of small amounts of charcoal but was mainly leaf-litter material. The origin of the charcoal is unknown at this point, and it occurred in quantities too small for radiometric dating to be undertaken. The leaf litter, however, does suggest that this sample came from a possible feature which was able to act as a basin of deposition which captured this material. The heavy clay may have created an anaerobic environment sufficient to prevent full organic decomposition of this material.

5.3 CONCLUSION

5.3.1 The deposit from which this sample was taken may have appeared as an open ditch at one stage, thus explaining the presence of the partially decomposed leaf litter, which was subsequently buried and preserved in the sample. However, no conclusions can be reached when this occurred, or whether this was a long-term process, or one which occurred over a short period of a few years.

5.3.2 It is not recommended that further work be undertaken on this sample as it does not allow conclusions to be drawn regarding human activity around the area of Bowness-on-Solway, Cumbria.

TABLE 1: ENVIRONMENTAL ANALYSIS FOR: CP870, Bowness-on-Solway, Cumbria

Sample	1
Context	104
Volume processed (litres)	20
Volume of retent(ml)	1500
Volume of flot (ml)	50
Samples suitable for radiocarbon dating	-
Residue contents (relative abundance)	
Bone/teeth, burnt bone	-
Charcoal	-
Flint/chert	-
Magnetic Residue	1
Stones/gravel	3
Flot matrix (relative abundance)	
Charcoal	2
Leaf litter	2

(c: cereal types, x: wide niche) Relative abundance is based on a scale from 1 (lowest) to 3 (highest) where 0 is not present.

Table 1: Details of environmental analysis

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 The archaeological watching brief monitored the excavation of all groundworks associated with the Bowness-on Solway pumping station. No archaeological finds or obvious archaeological remains were noted during the watching brief. However, the possibility that a single deposit related to the Roman defensive ditch, which ran parallel with, and immediately north of Hadrian's Wall, was considered. As such, it was deemed appropriate to retain samples of the deposit for environmental sampling.

6.1.2 The environmental analysis of the retained samples was largely equivocal. Although the analysis revealed tentative evidence to suggest that the deposit from which the sample was taken may have appeared as an open ditch at one stage, no conclusions could be reached as to when, and under what circumstances deposition occurred.

6.2 RECOMMENDATIONS

6.2.1 As this watching brief was conducted as a condition of groundworks associated with the development of the Bowness-on-Solway pumping station, no further archaeological work is deemed necessary. However, given the site's location in relation to the Hadrian's Wall World Heritage Site, it is recommended that any work conducted in the future be subject to a similar programme of archaeological investigation.

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