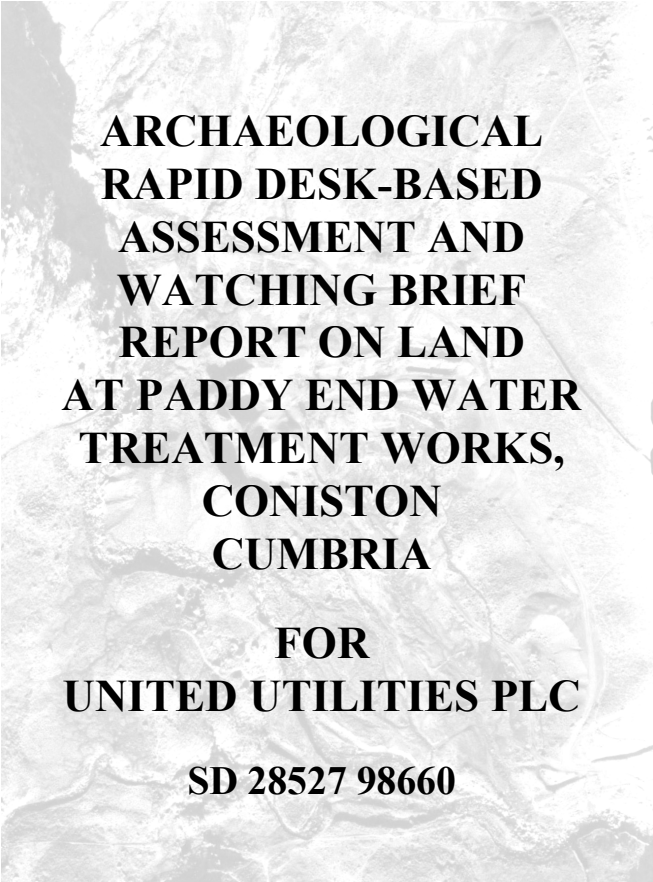


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# **NORTH PENNINES ARCHAEOLOGY LTD**

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**Project Designs and Client Reports No. CP/339/06**



**ARCHAEOLOGICAL  
RAPID DESK-BASED  
ASSESSMENT AND  
WATCHING BRIEF  
REPORT ON LAND  
AT PADDY END WATER  
TREATMENT WORKS,  
CONISTON  
CUMBRIA**

**FOR  
UNITED UTILITIES PLC**

**SD 28527 98660**

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## EXECUTIVE SUMMARY

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In March 2006, North Pennines Archaeology Ltd was commissioned by Barbara Cardie, Environmental Planner for United Utilities PLC, to undertake a rapid archaeological desk based assessment and watching brief as part of the archaeological recording of works due to be undertaken at Paddy End Water Treatment Works at Coniston, Cumbria (SD 28527 98660). The site is located within an area which has been part of extensive and important copper mining works, spanning the Lake District National Park Authority (LDNPA) recommended a programme of archaeological work be undertaken in accordance with a written scheme of investigation submitted to, and approved by the LDNPA. These works require a rapid desk-based assessment study of the area, followed by a watching brief to monitor all groundworks relating to the development.

The desk-based study involved the examination of all pertinent documents and cartographic sources held in the Cumbria County Records Office in Kendal and the Lancashire County Records Office in Preston, and the consultation of the Historic Environment Record (HER) of the DLNPA based in Kendal. The HER includes the locations and settings of Scheduled Ancient Monuments, Listed Buildings, Parks and Gardens and other, non-designated archaeological remains. In addition, a number of published sources were consulted to provide background information on the site.

The desk-based assessment has concentrated on known works relating to the Copper Mines, as this is of most direct relevance to the development. A more general summary of known historical sites in the area has been included in Appendix 1. The study revealed that copper mining began in the area in 1599. The majority of the extent features date to the late 18<sup>th</sup> and 19<sup>th</sup> century workings in the area. The development site itself was used as the terraced slime disposal area for the mill (Holland 1981, 60). Although it is likely that the construction of the existing Paddy End Water Treatment Works Building undoubtedly disturbed archaeological remains, it is likely that further remains may exist within the site.

As the area lies within a Scheduled Ancient Monument, archaeological mitigation in the form of a Watching Brief was undertaken on all groundworks associated with the development. This occurred in two stages, firstly the preparation and establishment of a compound area close to the village of Coniston itself, and secondly the excavations within the Scheduled Ancient Monument area beside the extent Paddy End Water Treatment Works Building. The latter works involved the extension of the existing water treatment works at the site, and the excavation of a culvert to divert a stream, as well as the creation of bunds to screen the new works. No archaeology was encountered during these works.

As this report comprises the recommendations for archaeological recording of the developments relating to works at Paddy End Water Treatment Works, no further work is necessary. However, due to the continuing high archaeological potential of the area, and the status of the site as a scheduled monument, any further development in the area should be subjected to a programme of archaeological investigation.



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## ACKNOWLEDGEMENTS

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North Pennines Archaeology Ltd would like to thank Barbara Cardie, Environmental Planner for United Utilities PLC for commissioning the project. Thanks also to Eleanor Kingston, of the Lake District National Park Authority at Kendal for allowing access to the Historic Environment Record (HER) of the area, and all other interesting historical information on the site. Further thanks are extended to all of the staff at the Cumbria County Record Office in Kendal, and at the Lancashire County Record Office in Preston, for their help during this project. In addition, thanks are extended to Cumbria Amenity Trust Mining History Society (CATMHS) for all of their kind assistance with the copper mining history, particularly to Sheila Barker, who generously lent many of her own personal documents for the project.

The desk-based assessment was undertaken by Cat Peters, with the assistance of Matt Town. The report was written by, and the drawings were produced by Cat Peters. The project was managed by Matt Town, Senior Project Manager for NPA Ltd. The report was edited by Matt Town.

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# 1 INTRODUCTION

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## 1.1 CIRCUMSTANCES OF THE PROJECT

- 1.1.1 The Lake District National Park Authority has approved an application for extending the water treatment works at Paddy End, Coniston (Planning Ref. 7/2006/5218). The development site, centred on SD 28527 98660, is within the area of the Scheduled Ancient Monument of Coniston Copper Mines (SAM Cumbria 542), and deposits of archaeological significance may exist in the area of the extension and associated works. As a result, a condition of the planning permission was that, before the development commences, a programme of archaeological work be undertaken in accordance with the written scheme of investigation, approved by the National Park Authority. This is in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16). The development works also required Scheduled Monument Consent from the Secretary of State for Culture, Media and Sport, and English Heritage advised that such consent was conditional upon the implementation of a programme of archaeological work.
- 1.1.2 North Pennines Archaeology Ltd (NPAL) were invited by Barbara Cardie, Environmental Planner for United Utilities PLC, to undertake the required rapid desk-based assessment and archaeological watching brief. The proposed groundworks involved the extension of the existing water treatment works at the site, and the excavation of a culvert to divert a stream, as well as the creation of bunds to screen the new works; works were also proposed adjacent to the village of Coniston, through the creation of a compound for the contractors' accommodation (Cardie *pers. comm.*). All of these groundworks had to be excavated under a full watching brief condition. The objective of this watching brief was to obtain an adequate record of any archaeological deposits or finds, which were disturbed or exposed by work associated with the development. Prior to the commencement of these works, a rapid desk-based assessment was completed in order to achieve a full understanding of the nature of the existing resource regarding the geographical, topographical, archaeological and historical context of the site (Town 2006). All stages of the archaeological work were undertaken following approved statutory guidelines (IFA 1994a and 1994b).
- 1.1.3 The desk-based assessment comprised a search of both published and unpublished records held by the LDNPA in Kendal, the Cumbria County Record Offices in Kendal (CROK) and the Lancashire County Record Offices in Preston (LROP), and the archives and library held by North Pennines Archaeology Ltd. Advice on the mining heritage of the area was also sought from Cumbria Amenity Trust Mining History Society. The principal objective of this assessment was to undertake sufficient work in order to identify and characterise the extent of the copper mines and its history, and to assess the impact that the development will have upon them, to provide details of what might be encountered during the proceeding groundworks to be monitored by an archaeological watching brief.
- 1.1.4 This report comprises the results of the various stages of the archaeological work programme, namely: the rapid desk-based assessment, and the written report, following

the archaeological recording of the three phases of groundworks associated with the development, as outlined in the approved written scheme of investigation.

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## 2 METHODOLOGY

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### 2.1 PROJECT DESIGN

2.1.1 A project design was submitted by North Pennines Archaeology Ltd in response to a request by United Utilities PLC for a rapid archaeological desk-based assessment and accompanying watching brief in the study area, in accordance with a brief prepared by the Lake District National Park Authority. Following acceptance of the project design, 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 of Field Archaeologists (IFA), and generally accepted best practice.

### 2.2 RAPID DESK-BASED ASSESSMENT

2.2.1 Several sources of information were consulted, in accordance with the project brief and project design. The study area consisted of a 1km radius centred on the proposed development area. The principal sources of information were historic maps and plans of the area and secondary sources on copper mining and industry in the Lake District, with a brief surmise of the Historic Environment Record (HER).

2.2.2 ***Lake District National Park Authority Historic Environment Record (HER):*** the HER in Kendal, a database of archaeological sites within the national park, was accessed. This was in order to obtain information on the location of all designated sites and areas of historic interest and any other, non-designated sites within the study area, which included monuments, findspots, Listed Buildings and Conservation Areas. A brief record including grid reference and description was obtained for the various sites within the study area, and has been included in Appendix 1. All secondary sources were also examined, and no aerial photographs or geotechnical data is available for the development site.

2.2.3 ***Cumbria County Record Office (Kendal):*** the County Record Office in Kendal (CROK) was visited to consult documents specific to the study area. Historic maps of the study area, including surveys, Tithe and Enclosure Maps, Acts of Parliament and early Ordnance Survey maps, were examined. Unfortunately no tithe or enclosure maps were held of the area. A search was also made for any relevant historical documentation, particularly regarding the copper-mining heritage of the area, drawing on the knowledge of the archivists. Several secondary sources and relevant websites were also consulted.

2.2.4 ***Lancashire County Record Office (Preston):*** the County Record Office in Preston (LROP) was visited to consult documents specific to the study area, as it used to lie within the boundaries of the County of Lancashire. Documents similar to those outlined in 2.2.3 were searched in relation to the history of the site, with particular reference to the historic mapping of the region.

2.2.5 ***English Heritage NMR and Archaeology Data Service:*** an electronic enquiry was also made of English Heritage's National Monuments Record and the website of the

Archaeology Data Service. This was in order to enhance and augment the data obtained from a search of the appropriate repositories. No additional relevant sources were provided in the Archaeology Data Service catalogue that were not found elsewhere.

- 2.2.6 ***North Pennines Archaeology Ltd (NPAL)***: various publications and unpublished reports on excavations and other work in the region are held within the North Pennines Archaeology library and any undeposited archives of the sites themselves were examined.
- 2.2.7 ***Cumbria Amenity Trust Mining History Society (CATMHS)***: various unpublished reports, research and images belonging to CATMHS were assessed for the purposes of this project.

## **2.3 ARCHIVE**

- 2.3.1 A full professional archive has been compiled in accordance with the project design, and with current UKIC (1990) and English Heritage guidelines (1991). The archive will be deposited within an appropriate repository and a copy of the report given to the County Sites and Monuments Record, where viewing will be available on request. The archive can be accessed under the unique project identifier NPA06, PAD-A, CP339/06.

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## 3 BACKGROUND

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### 3.1 LOCATION, TOPOGRAPHY AND GEOLOGY

- 3.1.1 The site is centred upon National Grid Reference SD 28527 98660 in the parish of Coniston in Cumbria (Figure 1). The total area of the development affects 0.15 hectares, all of which is presently rough ground surrounding the water treatment works.
- 3.1.2 The solid geology of the site is Low Water Formation of the Borrowdale Volcanic Group, with glacial till surface drift (British Geological Survey Solid and Drift Geology Sheet 38 Ambleside).
- 3.1.3 “The Ordovician sedimentary and igneous rocks of the English Lake District host a widespread suite of epigenetic metalliferous veins dominated by copper sulphides with abundant arsenopyrite, pyrite and accessory galena and sphalerite. New field and microstructural evidence from examples of this suite at Coniston, Wasdale, Honister, Newlands and Borrowdale shows that the veins were strongly cleaved during the Early Devonian (Emsian) Acadian orogenic event” (Millward, Beddoe-Stephens and Young, 1999, 159). It is this strong copper sulphide content that have helped to dictate the historical land-use of the area.

### 3.2 HISTORICAL BACKGROUND

- 3.2.1 **Introduction:** this historical background is compiled mostly from secondary sources, and is intended only as a brief summary of historical developments specific to the study area. The cartographic sources will be discussed with the secondary sources in this section, in chronological sequence. All other known historical sites and developments in the surrounding area are summarised in Appendix 1, and shown in Figure 2.
- 3.2.2 **The Copper Mining Industry in the Lake District:** copper is possibly the earliest known metal, although it proved more useful when it was alloyed with tin to form bronze, a strong enough material for tools and weapons (Cossons 1975, 195). The word ‘copper’ comes from the Latin ‘cyprium’ meaning ‘ore of Cyprus’. The first record of copper mining is from Mesopotamia in 3500 BC (Fleming, 2000, 89). In Britain, it occurs most prominently in Cornwall, Devon, Anglesey and the Lake District. As many as fourteen stages are necessary to convert the ore into a metal, although this was reduced to six during the early nineteenth century, when the Webb process became universal. The ore is found in veins or lodes, and, after extraction by mining, the metal content is separated from the rock by roasting the ore to form an oxide. It is then refined, and reduced to a very pure copper by mixing in charcoal or coal and stirring with a green oak or birch pole causing a slag to form on the surface. This slag contains the impurities because the charcoal or coal deoxidises the copper, and the slag can be cast into blocks or pigs to be used again in the initial roasting stage (Jones 1996, 87).

- 3.2.3 The earliest documentary evidence for copper mining in the Lake District comes from the close rolls of Henry III, recording that Goldscope Mine at Newlands near Keswick was being worked for copper. Although there is no evidence of earlier works than this early thirteenth century document, it is not unreasonable to suggest that copper was being mined in the area during the Roman period, particularly in the Caldbeck Fells, and likely in the Coniston Fells as well (Fleming 2000, 90). It is generally accepted that copper mining did not begin in the Lake District in any significant way until the arrival of mining experts from Germany in 1563. In the late 15th, and 16th centuries, the Lake District became a hub of activity for various industrial processes (Tyson 1989).
- 3.2.4 It was in the opening years of the reign of Elizabeth I that the demand for metals increased rapidly, and new ways of accessing and manufacturing them were researched and developed by people working in groups, rather than individually (Raistrick 1973, 201). In 1556, Georgius Agricola produced a book on mining, which helped to introduce new methods using the then increasingly widespread use of water-power, and invited further developments to mining throughout Europe, encouraging countries to invite mining experts to locate new sources. Daniel Heckstetter arrived in England in 1563 to search for new ores in Cumberland, Westmorland, Lancashire and Yorkshire, as well as in various other parts of Britain. Two new companies were formed to exploit these ores and to further encourage German experts and workers to England: the Governor and Company of Mines Royal in 1568, and the Governor and Company of Mineral and Battery Works. The mines of the Caldbeck Fells first received a mention in the accounts of the Mines Royal Company in their first year (Fleming 2000, 90). The history of the Company of Mines Royal in the 16th century is well-documented elsewhere (e.g. Collingwood 1910, 1912, 1928, Donald, 1955 and Hammersley 1973), based on the activities of the Heckstetter dynasty of German mining experts in the Newlands Valley, west of Keswick (Grant 1985).
- 3.2.5 The Mines Royal Company had a base near Keswick, Cumberland, where it had a new smelt-mill, 78ft by 54ft with three smelting furnaces. Thurland described it as '*such a notable and substantial smelting house for the trying and refining of our ore that the like is not in all Germany*' (in Raistrick 1973, 202). The mines to the south of Keswick in the Newlands Valley were renovated, and new shafts were sunk in many areas. Although these ventures did experience difficulties, the mines and mills were worked consistently until they were destroyed during the Civil War, in 1651. Many have again been worked since, making it difficult to distinguish these earlier ventures, although adits and shafts of the period are known from the Newlands and the Coniston area, and these are mentioned in the Company's Journal (Collingwood 1912).
- 3.2.6 In 1663, the Company of Mines combined with that of the Mineral and Battery Works and, towards the end of the century, some of the privileges were transferred to the London Lead Company. The mining companies had problems with claims by the Crown on some of their mines. The Mines Royal Acts of 1689 and 1692 freed all mines of lead, copper and tin from claims by the Crown, even if gold and silver were discovered in the ores. This removed a key constraint in the development of mining. By the late 17th century the use of gunpowder in mining was widespread and copper mining increased. However, from the 1860s it again slumped into a decline, this time irreversible. Foreign competition proved to be the downfall for the industry in Britain.

- 3.2.7 ***Copper Mining at Paddy End:*** the Coniston Copper Mines were established by the Mines Royal in 1599 (Cossons 1975, 197). The mines exploited a series of veins, the principal lodes being the Paddy End Old Vein, New South Vein, South Vein, Belman Hole Vein, Kernal Vein, Park's Vein, Triddle Vein, Bonser Vein and the South Lodes, as well as more minor lodes. The Bonser Vein was most important with the Paddy End part ranking second (Adams 1988, 147). The 16th century efforts took place to the south-west of the head of the Coniston Valley, but it is uncertain where the smelting process was carried out. The area has since been repeatedly re-used for ore-preparation and smelting, and no traces of early work have yet been recorded (Crossley 1990, 197). Most of the present day traces date to after 1834. The primary copper ore that was mined at Coniston is called Chalcopyrite (Copper, Iron Sulphide), which is a yellowy brassy colour, similar to Pyrite ('Fools Gold').
- 3.2.8 It took half an acre of trees to provide charcoal for each ton of ore smelted and by the seventeenth century there were problems with the scarcity of timber to provide the charcoal. In addition, Commonwealth troops were alleged to have destroyed the Keswick smelters and associated works, causing the industry to stop (Fleming 2000, 92). Sir John Pettius, Deputy Governor of the Mines Royal Society believed that operations in the Newlands Mines ceased due to "*the death of the first German artisans and the neglect of a continuous stock, and want of fuel in those parts, and the succeeding wars*" (Pettius 1670). Recent studies suggest that it was low demand, rather than a lack of fuel, the death of the Germans, problems with claims by the Crown or the Civil War, that was the main reason for the decline of the copper mining (Hammersley 1973). A letter dated 25<sup>th</sup> May 1686 from John Blackwell to the landowner, Sir Daniel Fleming stated that the ground had been examined and that he was prepared to re-open the mines if mutually acceptable royalty fees could be agreed. Further proposals were made for re-opening in 1691 and although gunpowder was introduced into the Coniston Mines in 1694 making the driving of tunnels and winning of ore a much speedier process, it was not until the mid-18th century that operations returned to an increased rate. A Macclesfield-based company commence mining under one of their partners, Charles Roe in the 1760s. Surviving accounts for the period show that 904 tons of ore was raised between 1767- 1775 (Adams 1988, 147). The mine was again abandoned, at some time before 1800.
- 3.2.9 John Taylor, a famous mining engineer with extensive experience in Devon, Cornwall and Derbyshire, came to Coniston in 1824. He transformed the Coniston mines into the largest and most profitable copper mines in the north (Fleming 2000, 93). Level driving in this period proceeded below the old German workings in the Paddy End Mine. In 1825, Taylor started driving a deep adit level from the lowest practical point, an ambitious and expensive process. This area, behind the present youth hostel, became the main ore dressing floors in the Copper Mines Valley. The adit level became known as the Deep, or Horse Level, and eventually extended beneath the Red Dell (Bonser) and Paddy End workings, becoming 1.5 miles long and serving as an excellent tramway for horse-drawn waggons (Fleming 2000, 93). The earliest antiquarian map to show Copper Mines in the area of Paddy End is Hennett's 1828 map (Figure 3). On this map, Coniston is shown as Church Coniston, with Monk Coniston appearing further east, and the area to the south of Lever's water is depicted as Copper Mines. Another 'Copper Mines' is shown further south, with a crushing mill. At Paddy End in 1840, Levers Water Mine was started, and a survey in



1842 showed that ninety seven children were employed, the youngest being six years old. The Paddy End Mines first appear on mapping, in the First Edition Ordnance Survey of 1844/5 (Figure 4) where they are shown as Paddy End Works (copper) to the south of what had by now become Levers Water and to the north-west of Coniston Copper Works.

- 3.2.10 In the 18th and 19th centuries, the site of the present youth hostel (SD 289986) was the centre of the crushing and stamping works area, and the main workings were to the north-west. Numerous adits, shafts and piles of slag are still visible 200 yards to the south of the youth hostel, remnants of the smelting carried out at the Low Mill site in the 1890s. Initially the ore would have been picked over by hand, but by the mid 19th century mechanical ‘jiggers’ had been introduced, sorting the grades of ore, with various types of accompanying separators, or ‘buddles’. Even with these advances, ore processing was a labour-intensive exercise employing up to 600 workers including women and children. Water-power was used to ease the load, as water was available in abundance, and in the 1850s there were thirteen waterwheels in use at the Coniston Mines. At this time, the mine at Coniston was reaching its peak period. In 1849, the workings were down to 90 fathoms (540 feet) below Deep Level. 1856 was the year of the highest production figures for Coniston Mines, where the output was 3659 tons of ore, valued at £27,861. The Copper Mines had a great influence on the development of the village of Coniston. Houses were built on the banks to provide accommodation for the Miners in the 1840s (Fleming n.d.).
- 3.2.11 Following the destruction of the Keswick smelters in the mid 17<sup>th</sup> century, 250 tonnes of ore per month was carried away to be transported by ship from Greenodd (SD 315826), which was the major port in the area at that time (Cossons 1975). The railways were introduced to Coniston in 1859 and they took over the role of carrying the ore from the mines, taking it to Ulverston. However, during the 1860s the output of copper ore began an irreversible decline (Fleming 2000, 94). The workings had got so deep that the cost of maintenance was increasing. In addition, higher quantities of magnetite were occurring in the ore, which was difficult to separate. Declining prosperity resulted in the mine being put up for sale on 3<sup>rd</sup> August 1875 (with the Tilberthwaite Mine). It was bought by Thomas Wynn for £3,000. The Rio Tinto mines, in southern Spain, started large-scale production in 1873, and, with further competition from Chile after 1882, decline soon led to closure for Coniston copper mining once again, like copper mining throughout the country. Thomas Wynn sold the mine to Edwin Day, but little work was done, Day lost all of his money, and the mine finally closed in 1908 (Adams 1988, 147). Machinery in the lower levels was dismantled, although the extraction of ore in the higher and older workings continued until the turn of the twentieth century. The Third Edition of the Ordnance Survey Map of 1919 (Figure 5) depicts the site as *Paddy End Works (Copper Disused)*.
- 3.2.12 In 1912, a French company set up an electrolytic plant to process the spoil heaps, a process that lasted until the outbreak of the First World War (Fleming 2000, 99). During the 1930s, any remaining water wheels were removed for scrap. Since then, except for some prospecting work in the early 1950s, the mines were left to decay. The mine office is now a youth hostel and the mine foreman’s house and stables are now a mountaineering club headquarters. Settling ponds, ruined buildings and waterwheel pits are still visible. The stone arched entrance portals to Gaunts Level

and Deep Level adit are still intact. English Heritage have scheduled Coniston Mines as an historical monument, due to construction and excavation works that occurred on the site without planning consent after the Upper Bonser Mill dressing floors and associated ruined mine buildings were purchased by a developer.

- 3.2.13 The water treatment works now existing on the site were installed by the then Furness Water Company in 1972. They are situated near the confluence of the Levers Water Beck and Low Water Beck, and although they caused little damage to the survival of the mines, works on the pipeline feeding it damaged some buildings on the dressing floor terraces just to the north of the development site (RCHME 1995, 65). The site was built on the area previously used in the 19th century as the terraced slime disposal area for the mill (Holland 1981, 60). Although parts of the previously surviving features relating to this have been disturbed by the Water Treatment Works, groundworks as part of the proposed development could reveal further features associated with this process.

### **3.3 PREVIOUS ARCHAEOLOGICAL INVESTIGATION**

- 3.3.1 No previous archaeological excavation is known to have taken place on the site, though the site has been surveyed by the Cumbria and Lancashire Archaeological Unit on behalf of Philip Johnstone and Company in 1983 (Middleton 1985), and the RCHME undertook a more recent survey (RCHME 1995). The mines have also been subjected to the publication of detailed guides (Holland 1981, 1986), and continuing interest and research by Cumbria Amenity Trust Mining History Society (CATHMS). The surveys are summarised below:
- 3.3.2 In August 1983, the Cumbria and Lancashire Archaeological Unit undertook a survey of the old copper works in order to record the existing structures prior to restoration work and the conversion of the area into a centre for the study of Industrial Archaeology (Middleton 1985, 273). This provided a good summary of the development area and the surviving features, which are summarised in the table below. They lie just to the south of the Paddy End development site and extant Water Treatment Works Building, but their survival in good condition bodes well for archaeology on the development site.

	Feature	Description	Date
A	Deep Adit Level or 'Morse Level'	Connected a series of shafts and levels exploiting the Bonser Vein	19 <sup>th</sup> century, re-used 1913-14
B	Waste tip	Large steep-sided waste-tip created in 19 <sup>th</sup> century, re-worked by Electrolyte Company	19 <sup>th</sup> century, re-used c. 1913
C	Old Gunpowder Magazine	Used to store explosives for use in the mines	19 <sup>th</sup> century
D	Modern building	Built for restoration work (1980s)	Modern
E	Mill-race	Took water from a dam on Levers Eater Beck to drive the water wheel in pit (F)	19 <sup>th</sup> century
F	Wheel pit	One of a series of mill-races	19 <sup>th</sup> century
G	Mill-race	One of a series of mill-races	19 <sup>th</sup> century
H	Small square building	Unknown, but probable foreman's hut	Probable 19 <sup>th</sup> century
I	Large lagoon	To make the supply of water more controllable	19 <sup>th</sup> century
J	Wheel House	Originally the mine sawmill powered by a large diameter water wheel, and became the generation house for Electrolytic Works	19 <sup>th</sup> century
K	Slate Dressing Shed	The slate was dressed in the main part of the building, surrounded by heaps of waste slate.	19 <sup>th</sup> century
L	Wheel pit	Pit for a wheel	19 <sup>th</sup> century
M	Shaft	The wheel in (L) carried water to this shaft	19 <sup>th</sup> century
N	Drain	Main drain of the site, fed by (M)	19 <sup>th</sup> century
O	Wing structures	Long deep troughs to allow sediments to settle out of the waste water on-site	19 <sup>th</sup> century

3.3.3 The RCHME undertook a survey of Coniston Copper mines between February 1995 and July 1997 (RCHME 1995). It was carried out in response to a request from the Lake District National Park archaeologist who wanted an accurate plan and interpretative report for management purposes. The survey area is very large, covering an area of 5.5 square km, and is in an upland mountainous area. For this reason a scale of 1:2500 was chosen to encompass the whole site with three 1:500 enlargements for areas of particular complexity and interest. The survey is based on an air-photograph transcription done by Simon Crutchley of the Aerial Photographic Unit at the National Monuments Record Centre, Swindon; this survey was then enhanced in the field using ground based survey techniques. All the archaeology within the survey area was included in the survey, including several large slate quarries and a cairn field. Paddy End is discussed in terms of the dressing floors and adits, and includes a brief summary of the dressing floors, as follows,

*“The dressing floors are arranged on a series of eight curving terraces extending down the hillside which enabled the best use of gravity to feed the ore, and water for power from one process to another as it was gradually*

*refined. Water for the processing was transported by a network of leats which took water from the Levers Water Beck, Red Dell Beck (leat 339) and Low Water Beck (leat 418)” (RCHME 1995, 68).*

- 3.3.4 During the summer of 1997, the British Geological Survey in conjunction with members of CATMHS. began a survey of the underground workings as part of their on-going survey of the Lake District (Barker, pers, comm).

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## 4 WATCHING BRIEF RESULTS

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### 4.1 THE ARCHAEOLOGICAL WATCHING BRIEF

- 4.1.1 The watching brief was carried out between Monday 24<sup>th</sup> July and Monday 18<sup>th</sup> September 2006. It was undertaken in two key stages, firstly the preparation of the compound area for the use of the people and plants for nine months, and secondly the actual works in association with the extension of the Paddy End Water Treatment Works facility. The latter is the area of highest archaeological potential. The development site lies within the area previously used in 19th century as the terraced slime disposal area for the mill (Holland 1981, 60). Although parts of the previously surviving features relating to this have been disturbed by the Water Treatment Works, groundworks as part of the proposed development could reveal further features associated with this process.
- 4.1.2 Work began at the compound site on Monday 24<sup>th</sup> July. The compound site was situated in the field adjacent to the main Coniston Road on the east, surrounded by the road leading to the Copper Mines Youth Hostel on the western and southern side, and the cricket club to the north. The works at the compound can be seen outlined in Figure 6. The compound site was prepared preliminarily by the removal of turf and topsoil to a depth of 0.12m across the western third of the field, a total area of 65m by 65.5m. Natural was not revealed, as the depth did not reach below the topsoil. No features of archaeological origin were encountered. A 20m section of dry-stone walling was then removed before digging commenced to create a gentle sloped entrance into the compound for vehicles, the road being at a lower level than the field. No features of archaeological origin were encountered during this process. Following this, a narrow trench was cut, measuring 8.45m by 1.2m to a depth of 0.65m, 6 metres north of the entrance to the compound site. No features of archaeological interest were encountered. A series of post holes were then dug, totalling 57; each measuring, 0.7m by 0.4m and reaching a depth of 0.6m, for more permanent wooden fencing to be erected across the eastern part of the site, to screen the works from residential areas. No archaeological features were encountered during these groundworks. On Monday 24<sup>th</sup> July, some scree was removed from beside the main water reservoir, part of the Paddy End Water Treatment Works. This was scree placed there presumably with the construction of the water plant, and thus the lack of archaeological features encountered during its removal can be explained.
- 4.1.3 The Paddy End Water Treatment Works began on Tuesday 8<sup>th</sup> August 2006. The works undertaken in association with the extension to the Water Treatment Works can be seen in Figure 7. The area was first made safe by the provision of Herris Fencing around the site. The actual development works began with the removal of scree and undergrowth from the bank to the north-east of the building at the edge of the site (Area A). This was to create a levelled area of 1.6m wide for the positioning of a new vehicular access to the Water Treatment Works. As the area was a natural bank, some material was moved and then repositioned to create a level platform. This involved the occasional use of a mechanical pecker tool, on the 225LCV machine, to break up some of the larger section of rock. The spoil was removed and repositioned with a toothed

ditched bucket. Excess spoil not required for levelling was redistributed onto spoil heaps, which were located at the far north-western corner of the development site (Area B). The soil on this bank was a mid-brown colour with 30% boulder inclusions (rock averaging 0.5m in diameter). Where the bracken foliage was at its most rife, at the centre of the bank, the soil was of a more sandy consistency and appeared more yellow-orange in appearance with more occasional (20%) and smaller stone inclusions (averaging 0.2-0.4m diameter). Whilst this work continued, it was necessary for a much smaller levelled platform to be created further to the east and higher up the bank to create a safer, more sheltered area for the Herris Fencing, which was prone to being blown over by the occasional string gust of wind. This platform or ledge was only 0.25m wide and was created from the grey gravel scree (Area C). No archaeological features were encountered during this development. In addition to the levelled platform area for the new vehicular access, the development of the Paddy End Water Treatment Works building also required the re-routing of the existing partially culverted stream, in order for the building extension to be inserted at a later date. This required the levelling of a further platform area just to the north-east of the existing stream-location, of 2.5m wide. The new route of the stream was re-routed through a 1.2m diameter pipeline throughout this section of the development site, to avoid detrimental effects of the development on the water (Area D; Plate 4). The make-up of the soil remained the same at this level, as that on the new vehicular access route, and the same methods in terms of spoil redistribution was undertaken. At times the mechanical pecker tool was required to break through larger boulders of rock. The overall picture of the ground in this banked area was of previously made-up ground of some sort, natural was not reached and no archaeological features were encountered during these groundworks (Plate 5).

- 4.1.4 The beginning of the preparation for the ground due to house the building extension began on Friday 18<sup>th</sup> August with the excavation of two test pits of 2m by 2m, one at 1.1m deep at the corner of the existing building in the 'bund' which located the existing water mains, and one 3m north-east of it, to a depth of 1.5m which failed to locate the existing water mains (Area E). The north-west section of the 'bund' of material just outside the extant Paddy End Water Treatment Works building was begun on Monday 21<sup>st</sup> August (Area F). Perhaps unsurprisingly, no archaeological features were encountered during these works, as the 'bund' presumably dates to the 1970s when the Water Treatment Works were established at Paddy End, and it was created to protect the entrance of the building, from view and from the weather. The 'bund' comprised 40% stone and rubble material, the rest being mid-brown coloured soil. The occasional brick was also encountered, some of which were marked 'NB', and all measured 0.22m in length, 0.07m in height and 0.11m in width. They varied in colour, some being a pale yellow, but mostly they were red.
- 4.1.5 Due to several days of bad weather, it became necessary to create three shallow trenches for excess rainwater to ease its passage to the main drain towards the north of the site. From this main drain, one extended east, one north-east and one north (Area G). All were 0.5m in width and completed to a depth of 0.25m, and were backfilled with loose gravel to allow the passage of the excess water and to stop it from pooling on the site.
- 4.1.6 On Friday 1<sup>st</sup> September 2006, work began on the installation of new ducts to the rear (west) of the existing, partly covered Paddy End Water Treatment Works Building. This

programme of work involved the removal of a 5m long section of stone wall surrounding the existing open-air water tanks in this area. The trench was C-shaped, measuring 4 metres by 2 metres of a width of 1 metre (Area H). The maximum depth of the trench was 0.5m, and the fill consisted of a dark greyish grainy loam surrounding the existing manhole. As it did not reach the depth of the manhole, it is clear that this is backfill, explaining the absence of archaeology (Plate 6).

- 4.1.7 The entire surviving 2.5m high scree 'bund' bank of redeposited material from the original building of Paddy End Water Treatment Works was removed to create room for the new building extension. Plate 3 shows the area once these works were completed. No archaeology was encountered among the material removed. Two test trenches were excavated within the footprint of the new building, running parallel to each other and separated by 2m and running east to west (Area I). The southern trench was 8 metres long and 1 metre wide and to a depth of 0.8m maximum. The second trench, to the north, measured 6 metres by 1 metre and reached a maximum depth of 1.1m. Rock was revealed at the base of these trenches, to give an idea of the lie of the land to aid the planning of the foundations of the building.
- 4.1.8 Following a number of telephone conversations with the Project Manager, it was established that no further digging would be required and that the watching brief formally ended. Archaeological on-site cover ended on Monday 18<sup>th</sup> September 2006.

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## 5 CONCLUSIONS AND RECOMMENDATIONS

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### 5.1 CONCLUSIONS

- 5.1.1 The rapid desk-based assessment showed that copper mining began in the area in 1599. The majority of the surviving features relate to the later 18th and 19th century workings. The development site is in the area previously used in the 19th century as the terraced slime disposal area for the mill (Holland 1981, 60). Although parts of the previously surviving features relating to this have been disturbed by the Water Treatment Works, groundworks as part of the proposed development could reveal further features associated with this process.
- 5.1.2 Despite the high archaeological potential of the area, the watching brief did not encounter any archaeological features. The location of all groundworks associated with the development were monitored, and an archive kept for future reference.

### 5.2 RECOMMENDATIONS

- 5.2.1 As this report comprises the recommendations for archaeological recording of the developments relating to works at Paddy End Water Treatment Works, no further work is necessary. However, due to the continuing high archaeological potential of the area, and the status of the site as a scheduled monument, any further development in the area should be subjected to a programme of archaeological investigation.



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## 6 BIBLIOGRAPHY

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### 6.1 PRIMARY SOURCES

Hennett's Map of Lancashire, 1828

Ordnance Survey 1<sup>st</sup> Edition, 1844/5, HMSO © Crown Copyright

Ordnance Survey 3<sup>rd</sup> Edition, 1919, HMSO © Crown Copyright

### 6.2 SECONDARY SOURCES

Adams, J. (1988), *Mines of the Lake District Fells*, Dalesman Books: Lancaster

Agricola, G. (1556), *De Re Metallica*, Basle

Collingwood, W.G. (1910), 'Germans at Coniston in the Seventeenth Century', *CW2*

Collingwood, W.G. (1912), 'Elizabethan Keswick', in *Tract Series Volume VIII, Cumberland and Westmorland Antiquaries and Archaeological Society* (rep 1987)

Collingwood, W.G. (1928), 'The Keswick and Coniston Mines in 1600 and later', *CW2*

Cossons, N. (1975), *The BP Book of Industrial Archaeology*, David and Charles (Holdings) Ltd: Devon

Crossley, D. (1990), *Post-Medieval Archaeology in Britain*, Leicester University Press: Leicester

Donald, M.B. (1955), *Elizabethan Copper: The History of the Company of Mines Royal, 1568-1605*, London

English Heritage (1991), *MAP II: The Management of Archaeology Projects, Appendix 3*

Fleming, P. (n.d., c. 1989), 'A Circular Walk from Coniston Around the Coppermines', *a leaflet compiled and produced for the Cumbria Amenity Trust Mining History Society*

Fleming, P. (2000), Lakeland's Mining Heritage- Copper, in Cumbria Amenity Trust Mining History Society, *Lakeland's Mining Heritage*, Alston, pages 89-114

Grant, D. (1985), 'The Sixth Duke of Somerset, Thomas Robinson and the Newlands Mines, in, *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society, volume LXXXV, pages 143-162* (NPAL Library acc. C382)

Hammersley, G. (1973), 'Technique or Economy? The Rise and Decline of the Early English Copper Industry, ca 1550-1660', in, *Business History, volume 15*

Holland, (1981), *Coniston Copper Mines, A Field Guide*, Cicerone Press: Cumbria

Holland, (1986), *Coniston Copper: A History*, Cicerone Press: Cumbria

IFA (1994a), *Standards and Guidance for Archaeological Desk-Based Assessments*

IFA (1994b), *Standards and Guidance for Archaeological Watching Briefs*

- Jones, W. (1997), *Dictionary of Industrial Archaeology*, Sutton Publishing Ltd: Gloucestershire
- MCG (1992), *Standards in the museum care of archaeological collections*
- Middleton, R.H. (1985), 'A Survey of the Old Copper Works, Coppermines Valley, Coniston', *CW2 volume LXXXV*, pages 273-275
- Millward, D., Beddoe-Stephens, B. and Young, B., (1999), 'Pre-Acadian copper mineralization in the English Lake District', in, *Geological Magazine (1999)*, volume 136: pages 159-176, Cambridge University Press, Cambridge
- Pettius, Sir J. (1670), *Fodinae Regales*, London
- Raistrick, A. (1973), *Industrial Archaeology*, Granada Publishing Ltd: St. Albans
- RCHME (1995), *Coniston Copper Mines 1:2500 Survey. Archaeological Survey Report*
- Town, M. (2006), *Project Design for an archaeological watching brief at Paddy End Water Treatment Works, Coniston, Cumbria*, unpublished report by NPAL for United Utilities PLC
- Tyson, B. (1989), 'Coniston Forge, 14<sup>th</sup> January 1675 to 12<sup>th</sup> May 1766', in *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society*, volume LXXXIX, pages 187-206 (NPAL Library acc. B222)
- UKIC (1990), *Guidelines for the preparation of excavation archives for long-term storage*

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## APPENDIX 1: GAZETTEER OF SITES

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Site No.	Source	Name	Description	NGR
1	HER 4154	Coniston Copper Mines	Very important complete copper mining and processing site featuring wheel, huts, sluices, earthworks, sawmill, crushing mill, dressing floors, flotation unit, powder house etc.	328500, 499200
2	HER 30167	High Bobbin Mill, Coniston	Site of a Bobbin Mill	330400, 497840
3	HER 3355	Coniston Forge	Forge established in the 1670's and ceased before 1757	330120, 497690
4	HER 3357	Church of St Andrew and earlier Chapel	Church of St Andrew, built in 1819 on site of earlier chapel, consecrated 1586	330240, 497560
5	HER 18088	Coniston Carding Mill	Seen on OS 6" sheet 4 (1851), no longer marked	329880, 497770
6	HER 3221	Holywath Beck Bloomery	A bloomery site was discovered in the grounds of Holywath in a ditch, cut in 1957, with some building foundations	329830, 497750
7	HER 18089	Mouldry Bank Sand Put	Site of a sand pit seen on first and second edition O.S. mapping	329710, 497980
8	HER 3159	Dixon Ground Coniston Copper Works	Copper mill (NRIM 443662). No details given	329800, 497700

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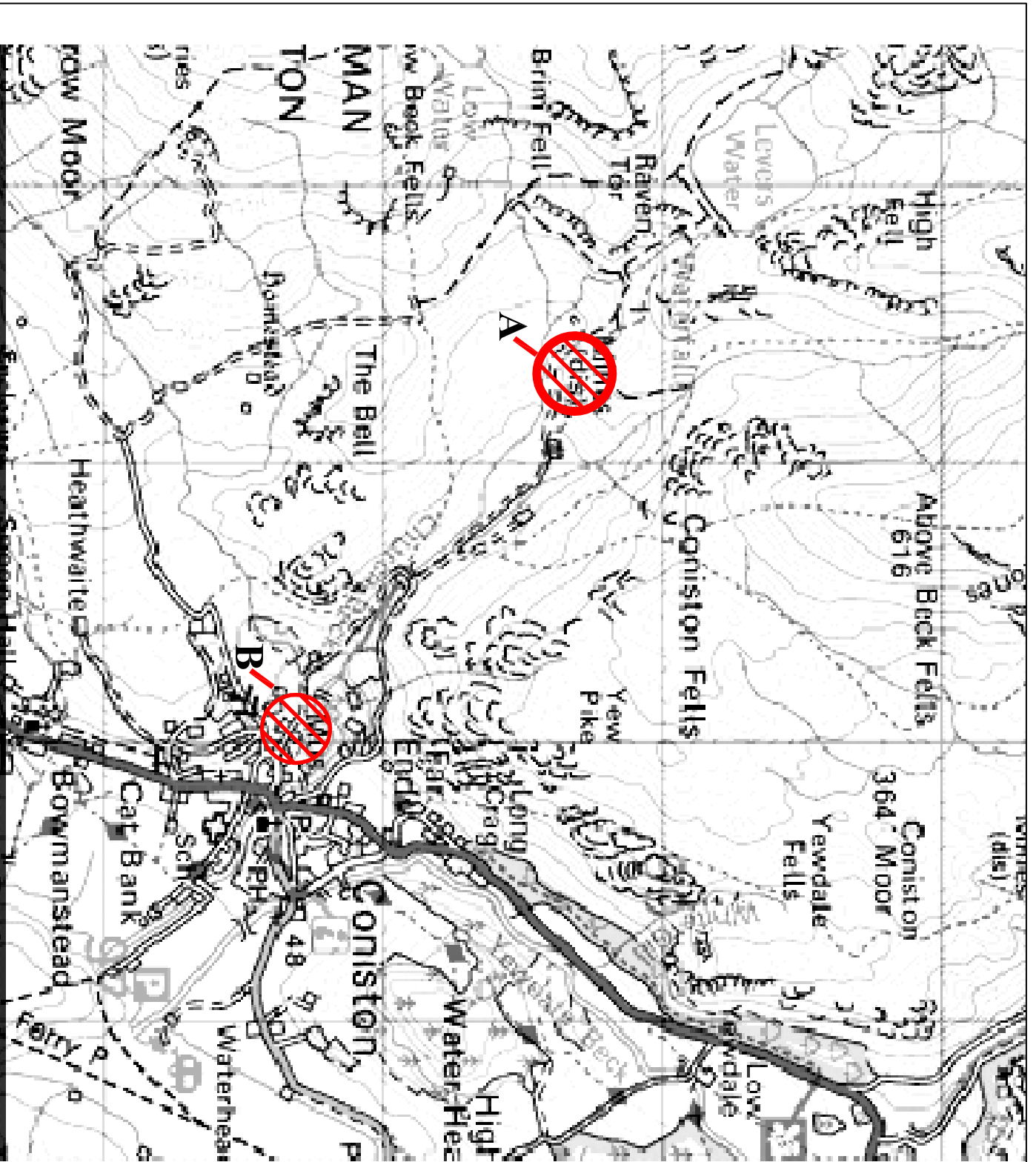
## **APPENDIX 2: FIGURES**

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## **APPENDIX 3: PLATES**

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2006

Paddy End Water Treatment Works

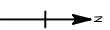
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DRAWN BY: CP

DATE: JULY 2006

LOCATION:



KEY



A: Location of Paddy End Water Treatment Works



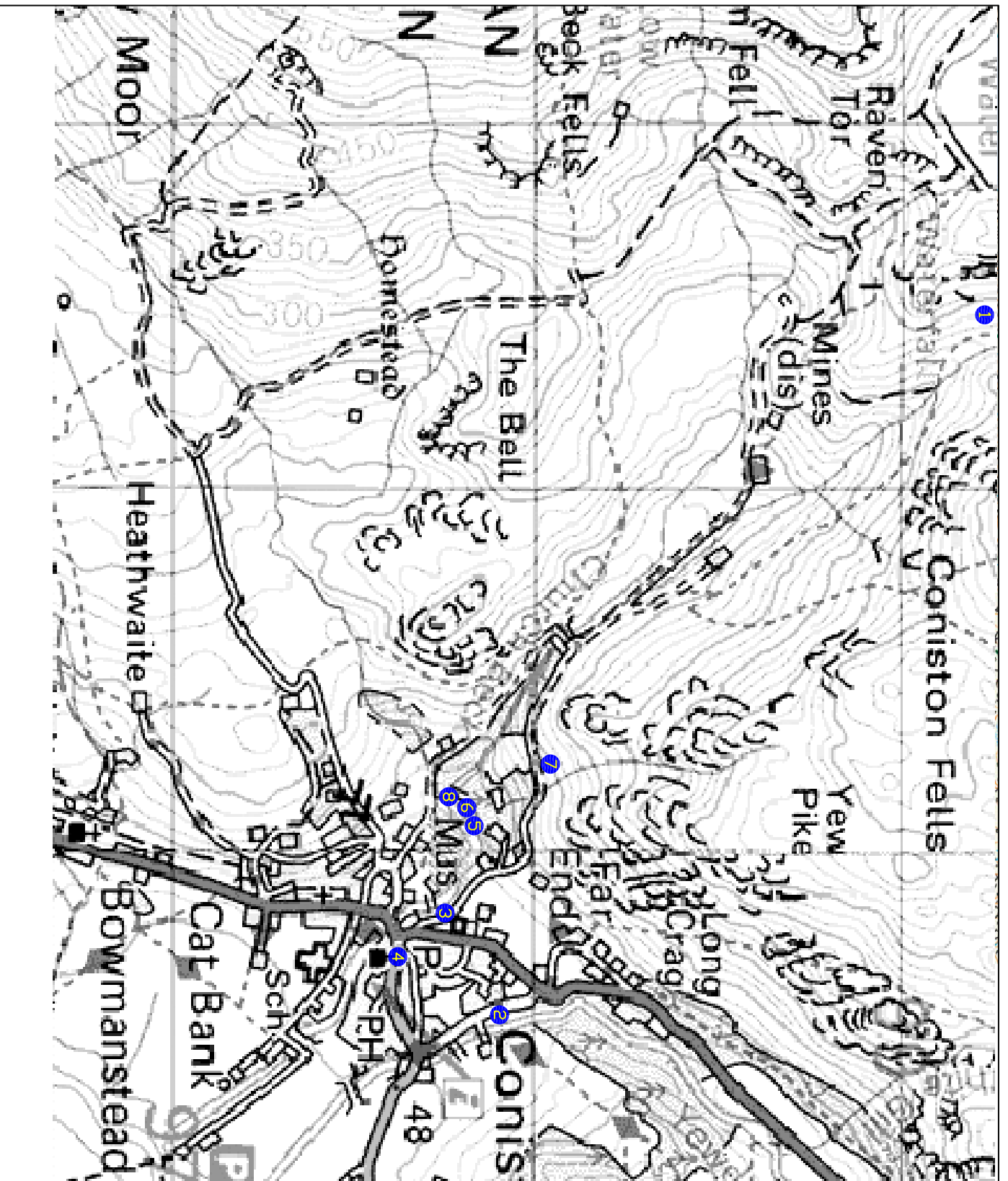
B: Location of Compound Site

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Figure 1 : Site Location



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Paddy End Water Treatment Works

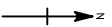
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DRAWN BY: CP

DATE: JULY 2006

LOCATION:



KEY



Location of Historic Site

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Figure 2 : HER Site Location Plan





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Paddy End Water Treatment Works

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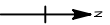
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not to scale (Antiquarian Map)

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DATE: JULY 2006

LOCATION:



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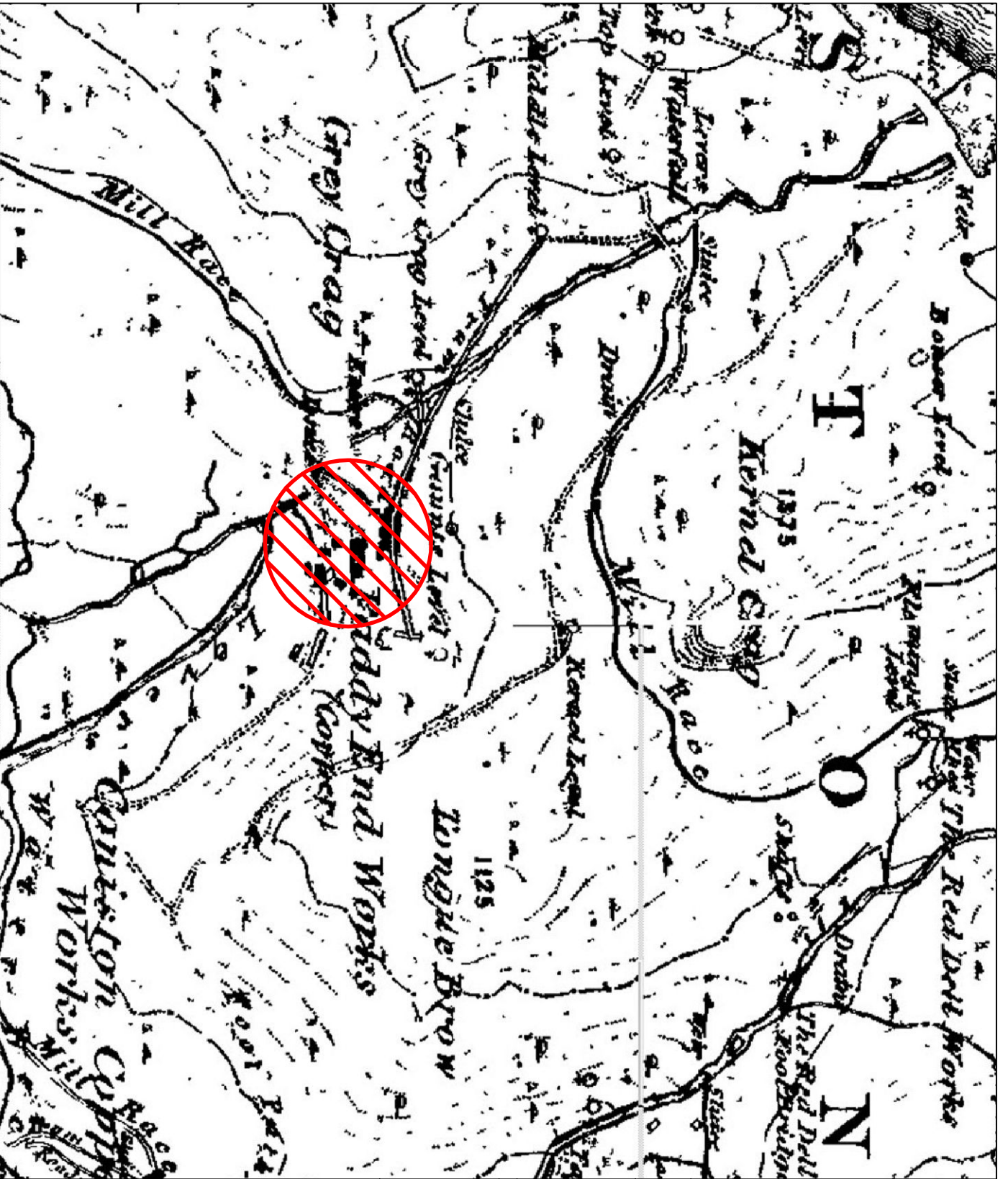
Paddy End Site location

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Figure 3 : Hennett's Map of Lancashire, 1828





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Paddy End Water Treatment Works

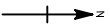
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LOCATION:



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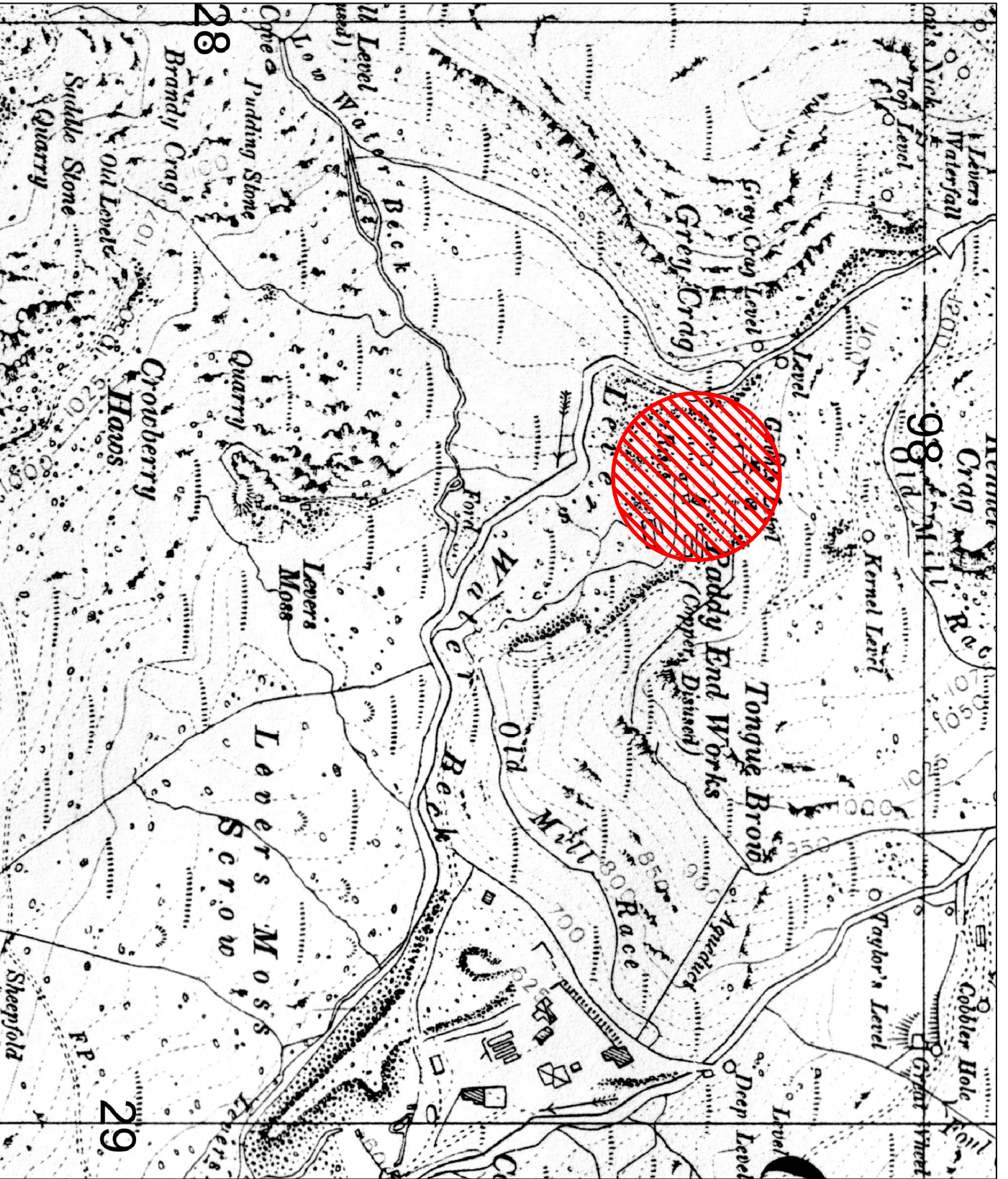
Paddy End Site location

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Figure 4 : First Edition Ordnance Survey Map, 1844/5





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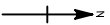
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DATE: JULY 2006

LOCATION:



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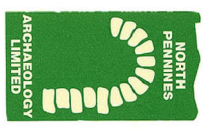
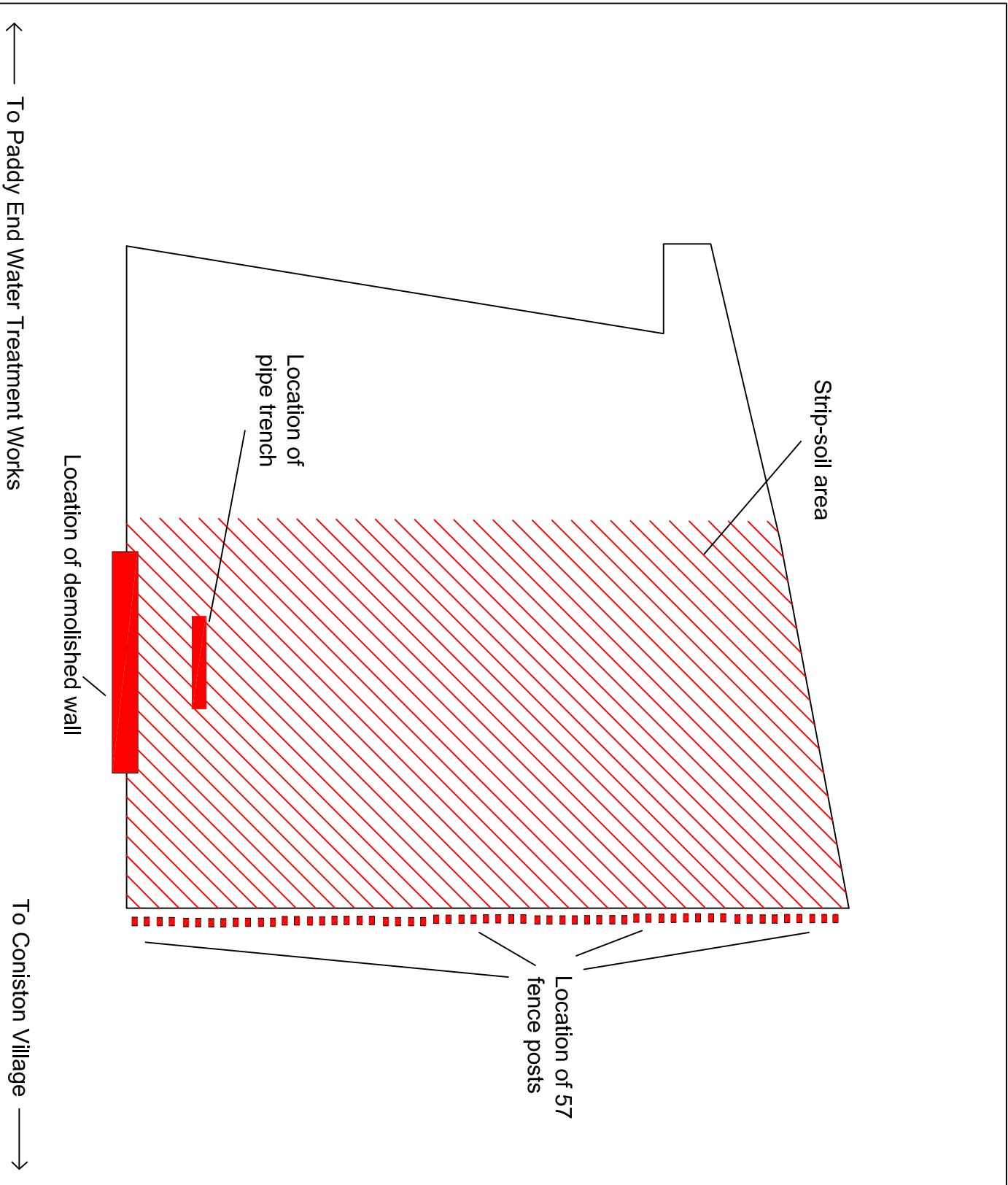


Paddy End Site Location

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Figure 5 : Third Edition Ordnance Survey Map, 1919



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Paddy End Water Treatment Works

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SCALE:  
1: 500

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CP

DATE:  
JULY 2006

LOCATION:



KEY



Area strip-soiled

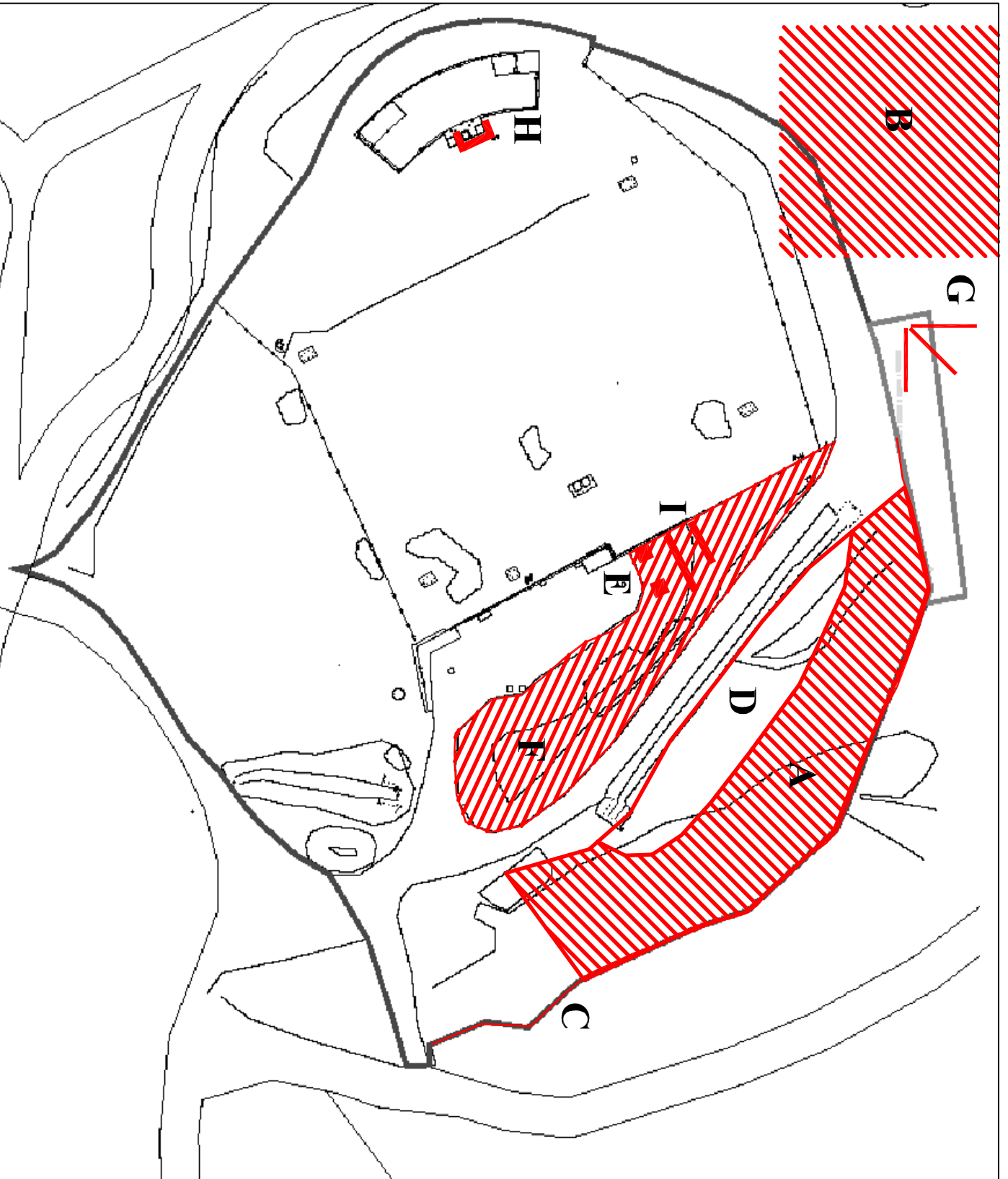


Excavated Area

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Figure 6 : Plan Showing Groundworks at the Compound Site



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Paddy End Water Treatment Works

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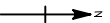
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SCALE: 1:700

DRAWN BY: CP

DATE: JULY 2006

LOCATION:



KEY



Location of Groundworks

- A: Removal and Levelling of bank
- B: Location of Spoil Heaps
- C: Platform for Herri's Fencing
- D: Excavation for re-routing of stream
- E: Location of Test Pits
- F: Removal of 'bund'
- G: Location of shallow trenches
- H: Excavation for ducts
- I: Location of Test Trenches

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Figure 7 : Plan Showing Groundworks Associated with the Extension of Paddy End Water Treatment Works



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## APPENDIX 3: PLATES

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Plate 1: Paddy End before the establishment of the Water Treatment Works  
(after Holland 1986)



Plate 2: Paddy End after the establishment of the Water Treatment Works  
(after Holland 1986)

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## APPENDIX 3: PLATES

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Plate 3: The Paddy End Water Treatment Works site after Ground Works were completed (September 2006)



Plate 4: Photograph showing the new location of the stream (culvert) and road to the right



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## APPENDIX 3: PLATES

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Plate 5: Location of the main works, with the new road on the right, stream at the centre and building extension due to be inserted by the furthest machine at the centre



Plate 6: Photograph Showing the C-Shaped trench for ducts to the west of the existing Water Treatment Works Building