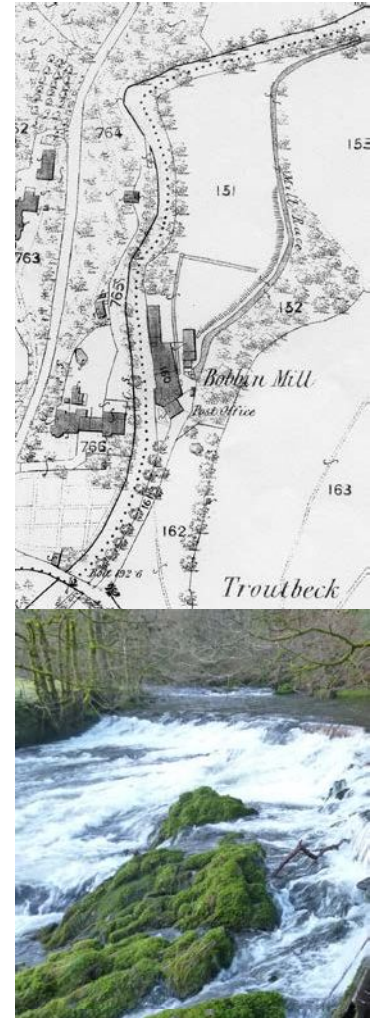


# PROPOSED HYDRO ELECTRIC SCHEME, TROUTBECK BRIDGE, WINDERMERE, CUMBRIA

## Heritage Statement



Client: Troutbeck Hydro Ltd

NGR: 340454 500665

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December 2012



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## Non-Technical Summary

Prior to the submission of a planning application for the establishment of a new hydro electric scheme at Troutbeck Bridge, Windermere, Cumbria the Lake District National Park Authority requested the submission of a Heritage Statement. The site is known to have been utilised by mills since at least the medieval period, although no part of it is statutorily protected as a heritage asset.

There are mills recorded at Troutbeck Bridge from at least 1390, and perhaps as early as 1274, initially comprising fulling and corn mills, with both perhaps operating at the same time. A mill connected with the processing of iron ore is also recorded in the area, perhaps on the same site. Certainly by the late 17<sup>th</sup> and 18<sup>th</sup> century two mills were operating at Troutbeck Bridge, a corn mill and a paper mill. The latter had gone out of use by the beginning of the 19<sup>th</sup> century, and by the 1820s a bobbin mill had been established on the site, which continued to operate into the early 20<sup>th</sup> century. At the end of the 19<sup>th</sup> century the mill race was being utilised to produce electricity, which also continued into the 20<sup>th</sup> century. In the late 20<sup>th</sup> century the bulk of the site and the former bobbin mill buildings were taken over for use as a stone masons.

The site visit revealed that the north-east section of the mill race remains in relatively good condition, with seven separate elements recorded, including the weir, sluice and mill race structure, and associated features such as an iron pipe and valve. A consideration of the evidence of the documentary research and the site visit concluded that while the extant section of mill race was certainly in existence by the mid-19<sup>th</sup> century it is likely to have earlier origins. It has, however, been subject to later modification, probably resulting from the installation of a hydro-electric plant in the 1890s, and is in a state of disrepair.

It is considered likely that the proposed development would have a relatively minimal impact on the extant mill race, although this would depend on the manner in which the associated work was carried out. The remains are of local significance, however, and since the excavation for the water pipe, continuing the line of the mill race to the west, would have the potential to affect as yet unknown remains of archaeological interest, it is recommended that a watching brief be carried out to monitor this.

## Acknowledgements

Greenlane Archaeology would like to thank Troutbeck Hydro Ltd for commissioning the project, in particular James Barratt who provided information about the site, and John Hodgson for his information concerning the requirements of the Heritage Statement. Further thanks are also due to the staff at Gordon Greaves (Slate) Ltd for enabling access to the previous historical research into the site. Special thanks are due to the staff of the Cumbria Archive Centre in Kendal for their help with accessing the archive material. Additional thanks are due to the various people who helped interpret the Latin text relating iron processing at the site, in particular those who respond via [www.Academia.edu](http://www.Academia.edu): Guy Chamberland (Laurentian University), Jasper Doomen (Leiden University), Cristian Ispir (King's College London), and Francesco Marzella (Università Degli Studi Dell'Aquila).

The project was managed and carried out by Dan Elsworth who also wrote the report. The illustrations were produced by Tom Mace, and the report was edited by Jo Dawson.

# 1. Introduction

## 1.1 Circumstances of the Project

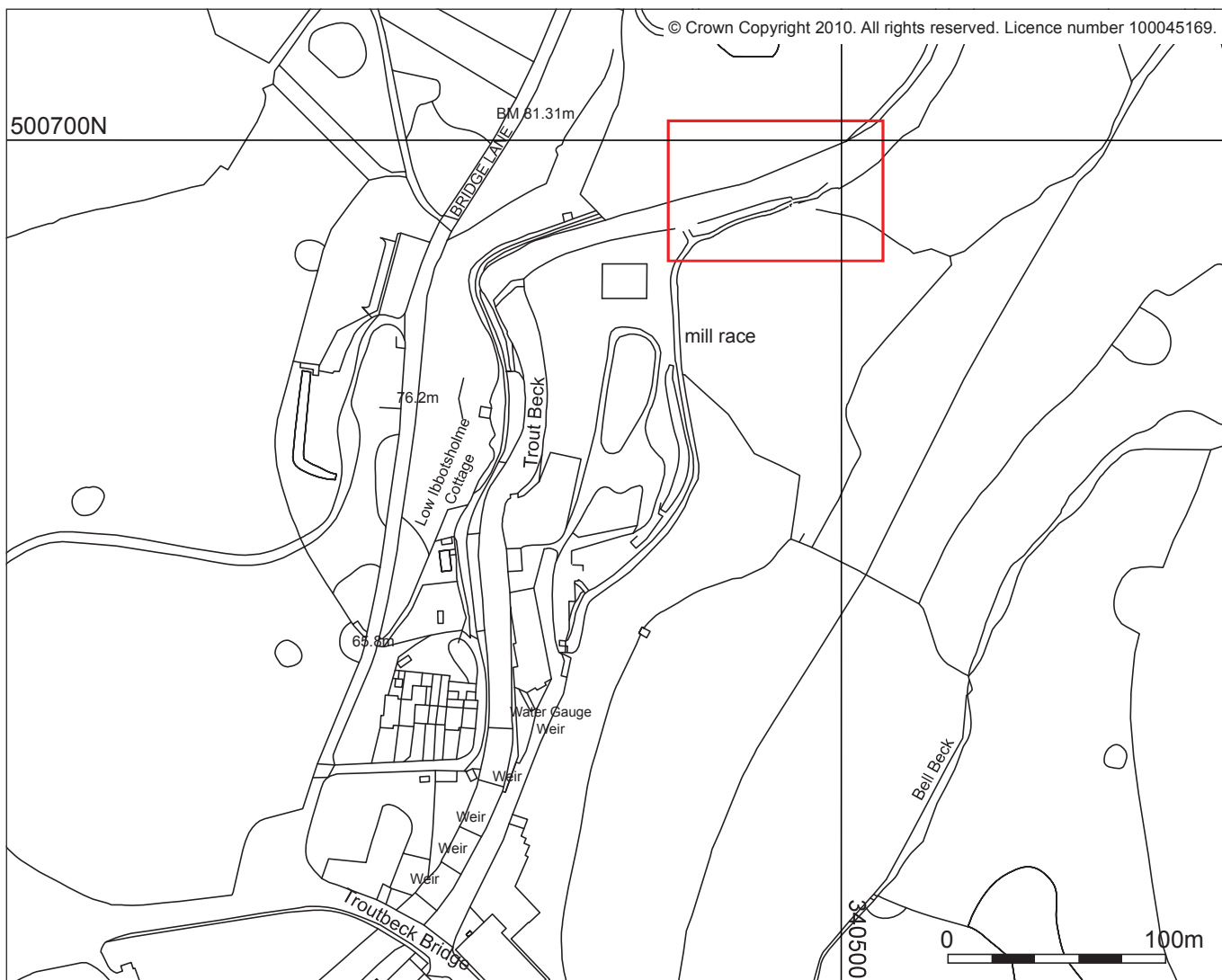
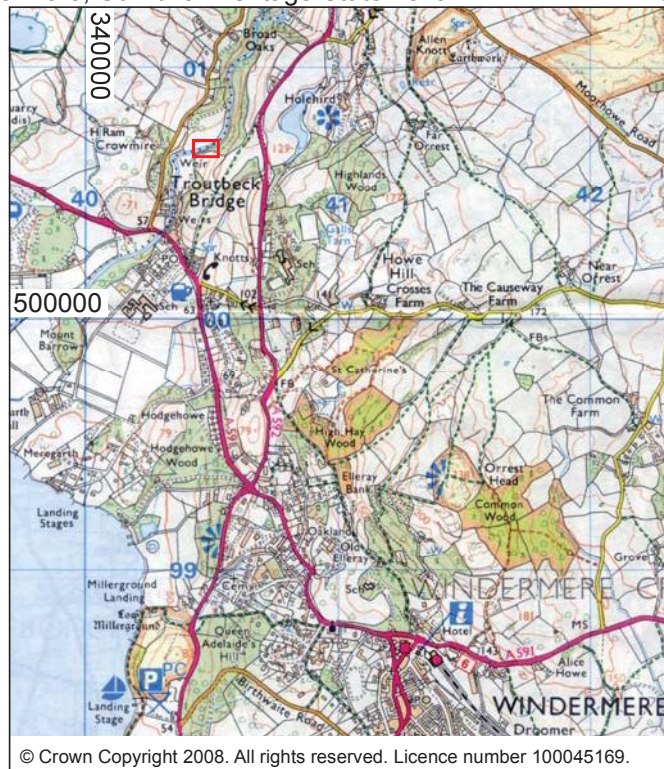
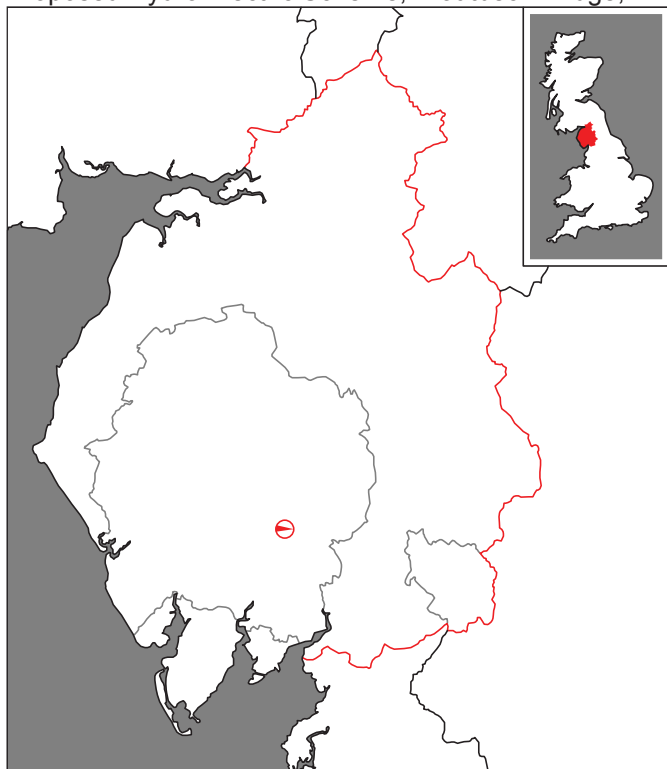
1.1.1 Following a pre-application consultation prior to the submission of a planning application for the establishment of a hydro electric scheme at Troutbeck Bridge, Windermere, Cumbria (NGR 340454 500665), the Lake District National Park Authority (LDNPA) requested a Heritage Statement be submitted with the application. The proposed scheme makes use of a former mill race which is of some historical and archaeological interest, and so the heritage statement would enable the affected area to be recorded and an assessment of the impact of the development to be made. Greenlane Archaeology was approached by James Barratt of Troutbeck Hydro Ltd (hereafter 'the client') to produce a Heritage Statement.

1.1.2 The site is in an area known to have been used for milling from the medieval period to the 20<sup>th</sup> century and is recorded by the LDNPA Historic Environment Record as site number 17154.

## 1.2 Location and Arrangement, Geology, and Topography

1.2.1 Troutbeck Bridge is situated approximately mid-way between the towns of Windermere, less than 3km to the south-east, and Ambleside, approximately 4km to the north-west, with the village of Troutbeck less than 2km to the north (Figure 1). The site is actually located to the north of the village of Troutbeck Bridge, against the Trout Beck to the north and west and with the buildings now utilised by Gordon Greaves (Slate) Ltd to the south.

1.2.2 The local topography comprises a relatively steep-sided valley formed by the Trout Beck, which runs on a generally north/south orientation towards Windermere to the south. The site is at approximately 70m-60m above sea level (Ordnance Survey 2008). The local solid geology principally comprises Bannisdale slate (Moseley 1978, plate 1). This is typically overlain by glacially-derived deposits, largely boulder clay, laid down at the end of the last ice age, which tend to gather in valley bottoms but leave numerous rocky outcrops (Countryside Commission 1998, 33).



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Figure 1: Site location

## 2. Methodology

### 2.1 Desk-Based Assessment

2.1.1 A desk-based assessment was carried out in accordance with the guidelines of the Institute for Archaeologists (IfA 2008a). This principally comprised an examination of early maps of the site and published secondary sources. A number of sources of information were used during the desk-based assessment:

- **Cumbria Archive Centre (Kendal) (CAC(K))**: this was visited principally in order to examine early maps and plans of the site, but other documentary sources and published records were also consulted in order to gather information about the historical development of the site and its environs;
- **Lake District National Park Historic Environment Record (LDNP HER)**: this is a GIS database of all sites of archaeological interest maintained by the LDNPA. Each site is recorded with a unique number and the record contains information outlining the known history of the site and its location. Information held by the HER was consulted;
- **Cumbria Archive Centre (Barrow-in-Furness) (CAC(B))**: a further primary source was examined here that related directly to proposed additions to the mill race in 1924;
- **Gordon Greaves (Slate) Ltd**: digital copies were made of previous research, some or all carried out by Mike Davies-Sheil, present on site during the site visit and this information was utilised in the report as necessary;
- **Greenlane Archaeology library**: additional secondary sources, used to provide information for the site background, were examined.

### 2.2 Site Visit

2.2.1 A site visit was carried out on 23<sup>rd</sup> November 2012. The intension of this was to examine and record the surviving elements of the mill race and provide the information on which a discussion of the significance of the site as a whole could be assessed. The following recording techniques, based on the guidelines of the IfA (IfA 2008b) and English Heritage (2007) were used to achieve this:

- The production of a plan of the extant earthworks and associated features at a scale of 1: 100 through the hand-annotation of an existing topographic survey produced by Spatial Data Limited;
- The production of cross-sections at a scale of 1: 100 through the hand-annotation of existing sections produced as part of the same topographic survey;
- Recording the various elements making up the mill race on Greenlane Archaeology *pro forma* record sheets, which record the form and dimensions in each case, and provide an assessment of significance;
- Photographs were taken in colour digital and colour 35mm print format of all of the elements recorded.

### 2.3 Report

2.3.1 A copy of this report will be deposited in the Cumbria Archive Centre (Kendal) at a suitable time on completion of the project, on agreement with the client. A copy of this report will be provided for the client and a copy will be retained by Greenlane Archaeology. In addition, at a suitable time, a record of the project will be made on the OASIS scheme and a copy will be provided to the LDNP HER, on agreement with the client.



## 3. Results

### 3.1 Introduction

3.1.1 The results of the desk-based assessment have been used to produce three separate elements. Firstly, the production of a general history of the site (*Section 3.2*). Secondly, a map regression outlining the way in which the site has developed over time (*Section 3.3*). In addition, information about the physical remains of the building, collected during the site visit, is presented in *Section 3.4*. Finally, the results of these three sections are discussed in *Section 3.5*.

### 3.2 Site History

3.2.1 **Troutbeck Bridge:** Troutbeck Bridge is actually historically situated in the township of Applethwaite in the parish of Windermere, rather than in the township of Troutbeck. The earliest references to Troutbeck and Applethwaite are only from the 13<sup>th</sup> century, but both contain elements that are Norse in origin (Smith 1967, 188 and 194) and so indicative of activity in the area as early as the 9<sup>th</sup> or 10<sup>th</sup> centuries.

3.2.2 **Mills and milling:** the importance of the site in accommodating mills has been acknowledged for some time, Mary Armitth stating in 1916 that '*Troutbeck Bridge mill-stream beats all record for the number of industries which it has successively lent a motive power*' (Rawnsley (ed) 1916, 411). The history of the mills and milling at Troutbeck Bridge has been investigated in some detail by Mike Davies-Shiel, who produced an undated report on the history of hydroelectricity at the site (and probably also has produced an anonymous and undated alternative version of the same report, a copy of which is held in the CAC(K)). In addition, John Gavin investigated the history of papermaking at the site (Gavin 1990). Mike Davies-Shiel also produced two reconstruction drawings of the site covering different periods, either side of a fire in 1867 (see *Section 3.2.5* below), copies of which were present in the offices at Gordon Greaves (Slate) Ltd (Plate 1 and Plate 2), the latter also being incorporated in the undated reports on hydroelectricity at the site (Davies-Shiel n.d., map b). These plans are significant because they suggest that the earliest mills were either on the west side of the Trout Beck or to the south of the buildings currently used by Gordon Greaves (Slate) Ltd, although no references are provided for the dates given or supporting evidence for this interpretation of the site. It is noticeable, however, that the line of the mill race in these drawings does not correspond to the current arrangement or that shown on early maps of the site (see *Section 3.3*), as it is shown running almost directly south from the weir, rather than first running west.

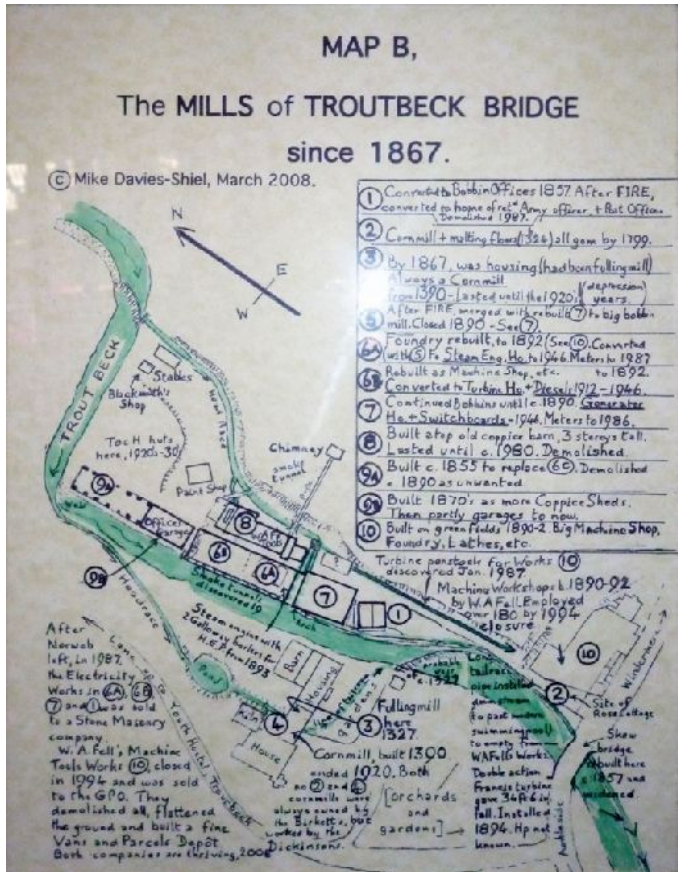
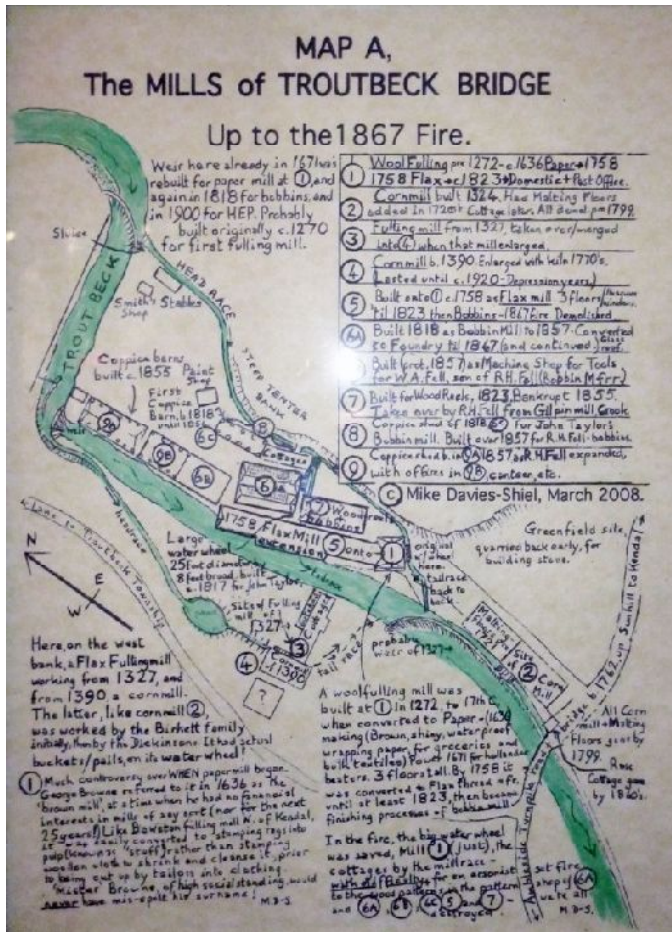


Plate 1 (left): Mike Davies-Shiel's reconstruction of the site up to the fire of 1867, showing the mills of various phases from the medieval period onwards

Plate 2 (right): Mike Davies-Shiel's reconstruction of the site after the fire of 1867

3.2.3 **Early History:** the origins of milling at Troutbeck Bridge are obscure and are complicated by the vague nature of references in the medieval period and the confusion caused by Troutbeck Bridge being in Applethwaite and not Troutbeck Township (see Section 3.2.1 above) and references frequently only being made to 'Troutbeck' rather than anything more specific. It has been suggested that a mill was present there as early as 1274, as suggested by the late Mike Davies-Shiel and recorded in the information held by the LDNP HER (No. 17154), and this has been repeated more recently (Welsh 1997, 157). The evidence for this claim is, however, uncertain and no source is given. It is possible that it has been inferred from the record that Walter de Lyndsey held the moiety of a mill in Appletwayt (*sic*) in 1272 (Curwen 1924, 59). In 1390 a rental document lists a fulling mill in Troutbeck held by the tenants (*op cit*, 44), which has been taken to be situated at Troutbeck Bridge (Marshall and Davies-Shiel 1969, 59), although it is also stated that there were as many as three fulling mills in Troutbeck by the end of the 14<sup>th</sup> century (Armitt 1908, 139). The presence of mills in Applethwaite and Troutbeck is also indicated by an inquisition of 1442, which states that 'the house of John Robynson Thomson called le Milnehouse is out of repair, likewise the thatching of the mill of the tenants of Troutbek' (Curwen 1924, 71). Further references to the site are not found until perhaps 1492/3, by which date the tenants of Troutbeck, 'on the orders of the lord and his council' had apparently built a mill 'pro ferro triando' (Parsons 1996, 139; 1997, 81), most likely referring to the processing and separating of iron ore (see the description of water-powered stamp mills, used as part of this process, in Agricola's *De Re Metallica*: Hooper and Hooper 1950, 284-290), indicating that iron was being smelted in the area at that time (Parsons 1997, 81). There is little certainty about the numbers of mills operating in Troutbeck at this time, however, and an account of 1506-1507 states that 'a walk-mill [meaning fulling mill] lately set up under the chapel of Troutbeck [had] been pulled down by the officers of the Lady Margaret, Countess of Richmond, lest damage should be caused by it to the fish breeding in Windermere' (Armitt 1908, 141). Certainly in the 17<sup>th</sup> century there

was both a fulling mill and a corn mill operating at the site, considered by John Gavin to have been the original medieval structures, but these were destroyed by fire in 1653 (Rawnsley (ed) 1916, 411) and subsequently rebuilt (Gavin 1990 80).

**3.2.4 Later History:** by the middle of the 17<sup>th</sup> century there was certainly a corn mill at Troutbeck Bridge possessed by the Birkett family, who sold their share in 1668 to Robert Philipson of Calgarth (Rawnsley (ed) 1916, 410), and evidently also a fulling mill (CAC(K) WDTE/UB/28 1649). However, by the end of the century a significant shift in the use of the site took place. In 1673 Philipson leased his share in one of the mills, evidently the fulling mill, to George Cumpstone, the son of Richard Cumpstone, who operated a paper mill in Ambleside (Gavin 1990, 80; see also CAC(K) WDX/1523 1980s-1990s). It is evident that George Cumpstone established a paper mill at Troutbeck from 1673, and it continued to be operated by members of the Cumpstone family until at least 1687 (Gavin 1990, 81); the family appear to have gradually shifted the focus of their operations from Ambleside to Troutbeck Bridge (*op cit*, 85). In 1688 it was leased by Thomas Jones, whose family at that time operated three of the four paper mills working in Cumbria (*op cit*, 83). The venture also involved a mercer from Cockermouth named Robert Tubman from 1697 (*op cit*, appendix 2), and probably continued into the beginning of the 18<sup>th</sup> century (*ibid*). Certainly the paper mill was still operating into the late 18<sup>th</sup> century, although the expansion of the industry had led to the development of a second mill in nearby Applethwaite by c1740 (*ibid*). The general decline in business throughout the 18<sup>th</sup> century saw the bankruptcy of several paper mills before 1800, it is not clear when the paper mill at Troutbeck Bridge closed, but it had apparently been converted to a corn mill by at least 1788 (CAC(K) WD/AG/Box 90 1628-1913) and a flax mill by 1801 (Gavin 1990, appendix 2). It is worth noting, however, that several original documents make it clear that throughout the 17<sup>th</sup> and 18<sup>th</sup> centuries, while the paper mill was in operation, a corn mill was also working on the site, which is also described as having an associated house, drying kiln and malting kiln (CAC(K) WD/AG/Box 90 1628-1913; CAC(K) WDTE/UB/28 1649; CAC(K) WDTE/UB/84a 1749; CAC(K) WDTE/UB/117 1753). It is also notable that the corn mill at Troutbeck Bridge was described as 'ancient' when it was repaired by George Birkett, carpenter, in 1719 (Tyson 1982, 151), perhaps indicating that it was not destroyed in the fire of 1653.

**3.2.5** By the 1820s at least one of the mills at Troutbeck Bridge had been converted into a bobbin mill (Gavin 1990, appendix 2), which operated into the 20<sup>th</sup> century (new mill buildings with steam engines being added after 1920; CAC(K) WDB/121/299 1920). The bobbin mill was long associated with the Fell family of Troutbeck Bridge, although they did not establish it (Somervell 1930, 113). The history of the bobbin mill is in some ways less well recorded than some of the earlier elements of the site, although the map evidence clearly shows its extent (see *Section 3.3*). However, in September 1867 the bobbin mill was all but destroyed by a fire, although the company managed to survive this event and rebuilt (Davies-Shiel n.d.). By 1870 the site had been further enhanced with the creation of an iron foundry by the Fell family, described as 'recently erected' at this time (CAC(K) WMB/121/1 1870). The foundry was used to produce bobbin mill machinery (Davies-Sheil n.d., map B). The most significant alteration to the use of the site during the late 19<sup>th</sup> century was the installation of a turbine for the production of electricity in 1893 (see Anon n.d.; Berry 2006; but primarily Davies-Shiel n.d.). The scheme originated during a period of depression in the bobbin industry, and was the initiative of Mr Frederic Fowkes, the managing director of RH Fell & Sons' bobbin mill (*op cit*, 1). A meeting was held with influential local residents on the 16<sup>th</sup> May 1892 to discuss the scheme but no agreement was reached regarding finding the £6000 necessary to acquire the freehold and provide the equipment and so RH Fell & Son commenced work themselves under Fowke's management and by early 1893 they had installed a 25 horsepower Gilkes single water wheel turbine, a Galloway boiler, Greenwood & Bately horizontal steam engine, and 25kw alternators (*ibid*). By June electricity was being supplied to five customers in the area: four hotels and one private residence (*op cit*, 2). The scheme was evidently a success and continued to be operated by RH Fell & Son until 1897, at which point it was taken over by the Windermere and District Electricity Supply Co Ltd, which had been incorporated in 1894 with the intension of utilising water at Newby Bridge and Backbarrow, although these schemes never came to fruition (*ibid*). The new company soon expanded the supply, laying cables to Ambleside and then Grasmere in 1913 and installing a larger steam engine to cope with the occasional need for additional capacity (*ibid*). Capacity continued to be increased throughout the early part of the 20<sup>th</sup> century (*op cit*, 3-4). The site continued to be used for the making of electricity, alongside the remnants of Fell's machine workshops, until late in the 20<sup>th</sup> century, with



Norweb finally abandoning it in 1987 from which point it was used as a stonemason's yard (*op cit*, map b).

### 3.3 Map Regression

3.3.1 **Introduction:** there are relatively few detailed early maps of the area and those that there are unfortunately did not include the area of the mill and its associated structures. The Tithe Map for Applethwaite township (CAC(K) WDRC/8/286 1841), for example, did not include this land, which suggests that it did not pay tithes. A detailed estate plan of land in the area (CAC(K) WDBIG/PLANS/1251 1844) also did not include the mill or associated land. Therefore, the earliest reliable and detailed plans begin with the Ordnance Survey maps from the 1860s onwards.

3.3.2 **Ordnance Survey, 1862:** this map, although at a scale of 1: 10,560, clearly shows the weir and mill race, at this date feeding a bobbin mill (Plate 3). A further short section of possible former mill race is also visible on the west side of the river, near where it turns to the south; this is interpreted as a part of the medieval mill system by Mike Davies-Shiel, who considers the building on the opposite side of the river to the bobbin mill marked as occupying the position of a mill of medieval origin (see Plate 1). The structures comprising the bobbin mill are shown in reasonable detail with an L-shaped feature running between the mill race and mill depicted, although it is not clear what this represents.

3.3.3 **Ordnance Survey, n.d.:** although undated this plan is probably of a similar date to the previous one and is more detailed as it is at a scale of 1: 2,500 (Plate 4). It shows essentially the same information as the previous map, although the bobbin mill buildings are shown in more detail as is the L-shaped structure to the north, although the purpose of this is still not clear. The short section of what appears to be mill race on the west side of the river is also shown as is the weir feeding the extant mill race.

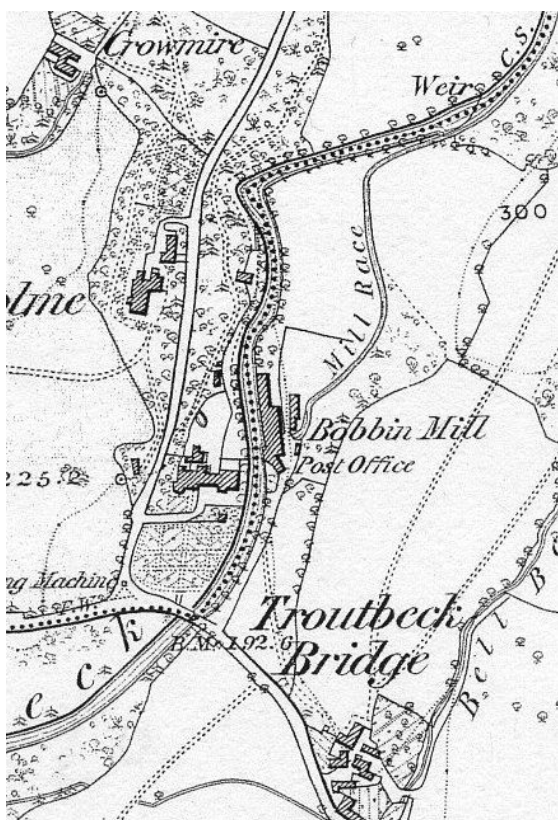


Plate 3 (left): Extract from the 1: 10,560 Ordnance Survey map of 1862

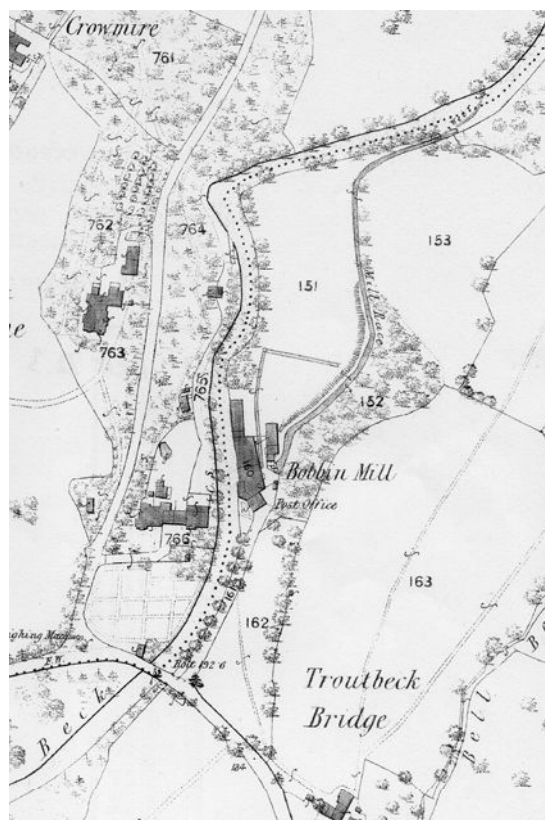


Plate 4 (right): Extract from the 1: 2,500 undated Ordnance Survey map

3.3.4 **Deed plan, 1893:** this plan, from a deed of 1893, shows the mill race in reasonable detail and clearly indicates that an additional arm linking back to the river, presumably to form a divert channel, has

been constructed by this date (Plate 5). Various trees are marked along the north and south sides of the north-east end of the mill race, and elements apparently labelled 'Clew' are also labelled although it is not clear what this refers to; it is perhaps a name as other names, presumably those of land owners are shown elsewhere on the same plan. The mill buildings to the south have clearly been substantially reorganised and the complex extends to the north. Other features such as what is presumably a bridge and a 'flue' are marked as crossing the line of the mill race.

3.3.5 **Deed plan, 1908:** this map is also taken from a deed, of 1908, but does not show as much detail. The mill race is clearly still extant but the southern block of land is marked as belonging to the 'Windermere Electric Light Company' (Plate 6).

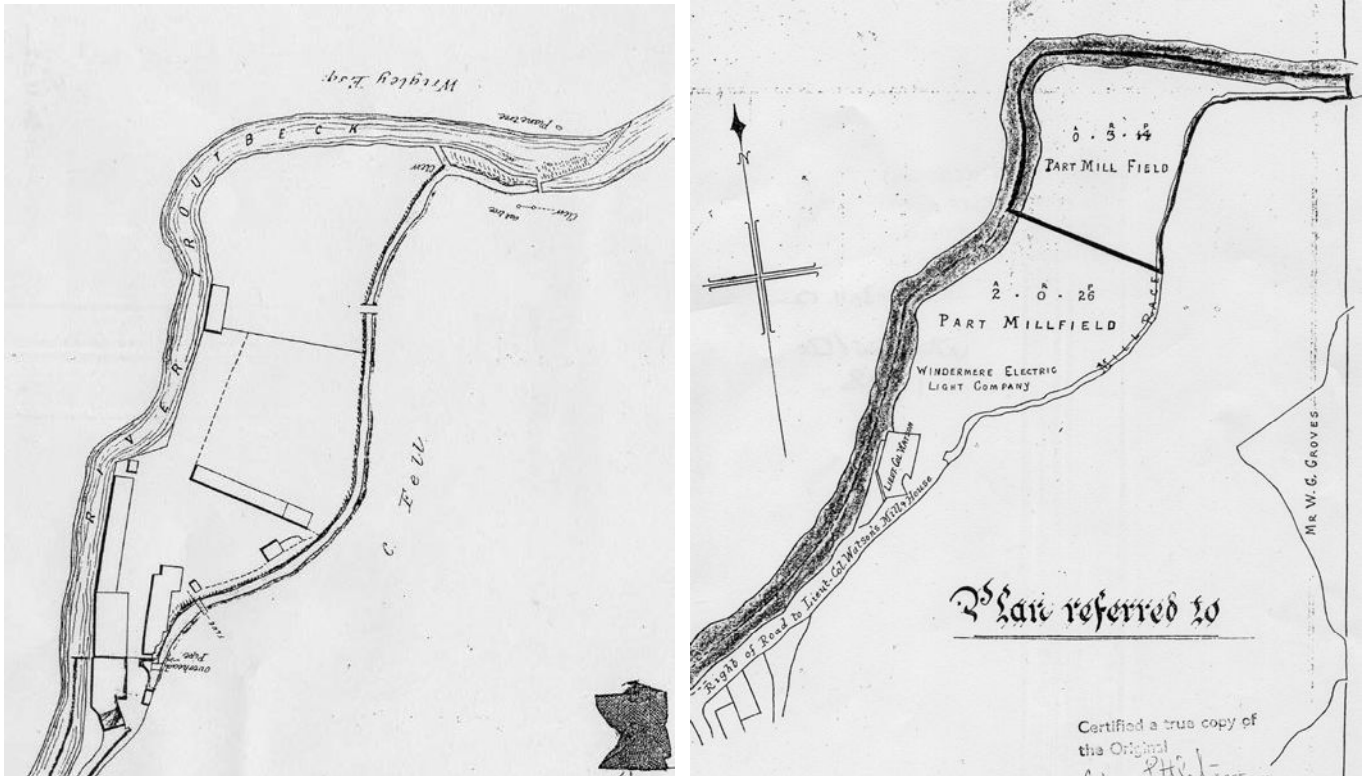


Plate 5 (left): Plan of 1893 extracted from a deed (CAC(K) WDMDS/130 1893-1963)

Plate 6 (right): Plan of 1908 extracted from a deed (CAC(K) WDMDS/130 1893-1963)

3.3.6 **Ordnance Survey, 1912:** this broadly confirms the arrangement of the 1893 plan, although it is clear that some of the outlying buildings associated with the mill have been reorganised since then and the site is referred to as the 'Windermere & District Electricity Works' (Plate 7). The weir and sluice are marked at the end of the mill race and the additional arm to the north is also clearly shown (Plate 8). In addition, a further weir is labelled further down the river, which corresponds to the possible section of mill race on the west side of the river, although the building to the south is named 'Ibbotsholme Cottage'. In addition an iron works is shown to the south of the whole complex, adjacent to the road.

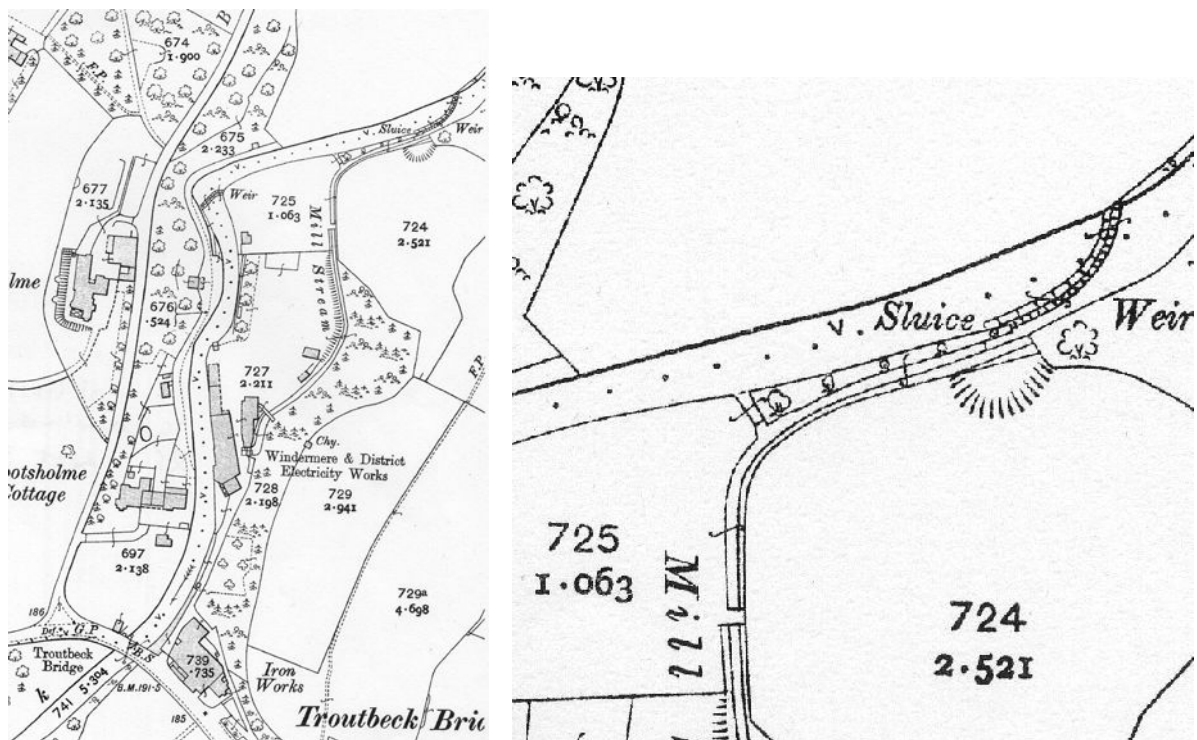


Plate 7 (left): Extract from the Ordnance Survey map of 1912

Plate 8 (right): Extract from the Ordnance Survey map of 1912, showing the detail of the upper part of the mill race

3.3.7 **Proposed screen across the mill race, 1924:** drawings for a proposed grated screen, intended to prevent fish from entering the mill race from the Trout Beck, were produced in 1924 (CAC(B) BDHJ/16/3 1922-1937). It is not clear if this screen was ever built but it was of largely iron construction supported by timber planks and with a cement base, set at an angle across the entrance to the mill race (Plate 9).

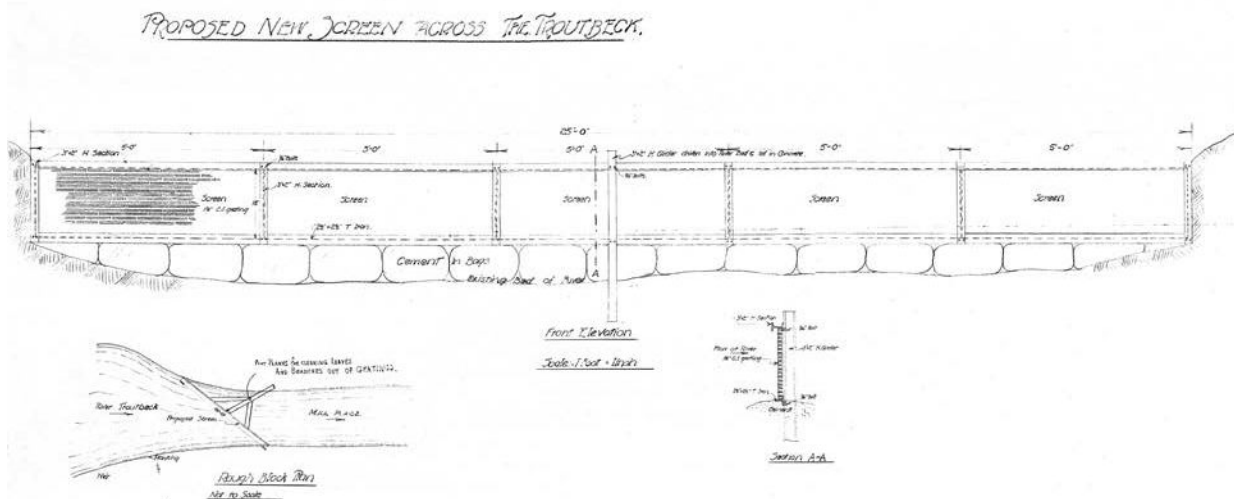


Plate 9: Plan of 1924 showing proposed grating over the mill race at Troutbeck Bridge (CAC(B) BDHJ/16/3 1922-1937)

### 3.4 Site Visit

3.4.1 The site visit revealed that the surviving section of mill race could be divided into seven separate elements. These are described below and shown in Figure 2.



3.4.2 **Element 01**: this comprises the weir and associated structures, although it could not all be examined due to the high water level at the time. It is largely of thick gravelly concrete construction, with timber edging boards orientated initially approximately east/west before turning north at the east end (Plate 10). The boards in the centre across the weir proper appear to be very recent. An iron pipe of 0.2m diameter orientated east/west is incorporated within the concrete and visible where part of this has broken away, the pipe too being damaged in this area (Plate 11). The weir structure forms the entrance to the mill race at its west end where it meets the sluice (**Element 03**).



Plate 10 (left): General view of the weir (**Element 01**)

Plate 11 (right): Detail of the iron pipe incorporated into the weir

3.4.3 **Element 02**: this comprises a flight of stone steps running up the slope to the south-east of the sluice (**Element 03**) (Plate 12). There are nine slate steps, set between retaining walls to the north and south, the south forming part of a former boundary wall that ran along the side of the mill race (**Element 04**).



Plate 12: Stone steps (**Element 02**)



3.4.4 **Element 03**: this comprises a number of elements which presumably originally formed a sluice gate set across the head of the mill race (**Element 04**). On the north side there is a block of masonry built of stone and 1.2m long (north/south) by 0.9m wide (east/west) and 0.5m thick, comprising rough courses with concrete mortar and topped with a concrete slab 0.1m thick (Plate 13). There is a projecting lower block of concrete to the west of this, 0.9m long (north/south) by 0.6m wide (east/west) and 0.1m thick, with an upright slate edging slab along its west side (Plate 13). On the opposing, south, side of the mill race is another large, angular block of concrete covered with moss and set into the side wall. Between the two blocks, in the channel of the mill race, is a large block of poured concrete (but incorporating a horizontal piece of timber) 1.2m long (north/south) by 0.6m wide (east/west) and 1.2m thick (Plate 14). This has clearly been placed to blocked the mill race.



Plate 13 (left): Detail of the north side of the sluice (**Element 03**)

Plate 14 (right): General view of the sluice (**Element 03**) showing concrete blocking

3.4.5 **Element 04**: this comprises the mill race itself, which runs from the sluice to the east (**Element 04**) to the west, where it divides and comes to an end. It is largely constructed from drystone walls, although the east end of the south side appears to be a rock face where it has been cut into the bedrock, augmented with elements of walling (Plate 15). Most of the walling is obscured by moss and vegetation, as is the base of the channel, which is also covered by mud and fallen masonry. The walls are built from a mixture of local slate and volcanic rocks, in a mixture of angular and rounded types (the south side noticeably containing more angular stones); in the centre (perhaps as a result of more recent repair) the wall is free of moss and up to six irregular courses are visible (Plate 16). Along the south side, at the top of the associated slope, there are the remains of a drystone revetting wall, which runs from the steps to the east (**Element 02**), but, assuming it continued to the west, is largely collapsed. On its line are a number of tree stumps suggesting that it perhaps continued as a hedge. At the west end of the mill race it divides, one arm turning north towards the Trout Beck, the other south-west. The north arm has rebates, approximately 0.3m wide, formed by shuttered concrete set into the wall, evidently originally housing another sluice gate (Plate 17 and Plate 18), and is crossed by an iron pipe (**Element 06**) with associated valve (**Element 05**) at its north end. The south-west arm is blocked by debris.





Plate 15 (left): General view of the east end of the mill race (*Element 04*) from the east

Plate 16 (right): General view of the centre of the mill race (*Element 04*) from the west, showing the exposed wall construction



Plate 17 (left): Concrete rebate for a sluice gate on the east side of the north arm of the mill race (*Element 04*)

Plate 18 (right): Concrete rebate for a sluice gate on the west side of the north arm of the mill race (*Element 04*)

3.4.6 **Element 05**: this comprises an iron valve attached to a section of pipe connecting to **Element 06** (Plate 19). It is approximately oval in shape, orientated north/south and 0.33m long, 0.24m wide, and 0.5m tall. It has a square central thread and is held with iron bolts. A section of pipe projects from the south side but is apparently truncated as it stops abruptly at a junction.





Plate 19 (left): Valve (*Element 05*) and associated pipe (*Element 06*)

Plate 20 (right): Iron pipe (*Element 06*)

3.4.7 **Element 06:** this comprised a section of iron pipe of 0.2m diameter, actually formed by two sections jointed together with an arm to the south-west connecting to the remains of a valve (**Element 05**) (Plate 20). The pipe is orientated approximately east/west and must be incorporated behind the retaining wall against the river (**Element 07**) and is clearly the same as the pipe evident within the structure of the weir (see *Section 3.4.2* above).

3.4.8 **Element 07:** this comprises a drystone retaining wall running along the south side of the Trout Beck but effectively forming the north side of the structure of the mill race. It is approximately 1.2m tall and 1m wide and orientated east/west, although it could not be fully accessed.



Plate 21: Retaining wall (*Element 07*) alongside the Trout Beck

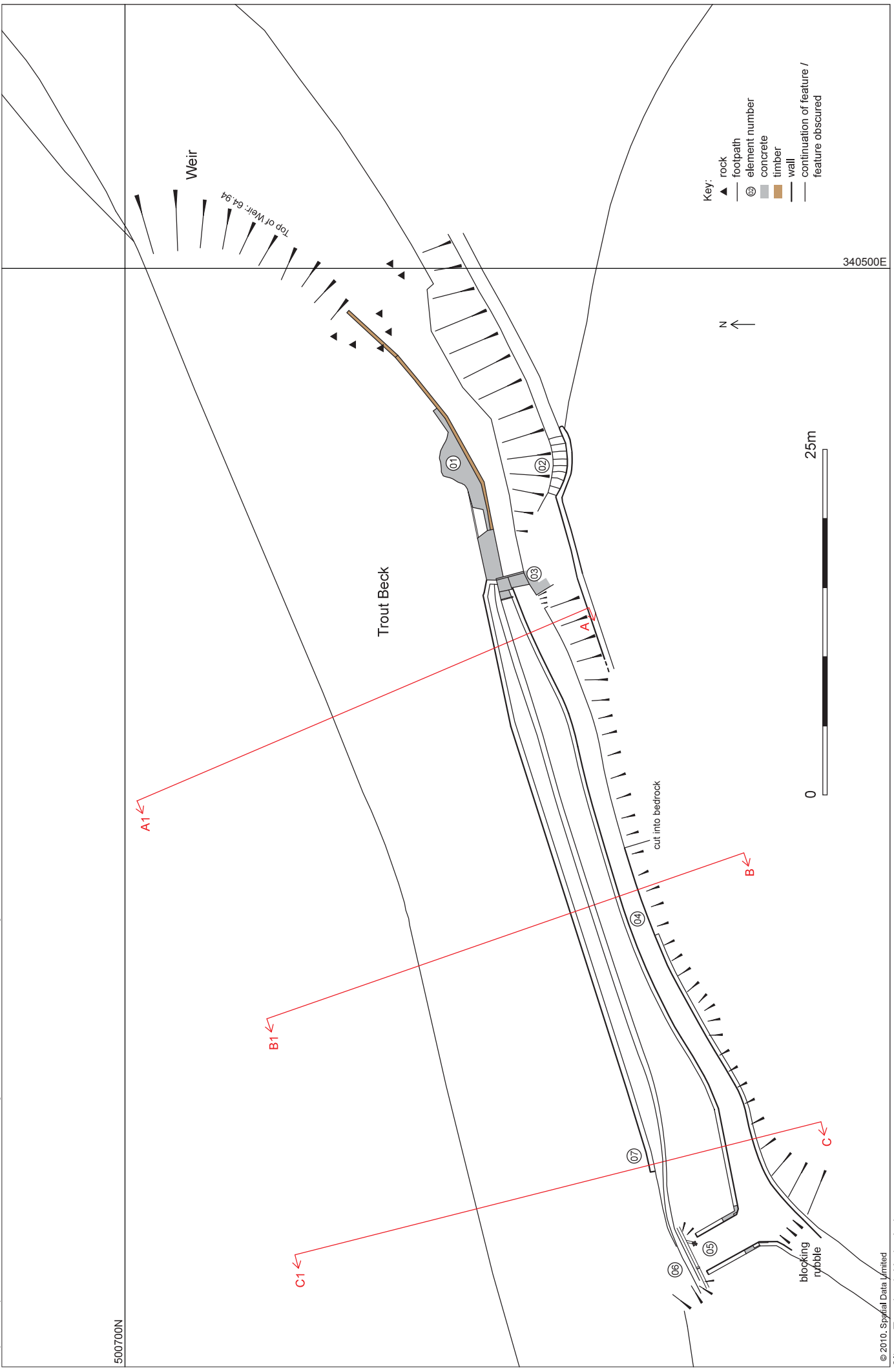


Figure 2: Plan of the north-east end of the mill race

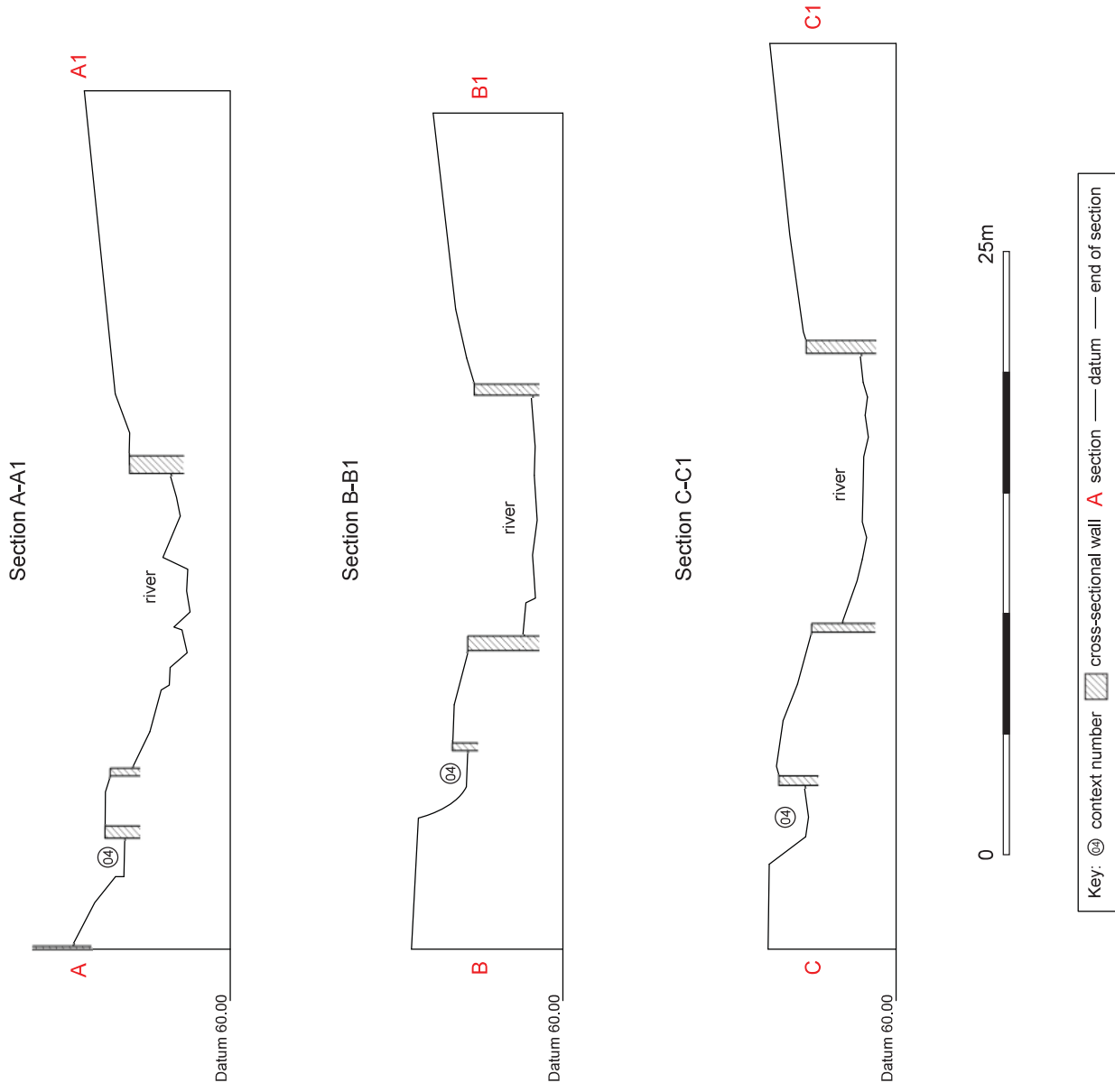


Figure 3: Cross-sections A-A1, B-B1, and C-C1

## 3.5 Conclusion

3.5.1 The desk-based assessment clearly shows that mills have been operating at Troutbeck Bridge since at least the medieval period, although identifying exactly where each mill was is extremely difficult, especially as the Trout Beck formed the boundary between the townships of Applethwaite and Troutbeck, and numerous references only provide a location by parish. Mike Davies-Sheil's confident reconstruction needs to be taken with some caution as no explanation of how the conclusions were reached is given and no sources provided for the various dates at which mills were erected and operating. Nevertheless, it is certain that the site housed at least two mills during much of its history, initially a corn mill and fulling mill, during the medieval and early post-medieval period, followed by a corn mill and paper mill during the late 17<sup>th</sup> to 18<sup>th</sup> century. However, evidence for mills involved in the iron industry also exists, and by the 19<sup>th</sup> century the site had become dominated by operations directly connected to the wider Industrial Revolution, namely the manufacture of bobbins, and latterly the manufacture of associated machinery. By the end of the 19<sup>th</sup> century the water power provided by the Trout Beck was being utilised to provide electricity, something which continued into the 20<sup>th</sup> century, although the mills themselves had fallen out of use by that time.

3.5.2 The site visit revealed that the fabric of the mill race survives in reasonable condition, with the side walls comprising drystone but the sluice, weir, and later modifications to form the divert channel from the race constructed in concrete. An iron pipe and valve had also been incorporated into the fabric of the race, apparently running along the full length of the north side.

3.5.3 The documentary evidence and results of the site visit suggest that the modification evident in the surviving section of mill race is most likely the result of alterations carried out to convert the site to providing electricity in the 1890s. The iron pipe presumably provided water directly from the Trout Beck to the turbine, with the concrete blocking and added divert channel intended to prevent water passing into the mill race, or enabling it to be quickly removed if it did. It is not clear how the bobbin mill, which appears to have continued in operation after the installation of the electricity turbine, was powered, but it is likely that steam engines had replaced the original water wheel. These were certainly included in the proposed new buildings of 1920. However, the positioning of the iron pipe that is presumed to have fed the turbine suggests that the earlier mill race was deliberately retained and so it may have still been in use after 1893. The mill race must have effectively gone out of use early in the 20<sup>th</sup> century, although it remained a physical part of the site and is still evident today and the north-east end is the best preserved section.

## 4. Discussion

### 4.1 Introduction

4.1.1 The discussion of the results of the desk-based assessment and site visit is intended to determine the archaeological and historical significance of the site, in light of known history and impact of the proposed development. This information is then used to produce recommendations for the site in relation to its history and archaeology.

### 4.2 Significance

4.2.1 Mills have been present on the site almost continuously since perhaps as early as the late 13<sup>th</sup> century, certain from the late 14<sup>th</sup> century. These have had a wide variety of uses, most commonly in connection with the processing of grain into flour and in connection with the textile industry – fulling mills were used for washing cloth prior to dyeing, in order to remove the natural grease that occurred in sheep's wool (OA North 2012, 16-17). The site at Troutbeck Bridge was possibly also connected to the iron industry at an early date, and later housed a substantial bobbin mill and associated foundry. It is therefore a locally very significant site; the surviving section of mill race, although not easily dated in itself, is quite likely to have early origins.

### 4.3 Potential

4.3.1 The entire site utilised by mills operating at Troutbeck Bridge, if taken as extending from the surviving section of mill race in the north-east to the extant bobbin mill buildings, now used by Gordon Greaves (Slate) Ltd, and potentially (according to the research of Mike Davies-Shiel) extending across to the west side of the Trout Beck, has immense archaeological and historical potential. There has been perhaps almost 800 years of industrial activity on the site. However, the surviving section of mill race, which is the subject of this report, only represents a small element of that. Its origins are uncertain; it was clearly in existence by the mid 19<sup>th</sup> century, but is likely to have come into existence several centuries before this. Since the main focus of activity, the site of the mill buildings, was probably some way to the south, there is perhaps limited potential in further investigation by comparison. Nevertheless, there is certainly the likelihood that earlier remains might be present on any part of the site and evidence relating to the early history of the site could be revealed in the area of the extant section of mill race.

### 4.4 Disturbance

4.4.1 The whole site has been repeatedly modified over several centuries, and while much of this change is of historical interest in its own right, some phases will undoubtedly have damaged or destroyed earlier remains of interest. The extant section of mill race has clearly been modified relatively recently and has suffered considerable damage through lack of maintenance. It is, however, one of the only elements of the mill complex to now remain, the rest of the mill race being completely buried below the yard used by Gordon Greaves (Slate) Ltd and the former bobbin mill buildings having been put to new use.

### 4.5 Impact

4.5.1 The proposed infilling of the surviving section of mill race in order to house a pipe for the new hydro electric scheme is unlikely to cause any substantial damage to the remaining fabric, and will, in effect, preserve some or all of it below ground and protect it from further deterioration. However, this will depend on the manner in which it is infilled and the extent of work carried out in order to clear the race prior to this. If clearance is restricted to only loose material from within the mill race and not the removal of the structure itself, i.e. the walls or any masonry or clay lining, then the proposal would be unlikely to have much impact. If however, clearance would involve the removal of structural elements or associated ground then the impact should be considered severe. Similarly, relining and infilling the race following clearance would be of low impact if new material was brought to the site, ideally something recognisably

different to the local geology. But if infilling was to comprise simply pushing in the standing mill race walls and surrounding ground this too would substantially impact on the historic fabric. In addition, the excavation that will necessarily be required to form a line to continue the extant mill race until it meets the new turbine and the Trout Beck to the west may also impact upon as yet unknown remains of archaeological interest, potentially of medieval and later date, in this area.

## 4.6 Recommendations

4.6.1 Depending on the manner in which work is carried out, it is recommended that any excavation in connection with the project, as a minimum during that required for the installation of the new pipe continuing the line of the extant mill race to the west, should be monitored by archaeological watching brief.



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