

Ennerdale Weir, Egremont

Cumbria



Archaeological Desk- Based Assessment



Oxford Archaeology North

December 2011

The Environment Agency

Issue No: 2011-12/1237

OA North Job No: L10420

NGR: NY 01245 09833

Document Title: ENNERDALE WEIR, EGREMONT, CUMBRIA

Document Type: Archaeological Desk-based Assessment

Client Name: The Environment Agency

Issue Number: 2011-12/1237
OA Job Number: L10420
National Grid Reference: NY 01245 09833

Prepared by: Kathryn Blythe
Position: Project Officer
Date: December 2011

Checked by: Alison Plummer
Position: Senior Project Manager
Date: December 2011

Approved by: Alan Lupton
Position: Operations Manager
Date: December 2011

Signed.....

Signed.....

Oxford Archaeology North
Mill 3
Moor Lane Mills
Moor Lane
Lancaster
LA1 1GF
t: (0044) 01524 541000
f: (0044) 01524 848606

© Oxford Archaeology Ltd (2011)
Janus House
Osney Mead
Oxford
OX2 0EA
t: (0044) 01865 263800
f: (0044) 01865 793496

w: www.oxfordarch.co.uk
e: info@oxfordarch.co.uk

Oxford Archaeology Limited is a Registered Charity No: 285627

Disclaimer:

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Oxford Archaeology Ltd being obtained. Oxford Archaeology Ltd accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person/party using or relying on the document for such other purposes agrees, and will by such use or reliance be taken to confirm their agreement to indemnify Oxford Archaeology for all loss or damage resulting therefrom. Oxford Archaeology Ltd accepts no responsibility or liability for this document to any party other than the person/party by whom it was commissioned.

CONTENTS

SUMMARY	2
ACKNOWLEDGEMENTS	3
1. INTRODUCTION	4
1.1 Circumstances of Project	4
1.2 Location and Topography	4
2. METHODOLOGY	5
2.1 Project Design	5
2.2 Desk-Based Assessment	5
2.3 Site Visit	5
2.4 Archive	6
3. HISTORICAL BACKGROUND	7
3.1 Introduction	7
3.2 Background	7
3.3 Map Regression Analysis	13
3.4 Site Visit	15
4. ASSESSMENT OF SIGNIFICANCE	16
4.1 Introduction	16
4.2 Criteria for Assessing Significance	16
4.3 Conclusions and Recommendations	17
5. BIBLIOGRAPHY	18
5.1 Cartographic Sources	18
5.2 Primary Sources	18
5.3 Secondary Sources	19
6. ILLUSTRATIONS	21
6.1 List of Figures	21
6.2 List of Plates	21

SUMMARY

The Environment Agency have proposed the removal of the weir at Ennerdale Mill (centred on NGR NY 01245 09883), south of Egremont in Cumbria, as it is showing signs of failure. The Environment Agency commissioned Oxford Archaeology North (OA North) to undertake an archaeological desk-based assessment to try to determine the origin of the weir and to assess its significance based on its historic background, and its context in relation to other weirs in the locality. This was carried out from September to December 2011.

The desk-based assessment comprised a search of both published and unpublished records held by the Cumbria Historic Environment Record (HER) in Kendal, the Cumbria Record Office (CRO) in Whitehaven, and the archives and library held at OA North. Mill sites within a study area 3km up and downstream of the river from the weir were identified to provide an historical and archaeological context for the weir at Ennerdale Mill. In addition to this, the weir was visited, in order to assess its fabric.

The Ennerdale Paper Mill and associated weir were constructed in the 1750s or 60s. The mill site utilised a natural bend in the river, with the weir being built at the north end of the bend, and the mill buildings to the south. The historic mapping indicates that the mill was served by three mill races, and may initially have been powered by two waterwheels, but by the time it was put up for sale in 1881 only one was advertised. The weir was in a state of disrepair when the mill was up for sale again in 1899, but was presumably repaired around this time as the mill continued in use (as a textile mill) into the twentieth century. It is not certain when water-power ceased to be used at the mill, but it appears to have been some time in the early-mid twentieth century.

The mill site has been partially demolished and redeveloped in recent years, and the mill races are beneath a road and a concrete surface. A sluice on the weir is in a dilapidated condition, and part of the tail race alongside the river is evident as a tumbled stone wall. The visit to the site and others in the study area found Ennerdale Mill weir to be the most accessible in terms of visual appreciation, as it is unencumbered by surrounding buildings.

The weir is considered to be of local archaeological importance, and therefore it is recommended that it is the subject of an archaeological survey prior to any modification works taking place. The survey should serve to provide detail of the fabric and method of construction of the weir.

ACKNOWLEDGEMENTS

OA North would like to thank the Environment Agency for commissioning the project. Thanks are also due to Jo Mackintosh at the Cumbria Historic Environment Record (HER) and the staff of the County Record Office in Whitehaven, for their assistance with this project.

Kathryn Blythe undertook the desk-based assessment, Alastair Vannan carried out the site visit, and Mark Tidmarsh produced the drawings. Alison Plummer managed the project and edited the report.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF PROJECT

- 1.1.1 The Environment Agency have proposed the removal of the weir at Ennerdale Mill (centred on NGR NY 01245 09883), south of Egremont in Cumbria, as it is showing signs of failure. The Environment Agency commissioned Oxford Archaeology North (OA North) to undertake an archaeological desk-based assessment to try to determine the origin of the weir and to assess its significance based on its historic background, and its context in relation to other weirs in the locality. This was carried out from September to December 2011.
- 1.1.2 The desk-based assessment comprised a search of both published and unpublished records held by the Cumbria Historic Environment Record (HER) in Kendal, the Cumbria Record Office (CRO) in Whitehaven, and the archives and library held at OA North. In addition to this, the weir was visited, in order to assess its fabric and condition.

1.2 LOCATION AND TOPOGRAPHY

- 1.2.1 The weir is located a short distance to the south of Egremont on the river Ehen (Fig 1) and in the eastern area of the West Cumbria Coastal Plain, which is a pastoral landscape that fringes the upland fells to the east (Countryside Commission 1998, 25). The source of the river Ehen is at the west end of Ennerdale Water, to the north-west of Egremont. The river runs westwards to Cleator Moor, and then turns southwards to Egremont. At Egremont, the river runs approximately north/south on the east side of the town. South of Egremont the river follows the coast, and joins the Irish Sea at Sellafield. The weir is located just north of mill buildings, which are on the east bank of the river and lie at approximately 40m AOD.

2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 The desk-based assessment was carried out in accordance with the relevant IfA and English Heritage guidelines (Institute for Archaeologists 2008, *Standard and Guidance for Archaeological Desk-based Assessments*; Institute for Archaeologists 2010 *Code of Conduct*; English Heritage 2006, *Management of Research Projects in the Historic Environment* (MoRPHE)) and generally accepted best practice.

2.2 DESK-BASED ASSESSMENT

2.2.1 The aim of the desk-based assessment was to provide an archaeological and historical context for the weir. The assessment comprised a study area 3km up and downstream of the river from the weir. The locations of mills located within the study area are depicted on Figure 2. The principal sources of information consulted were historical and modern maps of the study area, although published and unpublished secondary sources were also reviewed. The study has focused on the weir, although information from the immediate environs has been summarised.

2.2.2 ***Cumbria Historic Environment Record (HER)***: the Historical Environment Record (known formerly as the Sites and Monuments Record), maintained by Cumbria County Council in Kendal, holds records of archaeological sites within the county, and is held as both paper and digital information. A record, including grid reference and description, was obtained for the various sites within the defined area and for the immediate environs.

2.2.3 ***Cumbria County Record Office, Whitehaven (CRO)***: the County Record Office in Whitehaven was visited to consult historic maps of the study area, including the tithe map and relevant Ordnance Survey (OS) maps. A search was also made for any relevant historical documentation. Several secondary sources and archaeological or historical journals were also consulted, and the results of this have been incorporated into the historical background (*Section 3*).

2.2.4 ***Oxford Archaeology North***: OA North has an extensive archive of secondary sources relevant to the study area, as well as numerous unpublished client reports on work carried out both as OA North and in its former guise of Lancaster University Archaeological Unit (LUAU). These were consulted where necessary.

2.3 SITE VISIT

2.3.1 The site was visited in October 2011, in order to identify any extant features relating to the weir, or the remains of former features. A photographic archive was compiled, as conditions allowed (Plates 4 to 14). Further mill sites and weirs within the study area were also visited (Plates 15-18) in order to understand the weir within its local context (Fig 2).

2.4 ARCHIVE

- 2.4.1 Copies of this desk-based assessment will be deposited with the Cumbria HER for reference purposes.

3. HISTORICAL BACKGROUND

3.1 INTRODUCTION

3.1.1 The following section presents a summary of the historical background of the Egremont area, beginning with the Medieval Period, in order to place the study area into a wider historical and archaeological context.

3.2 BACKGROUND

3.2.1 **Late Medieval Period (1066-1540):** although much of England became part of the Kingdom of William I in 1066, Cumberland did not come under Norman rule until 1092 (Newman 2006, 93). The Barony of Egremont, within which the study area is located, was one of three estates which formed the Forest of Copeland, which was established sometime after 1120 (Todd 1995). The name Copeland is possibly derived from the Norse *kaupa-land* meaning 'bought land' (Winchester 1987). This, plus the evidence for Norse settlement in the coastal strip, could imply that the area was sold by an existing Anglian ruler to an incoming Norse chief. The settlement pattern at this time indicates an initial development of permanent settlement along the coastal strip, with the inland valleys and uplands being used for summer grazing. During the tenth to twelfth centuries more permanent colonisation and settlement of the inland areas then developed, perhaps on the sites of the former sheilings (*ibid*).

3.2.2 The early history of Copeland is not clearly understood, but in the first quarter of the twelfth century, Henry I placed William Meschin as the overlord of Copeland (Fair 1937). William Meschin founded a chapel in Egremont in 1122 (located on the same site as the nineteenth century church of St Mary and St Michael), and Egremont Castle in *c* 1125 (CCC 2006). William died in *c* 1131, and following the death of his unmarried son, Ranulf, his lands were divided between two heiresses Avice and Alicia. The Barony of Egremont went to Alicia, who was married to William FitzDuncan of Scotland (Fair 1937). In 1138, the castle came under attack by the Scots (*ibid*); in the eleventh and twelfth centuries Cumbria had been directly affected by the growing unity of a Scottish kingdom (Newman 2006, 93) and cross-border conflict had made the north of England relatively unstable with constant rebellions against the new rulership (Rollinson 1996, 43-4).

3.2.3 A grant of land and privileges to a community of burgesses by Richard de Lucy, the Lord of the Barony of Copeland in *c* 1200 indicates that the urban settlement of Egremont had its origins in the late twelfth century (Winchester 1979). The grant details the agricultural rights of the burgesses, and the duties they were to carry out in return. The charter also states '*if a burgess shall not build his burgage within the time allotted to him, namely within a year, he shall forfeit to the Lord 12d*'. This, therefore, strongly implies that the town was being developed at this time (*ibid*). This grant also mentions '*the assize of dyers, weavers and fullers*', indicating that these industries were taking place by the late twelfth/early thirteenth century. In 1267, Egremont received a royal market charter; the market subsequently serving the area between Workington and Ravenglass (*ibid*).

- 3.2.4 Further conflict characterised the following centuries with several rebellions and feuds in Cumbria, as well as raids from Scotland, such as the serious attacks led by Robert the Bruce in the first half of the fourteenth century (Rollinson 1996, 50), which included a 1315 assault on Egremont Castle (Turnbull and Walsh 1994, 79). Outbreaks of the plague also devastated vast areas during this period (Rollinson 1996, 50).
- 3.2.5 John de Multon held the Barony of Egremont from 1322 until his death in 1334 when the area was divided between his three sisters, and the rents from the burgesses in Egremont were also divided by three (Winchester 1979). A survey carried out in Egremont in 1334, recorded the castle with a plot called the Applegarth, a dovecot, the park below the castle, fisheries, 194 acres of demesne land and 47.5 acres of demesne meadow. Also listed were: 138 burgage plots; a number of waste places, including eight unbuilt burgage plots; two mills, one for fulling and one for corn; and two smithies (Curwen 1913; Winchester 1979). An annual fair was held as well as the weekly market. The towns industries seem to have been predominantly associated with the processing of local animal products at this time (Winchester 1979).
- 3.2.6 From the fifteenth century, truces brought about relative stability in the area, although the Dissolution of the Monasteries caused serious social and economic damage to the north of England (Rollinson 1996, 55-60). By 1578, two-thirds of Egremont had passed to the Percy family, the Earls of Northumberland (Liddell 1966). The Percy Survey of the Copeland Forest was ordered by the then Earl of Northumberland in 1578 (*ibid*). The survey recorded 101 burgage plots in Egremont, as opposed to 138 recorded in the 1330s. This, plus the description of the castle in 1578 as ‘almost ruined’, suggests that there was a decline in the town between the fourteenth and sixteenth centuries (Curwen 1913).
- 3.2.7 **Post-medieval (1540 - c 1750) and Industrial Periods (c 1750 - 1901):** the Lowther family held extensive estates across Cumberland and Westmorland, and, consequently, had an enormous influence on the development of the region during the seventeenth century, particularly in the Whitehaven area, where one of their two main estates (the other being Lowther) was located (Collier 1991, 26-7). The fishing harbour at Whitehaven was established by Sir Christopher Lowther as a trade port, initially for the export of salt to Ireland and later for coal. Coal bound for Ireland was the main regional export, however, the main import was Virginian tobacco and this meant that it was difficult to find return cargoes. Sir John, the son of Sir Christopher Lowther, therefore attempted to stimulate the linen, wool, and tannery industries in the local area in order to produce more exportable goods for the American market (*ibid*). These industries, and associated ones such as bleaching and paper making, continued to be the dominating social and economic factor of the wider area during the eighteenth and nineteenth centuries (Lancaster and Wattleworth 1977).
- 3.2.8 **Watermills and Weirs:** Ennerdale Paper Mill and weir date to the mid-eighteenth century at a time when water-powered industry was booming. However, watermills, initially for corn-grinding, have much earlier origins, with both Roman and Saxon watermills having been recorded in Britain. By the time of the Domesday Survey there were around 5624 watermills on

British rivers, with the number rising to around 7000 by the fourteenth century (Owen *et al* 2005, 172; Haslam 1991, 99; Brown 2011, 18). These early mills used horizontally mounted wheels placed directly in the river, which transferred power through a vertical shaft which would turn stones for grinding corn. In the medieval period mills began to use a vertically mounted undershot wheel placed in the water. However, there were problems with placing a wheel directly in the mainstream as, if the river or stream flooded, the wheel could be destroyed along with the internal machinery of the mill (Davies-Shiel 1978, 14-15; Owen *et al* 2005, 69).

- 3.2.9 Taking the mill away from the mainstream, via artificial cuts known as mill races or leats, gradually became the most popular way of managing water-flow, which could then be controlled using a weir and sluice gates. Overshot wheels were developed alongside this. Channelling of the water via a mill race allowed its force and quantity to build up. Wheels would sit in a pit so that the water could fall on to it from above and thus turn the wheel. Both undershot and overshot wheels were in use at least by the sixteenth century (Owen *et al* 2005, 172; Reynolds 1970, 37; Syson 1980, 32; Brown 2011, 34).
- 3.2.10 A weir is a low dam across a river, used to pool water and control its flow. Weirs probably originated as fishweirs (or kiddles), more to hold up fish than water, and to dam river crossings. Weirs eventually developed into more complex structures, which were used for a variety of reasons, including as at Ennerdale Mill, to divert water to a mill. One of the earliest recorded mill weirs was built on the Thames in 1306, and by the end of the fourteenth century weirs were established features in the landscape (Wenham 1989, 236; Haslam 1991, 71; Hartley 1964, 79; Syson 1980, 23; Brown 2011, 34 and 41).
- 3.2.11 Weirs varied in their design, with some, such as the one at Ennerdale Paper Mill, linear, and others V-shaped or curved. The design chosen in each particular case was intended to spread the flow of water over the sill (the top of the weir) to the river bed and banks below. Weirs were typically constructed of solid ashlar stones or, if timber was available, by piling wooden stakes into the river bed to form a frame into which large stones resting on gravel were inserted (Plate 1) (Syson 1965, 75; Brown 2011, 36).
- 3.2.12 The watercourses utilised and developed for a mill were dependent on the water source available. A mill does not necessarily require a fast flowing stream, rather an abundant flowing one so that enough water could be trapped behind a dam or weir to direct a smooth, bubble-free flow of water from the head race to the waterwheel (Davies-Shiel 1978, 14-15; Owen *et al* 2005, 69). The watercourse pattern used by Ennerdale Mill was that of a wheel at the end of a short head race leading from a weir. Mills using this pattern tended, as with Ennerdale Mill, to be located on a bend. The river Ehen is aligned approximately north/south at this point and a bend takes the river out to the west. The weir is located at the north end of the bend, on a north/south alignment with a mill race at its southern end. The mill race, into which the water is channelled, therefore continues the line of the inner bend of the river (Davies-Shiel 1978, 19). Water entering a mill race was typically controlled by a high-walled narrow entrance. A sluice would also be positioned at the junction of the river with the mill race to control the flow of water. Three mill races are apparent at Ennerdale Paper Mill, two which appeared to power

wheels and one used for overflow (see *Section 3.3.4*). It is not until the OS map of 1899 (see *Section 3.3.7*) that sluices are depicted (although they were probably extant before this date): one at the entrance to the central mill race, and one at the southern end of the weir. The sluice on the weir presumably acted to further control water flow, by taking off excess water.

- 3.2.13 The height of the weir was key, as if it was too high it could prevent the flow of water down-stream to other mills, as well as stopping the runs of fish and eels. A low weir, however, would not allow for the storage of much water, other than what was already in the river (Davies-Shiel 1978, 19; Syson 1965, 74). According to Davies-Shiel the watercourse pattern used by Ennerdale Mill, was not very common, more often head-races were long so that they, in effect, became a mill pond. This often allowed for a larger wheel to be installed, which was necessary for some industries, such as mining (Davies-Shiel 1978, 19 and 38).
- 3.2.14 **Ennerdale Paper Mill (HER 12177)**: the first paper mill known in Britain was established in Hertford in 1495 (Ashmore 1969, 138). Other paper mills were set up in the mid-sixteenth century, but it was not until the end of that century that paper mills began to flourish, and by the end of the seventeenth century there were around one hundred paper mills in England, four of which were in Cumbria (Watts 2000, 53; www.cumbria-industries.org.uk/paper.htm). There was a country-wide boom in paper mills in the mid-eighteenth century, which was reflected in Cumbria and included Low and High Mills in Egremont, as well as Ennerdale Paper Mill (www.cumbria-industries.org.uk/paper.htm).
- 3.2.15 Ennerdale Paper Mill is thought to have been in existence by 1755, when it was described as 'lately erected' by the lessor (CRO D/Lec/280/Papers re mills/Patrickson to Beacham 15-2-1755 cited in Winchester 1979). Read (1999, 89) gives a slightly later date of 1760 to the mill, and states that in February 1760, the Borough Court granted a rood of land known as 'Low Common' to Thomas Pool and John Ponsonby. They were given permission to erect one or more mills, and any other buildings or conveniences required for their paper making business on the land, which included the right to make a weir on the river Ehen (nb no document reference for this information is given by Read). Although the exact origins of the mill are not clear, it is on the 1774 map by Hodskinson and Donald (Fig 3). The map depicts two mills in this location, labelled 'Paper Mills'. Read (1999, 89) states that Thomas Pool and John Ponsonby did not finish the construction of the mill, but rather it was completed by an unknown party. Subsequently, White Barker and Co manufactured paper there until they sold it to TW Chapman and Sons, who also owned Green Dykes Mill in Egremont (*ibid*). The date of this sale is not known, but White Barker and Co are listed as paper makers in an unspecified mill in Egremont, in a trade directory for 1828-9 (Pigot and Co). Harrison Barker and Co are listed as the occupiers of Ennerdale Mill in the 1838 Lowside Quarter tithe award (YSPC 6).
- 3.2.16 In 1873 a mortgage was set up shared between Thomas Wood Chapman and Edward Chapman, and John Grice for the purchase of the mill, described as a flax mill (DBH/24/31/13). John Grice died in 1874, and his part of the mortgage was then taken over by Thomas Grice (*ibid*). From 1874 onwards the documentary sources refer to the mill as a flax or other textile mill, but the

OS mapping names it as a paper mill until the 1924 map when it is labelled 'woollen mill'. It would appear that the mill was known as 'the Paper Mill' (confirmed by DBH/24/31/13, see *Section 3.2.23* below), despite no longer functioning as such.

- 3.2.17 There had been a fire at the Green Dykes Mill in 1861, and TW Chapman and Sons then built a new section at Ennerdale Mill and fitted machinery of 1300 spindles so that they could continue manufacturing linen yarn. The two businesses were then run at Ennerdale Mill until 1877 (Read 1999, 89)
- 3.2.18 In 1877 TW Chapman and Sons went bankrupt (DBH 11/1), and in 1881 the mill, then known as Chapman's Mill and described as a Flax and Tow Mill, was up for sale (Plates 2 and 3). No mention of the weir is made, although the conditions of sale state that the water-power to work the mill is obtained from Lord Leconfield, the Lord of the Manor (*ibid*). One waterwheel is listed at the mill, described as: '14 feet wide and 14 feet in diameter, calculated, with full head of water, to drive 50 horse power' (Plate 3).
- 3.2.19 It is assumed that there was no sale of the mill at this time as, on its sale in 1899, it was still owned by the trustees of Thomas Grice (DBH/24/31/13), however Read says that in 1881 it was sold to Sundour Fabrics, so perhaps Chapman's share of the mill was sold or maybe the occupiers rather than the owners changed at this time.
- 3.2.20 In 1899, the mill (referred to throughout the papers dealing with the sale (DBH/24/31/13) as *buildings known as the Paper Mill with the piece of land called the Island*) and five cottages were sold to John Webster by Richard Grice, following the death of Thomas Grice in 1892. At the time the mill was occupied by Joseph Ramsey, who is described as the miller, but it is not known if he was still running the mill as a flax mill, as it had been when it was sold in 1873. The weir is also mentioned in the papers dealing with the sale (DBH/24/31/13), with the water power being leased by Lord Leconfield: *The liberty and privilege of taking and diverting so much water from the River Ehen as shall be necessary for working the Paper Mill and premises of the Lessee situate in or near to a close of land called Millfield in the Parish of Egremont in the County of Cumberland and No 45 on the Ordnance Survey Plan thereof and also of continuing the water weir or dam now erected and set up on the bed and soil of the said River at or near the said premises and as the said water weir or dam is now joined and fixed to the banks or sides of the said River and also of continuing the trench or watercourse thereon for conducting the weir to the said Mill doing as little damage as reasonably may be but so that such water weir or dam shall not at any time hereafter be made of such height as to cause the water to run over the same level with the foot of the tail race of the Mills leased by the lessor to the person or so as to interrupt or prejudice the free working of the lessor's Mills called Egremont Mills.*
- 3.2.21 Correspondence between John Webster and Richard Grice indicates that the weir was in need of repair at the time of the sale. A letter dated 11/9/1899 from John Webster suggests to Richard Grice that it should be his responsibility to repair the weir and banks before Webster took over the property. The tone of the letter indicates that Richard Grice was reluctant to do this (*ibid*).

- 3.2.22 By 1923 the mill had been sold to Thomas Goodacre and Sons of the Cumbrian Fibre Company, who manufactured carpets there until 1946 (SRDED 3/1/747; Read 1999, 89, 91 and 96). After 1946, the mill stood empty for some time until it was rented by a company named Bradford Gowns. It was later bought by Millers of Great Yarmouth, who also had a factory in Cockermouth, and manufactured slippers and shoes. Mr L Fischer then occupied the mill and manufactured bed headboards there, after which the mill stood empty. By 1999 some areas of the mill had been partially demolished and others were occupied by various businesses (Read 1999, 89, 91 and 96). The site is now referred to as Ennerdale Mill Business Park.
- 3.2.23 **Other Watermills on the Ehen within the study area:** in 1334 there were two mills in Egremont, a corn mill and a fulling mill, and these probably dated to the thirteenth century (Winchester 1979). The Percy Survey of 1578 recorded just one mill in the town, named 'New Mill'. It is not possible to link these early documentary references to later sites of mills. The 1861 OS map shows eight watermills in addition to Ennerdale Paper Mill on the banks of the River Ehen in the study area: High Mill, Woodend Mill, Brisco Mill, Bleach Green, Flint Mill, Great Mill, Low Mill and Low Mill Iron Foundry. The historical backgrounds for these are summarised below. In addition, Bridge End Tannery, which possibly originated as a mill has been discussed below.
- **Woodend Mill (HER 12892):** this is marked as a corn mill on the OS first edition map of 1861. The HER states that it was for sale in 1828, advertised as a water corn mill, and described as 'newly erected' (Whitehaven Museum photos, neg 289).
 - **Brisco Mill (HER 12891):** there may have been a medieval mill in the vicinity of Brisco Mill, but the mill (marked as a corn mill) on the 1861 OS map almost certainly post-dates the enclosure of the Waste of Brisco in 1783. This is confirmed by the absence of this mill on Hodgkinson and Donald's map of 1774 and the 1750 plan of Brisco (Winchester 1979). It is listed in Parson and White's directory of 1829, with a Michael Chambers as miller. A house is now built on the site. A weir is shown north of the mill buildings on the OS map of 1861.
 - **High Mill (HER 12337):** this mill is first shown on Hodgkinson and Donald's map of 1774. There was a petition to build a fulling mill on the site in c 1760, which probably led to the construction of the mill. The petition also marks a place 'where there is some remains of an old race', indicating that High Mill may have been constructed on the site of an earlier mill (Winchester 1979). The mill was used for paper production in the eighteenth century, then, using hemp, for the production of coarse linen thread. In 1860 it was taken over by Robert Briscoe and, using flax, produced a fine linen thread alongside the coarse thread (Read 1999, 88; www.cumbria-industries.org.uk/paper.htm). A weir (referred to by Read (1999, 88) as Seven Islands Weir) is shown north of the mill buildings on the OS map of 1861.
 - **Flint Mill (HER 12335):** this mill is not marked on Hodgkinson and Donald's map of 1774. However, a small mill may have existed on the site in the mid-eighteenth century, as the c 1760 plan of Egremont and Low Brisco shows two buildings beside the 'Lord's Mill Race' (High Mill mill

race) in the vicinity of the later Flint Mill (Winchester 1979). In the late eighteenth century the mill (also known as Crosswater Mill) was used by the Irving family to crack flint for use by the Whitehaven Potteries. The mill was subsequently used to make shoddy (a low quality yarn produced from sheep clipping waste and re-used woollen garments) (Read 1999, 87-88). The mill was serviced by the mill race and weir associated with High Mill.

- *Great Mill (HER 12334)*: this was the corn mill, leased from the lords of the manor in the seventeenth and eighteenth centuries. It is therefore likely to be the 'New Mill' mentioned in the survey of 1578. The present structure dates from 1855, and in the 1980s it was partially demolished, with the remaining buildings converted to residential use (Winchester 1979; Read 1999, 92). The mill was serviced by the mill race and weir associated with High Mill.
- *Bleach Green (HER 12875)*: two mills are marked in the location of Ennerdale Paper Mill on Hodkinson and Donald's map of 1774 as 'Paper Mills'. Winchester (1979) suggests that one of these is Bleach Green, however this does not match the location of Bleach Green as shown on the OS map of 1861. According to the HER record, Bleach Green was built in 1750 by Isaac Adamson as a bleaching mill. The mill was built south of a weir (shown on the OS map of 1861), which fed a mill race to it. The mill was used for the washing and dressing of materials needed in the making of sailcloth and fine linen (Read 1999, 91).
- *Low Mill (HER 12171) and Iron Foundry (HER 12166)*: the HER states that a water-flax and tow mill, together with extensive workshops, warehouses and cottages at Low Mill are recorded in a sale document of 12th June 1845. At some time after 1845 the northern mill was converted for use as an iron foundry, producing general purpose agricultural implements, but this was short lived and in 1860 the mill is recorded again as a flax spinning mill owned by Messrs Robert Brisco and Co. Low Mill incorporates a mill dam, weir and sluice.
- *Fulling Mill (Bridge End Tannery) (HER 12886)*: this is marked as a tannery on the OS map of 1861, but as a fulling mill on the c 1760 plan of Low Brisco (Winchester 1979). Bulmers Directory of 1883 refers to a tanner, John Mossop, at Bridge End Tannery. A weir is shown east of the tannery on the OS map of 1861.

3.3 MAP REGRESSION ANALYSIS

3.3.1 *Introduction* several historic cartographic sources were examined at the Cumbria Record Office in Whitehaven. Further documentary sources were consulted at OA North's office.

3.3.2 *Hodkinson and Donald's map of Cumberland, 1774 (Fig 3)*: five mills are depicted to the south, east and north-east of Egremont. These are thought to be High Mill, Great Mill, Ennerdale Paper Mill (depicted with two mill symbols) and Little Mill (not located on the river Ehen).

- 3.3.3 ***Greenwood's map of Cumberland, 1823 (Fig 4)***: this map is slightly more detailed than the 1774 map, the mills shown are as above, with the addition of Brisco Mill. Ennerdale Paper Mill is again depicted with two mill symbols.
- 3.3.4 ***Lowside Quarter Tithe, 1838 (Fig 5)***: Ennerdale Paper Mill is depicted as a building straddling a mill race on a north/south alignment. This central mill race diverts the water from a bend in the river by means of a weir constructed at the northern end of the bend. Further mill buildings are shown to the north and south of the main building on the east side of the central mill race. A separate building is shown a short distance to the east, and an additional mill race is located to the immediate east of it. This eastern mill race is not shown as adjoining the central mill race but perhaps was culverted at either end. Given that two mills were depicted on both the 1774 and 1823 maps it is assumed that a second wheel was housed within this building. An additional possible mill race within a culvert is shown aligned approximately north-east/south-west from the central mill race (north of the mill buildings) running back to the river. This western mill race presumably took off excess water. Plot 688, within which the mill is located is listed in the tithe award as a paper mill owned by 'Joseph Harriman (an infant)', and occupied by 'Harrison Barker and Co'.
- 3.3.5 ***Ordnance Survey 6" to 1 mile map, 1861 (Figs 6a and 6b)***: the mill and mill races are depicted much as they were on the 1838 map, with the addition of buildings on the west side of the central mill race. The eastern mill race is labelled as such, whilst the central mill race is not labelled. The western mill race is depicted as open water rather than a culvert. Four islands are depicted immediately downstream of the weir.
- 3.3.6 ***Ordnance Survey 25" to 1 mile map, 1880 (Fig 7)***: the mill and mill races are depicted as they were on the 1861 map.
- 3.3.7 ***Ordnance Survey 25" to 1 mile map, 1899 (Fig 8)***: the mill and mill races appear to have been altered by the time of this mapping. Whilst the central mill race is still straddled by the mill building, a large building running alongside the west side of the central mill race appears to have replaced the buildings that were located in this area. The northern end of this building partially overlies the area of the western mill race, which is not depicted and presumably had been infilled. Buildings are still shown to the east of the central mill race, though it is not entirely clear if the eastern mill race was still extant at this time. Its position is marked by a single line rather than a channel. A sluice is marked at the north end of the central mill race and a sluice is also shown at the southern end of the weir, which presumably took off excess water, and may have replaced the function of the western mill race. One large island is now depicted immediately downstream of the weir.
- 3.3.8 ***Ordnance Survey 6" to 1 mile map, 1900 (Figs 9a and 9b)***: the mill and mill races are depicted as they were on the 1899 OS map.
- 3.3.9 ***Ordnance Survey 25" to 1 mile map, 1924 (Fig 10)***: the mill and mill races are depicted much as they were on the 1900 OS map, with some minor alterations to the buildings. The mill is now labelled as 'Woollen Mill'.
- 3.3.10 ***Ordnance Survey 6" to 1 mile map, 1926 (Fig 11a and 11b)***: the mill and mill races are depicted as they were on the 1924 OS map.

3.4 SITE VISIT

3.4.1 The site of Ennerdale Mill weir (Plates 4-14), as well as the sites of other weirs in Egremont (Bleach Green, Brisco Mill and Bridge End Tannery) (Plates 15-18) were visited on 6th October 2011. Although the Ennerdale Mill site is in private use, the weir was found to be easily reached by public access and its situation outside of Egremont allowed it to be viewed without obstruction by surrounding buildings (Plates 4-11). This was a marked contrast to the weirs in Egremont itself. The Ennerdale Mill weir was also the largest and most extensive in the study area. It is clear that redevelopment of the mill site had eradicated the mill races, with the ground immediately south of the weir sluice in the location of the central and western mill races now under a concrete surface, and the area of the eastern mill race now beneath the current road. The weir sluice (Plate 9) was identifiable, but is in a dilapidated condition. Part of the tail race could be seen alongside the river, although it was clearly in a state of disrepair (Plate 11). A wall (Plates 4 and 8) was also observed on the north-west bank of the river, which was probably constructed to reinforce the river bank. Other stretches of wall were noted alongside the river, so the wall may not necessarily be associated with the weir. Two buildings and a house (Plates 12-14) appear to correspond with buildings shown on the 1899 OS map, but no evidence for earlier buildings was apparent.

4. ASSESSMENT OF SIGNIFICANCE

4.1 INTRODUCTION

4.1.1 In its Planning Policy Statement 5, the Department of Communities and Local Government (DCLG) advises that the '*significance of the heritage assets affected and their contribution of their setting to that significance*' be understood in order to assess the potential impact (Policy HE6, PPS 5, DCLG 2010). Therefore, the following section will determine the nature and level of the significance of the Ennerdale Mill Weir.

4.2 CRITERIA FOR ASSESSING SIGNIFICANCE

4.2.1 There are a number of different methodologies used to assess the archaeological significance of sites; that to be used here is the 'Secretary of State's criteria for scheduling ancient monuments' (Annex 1; DCMS 2010). The weir was considered in terms of each of the criteria, and those considered to be of relevance to this assessment are discussed below:

4.2.2 **Period:** the weir was constructed in the 1750s or 60s. A map of 1774 depicts this mill plus three others within the study area, two of which were also associated with weirs. By the time of the 1861 OS map there were nine mills within the study area and four weirs servicing them. Ennerdale Mill and weir are, therefore, one of the earlier sites in the study area, and can be considered significant in terms of period.

4.2.3 **Rarity:** weirs are a common feature across the country, including in Cumbria. The 6km long study area along the river Ehen identified four weirs in the Egremont area, and other weirs are extant both up and downstream of the study area on the Ehen. This weir is therefore not considered to be rare.

4.2.4 **Documentation:** the desk-based assessment has attempted to consult all primary documents associated with the weir. Whilst several documents associated with the history of the mill were identified, it was found that little mention of the weir was made within them. The weir is therefore not considered to be significant due to documentation.

4.2.5 One further document held at Cockermouth Castle (CRO D/Lec/280/Papers re: mills/Patrickson to Beacham 15-2-1755) was not consulted, which may confirm the date of the mill and weir construction. However, as an approximate date has already been established, it is not felt that this would change the assessment of significance made within this report.

4.2.6 **Group Value:** the weir has an historic group value with the mill buildings, as the one would not have existed without the other. It is also one in a group of weirs along this stretch of the River Ehen.

4.2.7 **Survival/Condition:** the weir appears to be linear in form, but it has not been possible to assess its fabric, due to the flow of water over it. Documentary

evidence would suggest that it was repaired in 1899. The site visit noted that the sluice on the weir is in a dilapidated condition.

- 4.2.8 **Setting:** the visit to this site and others in the study area found Ennerdale Mill weir to be the most accessible in terms of visual appreciation, as it is unencumbered by surrounding buildings. This therefore adds significance to its local importance.

4.3 CONCLUSIONS AND RECOMMENDATIONS

- 4.3.1 Ennerdale Mill Weir was constructed along with the paper mill in the 1750s or 60s, and is depicted on a 1774 map of the area with two wheel symbols. Whilst the mill was originally for paper manufacture, this appears to have been quite short-lived, and it was used as a textile mill from at least 1873 onwards.
- 4.3.2 The weir constructed to serve the mill utilised a natural bend in the river, with the weir being built at the north end of the bend, and the mill buildings to the south, within the bend. The historic mapping indicates that the mill was linear in form and that there were three mill races. The central race and one to its east appear to be associated with mill buildings, and would therefore appear to confirm the map evidence that there were initially two wheels at the site, although only one is listed in sales particulars produced for the mill in 1881. A western mill race appears to have diverted water from the central mill race back to the river, and presumably was constructed to deal with excess water. This mill race had gone out of use by the time of the OS map of 1899. However the 1899 OS map marks two sluices, one located at the southern end of the weir, and the other at the entrance to the central mill race, these would have allowed further control of the water flow, with the weir sluice perhaps replacing the western mill race. The mill was sold in 1899, at which time the weir was described as being in a state of disrepair, so is likely to have been repaired around this time.
- 4.3.3 The mill site has been partially demolished and redeveloped in recent years, and the areas of the mill races are beneath a road and a concrete surface. It has therefore, not been possible to further comment on the operation of the weir and mill races in terms of the type of wheel(s) used. The sluice on the weir is in a dilapidated condition, and part of the tail race alongside the river is perhaps evident as a tumbled stone wall. A house and two buildings standing at the site appear to correspond with buildings shown on the 1899 OS map, but no evidence for earlier buildings was apparent during the site visit. The visit to this site and others in the study area found Ennerdale Mill weir to be the most accessible in terms of visual appreciation, as it is unencumbered by surrounding buildings.
- 4.3.4 The weir is considered to be of local archaeological importance and, therefore, it is recommended that it is the subject of an archaeological survey prior to any modification works taking place. The survey should aim to identify and record the fabric of the weir, its method of construction, and any evidence for repair or alteration.

5. BIBLIOGRAPHY

5.1 CARTOGRAPHIC SOURCES

Greenwood's map of Cumberland, 1822

Hodkinson and Donald's map of Cumberland, 1774

Ordnance Survey, First Edition, 6" to 1 mile, 1861, *Sheet 72*

Ordnance Survey, 6" to 1 mile, 1900, *Sheet 72 SE*

Ordnance Survey, 6" to 1 mile, 1926, *Sheet 72 SE*

Ordnance Survey, 25" to 1 mile, 1880, *Sheet 72.8*

Ordnance Survey, 25" to 1 mile, 1899, *Sheet 72.8*

Ordnance Survey, 25" to 1 mile, 1924, *Sheet 72.8*

5.2 PRIMARY SOURCES

Cockermouth Castle Archives

CRO D/Lec/280/Papers re: mills/Patrickson to Beacham 15-2-1755, cited in Winchester 1979

Trade Directories

Bulmers, 1883 *Directory of West Cumberland*

Parson and White, 1829 *Cumberland and Westmorland Directory*

Pigot and Co, 1828-9 *Directory of Cheshire, Cumbria, Derbyshire, Durham, Lancashire, Leicestershire, Lincolnshire and Northumberland*

Whitehaven Record Office

DBH 11/1 - 1841-81. Papers concerned with the sale of Flax Mill and premises, Egremont, following the bankruptcy of the owners, Thomas Chapman and Son, including: lists of machinery and equipment; catalogue of sale; particulars, plan and conditions of sale; and newspaper cuttings.

DBH 24/31/13 - 1899. Correspondence between Richard Grice and others re: the sale of Egremont Paper Mill and cottages, following the deaths of John Grice (1874) and Thomas Grice (1892).

SRDED 3/1/747 - 1923. Application for additions to the carpet mill, W Goodacre and Sons (Cumbrian Fibre Co)

The Egremont Heritage (nd) - pamphlet

YSPC 6 Lowside Quarter, in the Parish of St Bees, Tithe Map and Award, 1838

Whitehaven Museum

Photos, neg 289 (referenced in HER 12892 description)

5.3 SECONDARY SOURCES

Ashmore, O, 1969 *The Industrial Archaeology of Lancashire*, Newton Abbot

Brown, J, 2011 *Water Power and Watermills. An Historical Guide*, Wiltshire

Collier, S, 1991 *Whitehaven 1660-1800. A new town of the late seventeenth century: a study of its buildings and urban development*, London

Countryside Commission, 1998 *Countryside Character, Volume 2: North West*, Cheltenham

Cumbria County Council (CCC), 2006 *Extensive Urban Survey Archaeological Assessment Report. Egremont*, English Heritage

Curwen, JF, 1913 The castles and fortified towers of Cumberland, Westmorland and Lancashire North of the Sands, *Cumberland and Westmorland Antiq Arch Soc Extra Series* **13**

Davies-Shiel, M, 1978 *Watermills of Cumbria*, Clapham

Department of Communities and Local Government, 2010 *PPS 5: Planning for the Historic Environment: Historic Environment Planning Practice Guide*

Department for Culture, Media and Sport (DCMS), 2010 *Scheduled Monuments: identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979*

English Heritage, 2006 *Management of Research Projects in the Historic Environment (MoRPHE)*, Swindon

Fair, MC, 1937 Notes on Early Copeland, *Trans Cumberland Westmorland Antiq Archaeol Soc*, n ser, **37**, 73-88

Hartley, D, 1964 *Water in England*, London

Haslam, SM, 1991 *The Historic River. Rivers and Culture Down the Ages*, Cambridge

IfA, 2008 *Standard and Guidance for Archaeological Assessments*, London

IfA, 2010 *Code of Conduct*, London

Lancaster JY, and Wattleworth, DR, 1977 *The Iron and Steel Industry of West Cumberland*, Workington

- Liddell, WH, 1966 The Private Forests of S.W. Cumberland, *Trans Cumberland Westmorland Antiq Archaeol Soc*, n ser, **66**, 106-30
- Newman, RM, 2006 The early medieval period resource assessment, in M Brennan (ed) *The Archaeology of North West England, An Archaeological Research Framework for North West England: Volume 1, Resource Assessment*
- Owen, S, Pooley, C, Folkard, A, Park, C, Clark, G and Watson, N 2005 *Rivers and the British Landscape*, Lancaster
- Read, EA, 1992 *Discovering Egremont*, Egremont
- Read, EA, 1999 *1000 Years of Egremont*, Egremont
- Reynolds, J, 1970 *Windmills and Watermills*, London
- Rollinson, W, 1996 *A History of Cumberland and Westmorland*, 2nd edn, Chichester
- Syson, L, 1965 *British Water-Mills*, London
- Syson, L, 1980 *The Watermills of Britain*, Vermont
- Todd, J, 1995 *Reluctant Conquerors? The Normans in Cumbria*, Centre for North west Regional Studies, Regional Bulletin No.9
- Turnbull, P, and Walsh, D, 1994 Recent work at Egremont Castle, *Trans Cumberland Westmorland Antiq Archaeol Soc*, n ser, **94**, 77–89
- Watts, M, 2000 *Water and Wind Power*, Buckinghamshire
- Wenham, P, 1989 *Watermills*, London
- Wilson, J (ed), 1905 *The Victoria History of the County of Cumberland*, **2**, London
- Winchester, AJL, 1979 *Cumbrian Historic Towns Survey, 1978-9. The archaeological potential of four Cumbrian towns: Egremont*, unpubl rep
- Winchester, AJL, 1987 *Landscape and Society in Medieval Cumbria*, Edinburgh
- www.cumbria-industries.org.uk/paper.htm

6. ILLUSTRATIONS

6.1 LIST OF FIGURES

Figure 1: Site location

Figure 2: Plan showing mills within the study area

Figure 3: Extract from Hodskinson and Donald's map of Cumberland, 1774

Figure 4: Extract from Greenwood's map of Cumberland, 1822

Figure 5: Extract from Lowside Quarter tithe, 1838

Figure 6a: Extract from the Ordnance Survey 25" to 1 mile map, 1861, north

Figure 6b: Extract from the Ordnance Survey 25" to 1 mile map, 1861, south

Figure 7: Extract from the Ordnance Survey 25" to 1 mile map, 1880

Figure 8: Extract from the Ordnance Survey 25" to 1 mile map, 1899

Figure 9a: Extract from the Ordnance Survey 6" to 1 mile map, 1900, north

Figure 9b: Extract from the Ordnance Survey 6" to 1 mile map, 1900, south

Figure 10: Extract from the Ordnance Survey 25" to 1 mile map, 1924

Figure 11a: Extract from the Ordnance Survey 6" to 1 mile map, 1926, north

Figure 11b: Extract from the Ordnance Survey 6" to 1 mile map, 1926, south

6.2 LIST OF PLATES

Plate 1: Common types of weir construction, after Syson 1965, 75

Plate 2: Sales Particulars, 1881 (DBH/11/1)

Plate 3: Sales Particulars, 1881 (DBH/11/1)

Plate 4: Looking north-west across the river Ehen to the wall on the north-west bank just below the Ennerdale Mill weir

Plate 5: Looking east-north-east from above the weir to the island in the River Ehen, downstream of Ennerdale Mill weir

Plate 6: Looking east from above the weir to the island in the River Ehen, downstream of Ennerdale Mill weir

Plate 7: Looking south across Ennerdale Mill weir

Plate 8: Detail of Ennerdale Mill weir construction and wall on the north-west river bank, looking south-west

Plate 9: Area of the former sluice at the south end of Ennerdale Mill weir, looking south

Plate 10: Looking south-east to Ennerdale Mill weir

Plate 11: Remains of the tail race south of Ennerdale Mill, looking east

Plate 12: Possible nineteenth century Ennerdale Mill building, looking south. The road is located over the central mill race.

Plate 13: Possible nineteenth century Ennerdale Mill buildings, looking south-west

Plate 14: Late nineteenth century house on Ennerdale Mill site, looking south-west

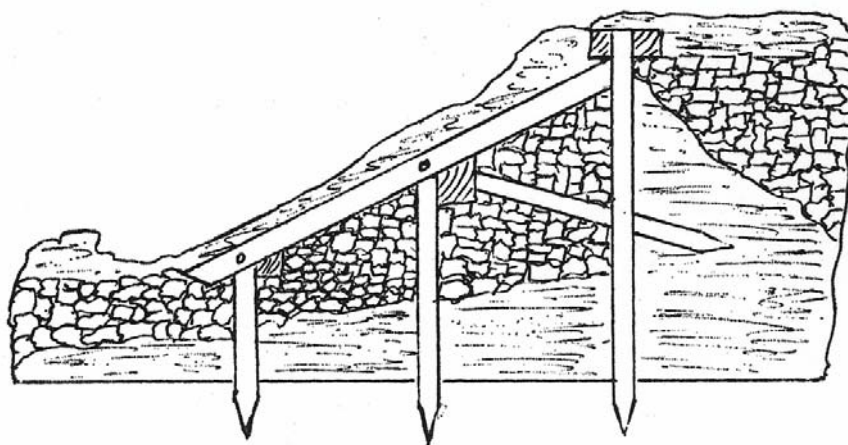
Plate 15: Bleach Green weir

Plate 16: Brisco Mill weir from downstream

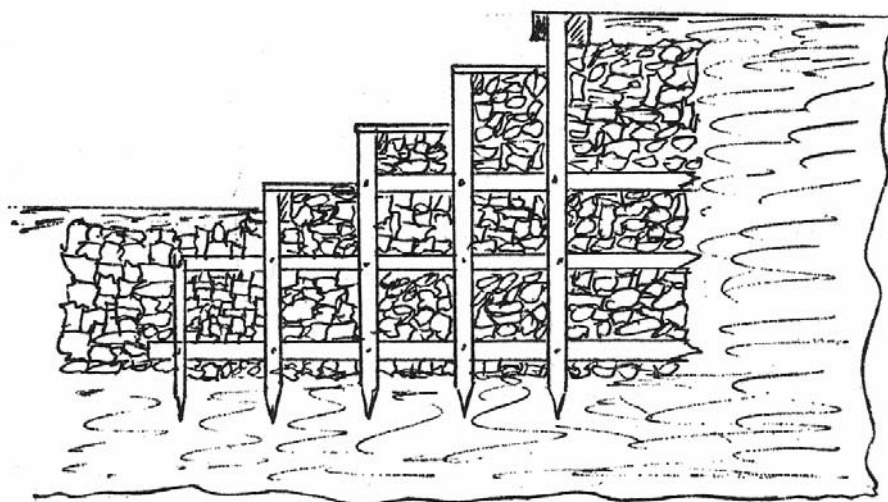
Plate 17: Brisco Mill weir from upstream

Plate 18: Weir associated with Bridge End Tannery

PLATES



32 A weir formed of piles, with an open frame of timber and boulder stones



33 Alternative construction of weir, using slabs in steps

Plate 1: Common types of weir construction, after Syson 1965, 75

Egremont, Cumberland.

FLAX MILL AND PREMISES.

Particulars, Plan, and Conditions of Sale
OF ALL THOSE THE

FLAX AND TOW MILL,
OR FACTORY,
MANAGER'S HOUSE AND OFFICES,
Three Dwelling-Houses, Gas Works, and Plot of Land,
Situate near Egremont, in the County of Cumberland,
KNOWN AS "CHAPMAN'S MILL,"
Containing One Acre and a Half of Land, or thereabouts.
And also the WATER WHEEL, ENGINE, BOILERS, SHAFTING and FIXED MACHINERY
belonging to the Mill, and which will be sold therewith.

ALL WHICH PREMISES

WILL BE SOLD BY AUCTION,
BY MR. JAMES JACKSON,
At his MART, in DUKE STREET, WHITEHAVEN,
On THURSDAY, the 13th day of OCTOBER, 1881,
AT TWO O'CLOCK IN THE AFTERNOON.

ALSO,

INVENTORY OF TENANT'S MACHINERY
In the said Mill, which the Purchaser will have the option of taking at a valuation.

Further particulars may be obtained on application to THOMAS GRICE, Esq., Bootle, Carnforth (who will give cards to view the Premises); Mr. EDWARD CHAPMAN, on the Premises; MESSRS. BROCKBANK, HELDER, AND BROCKBANK, Solicitors, Whitehaven; and of the AUCTIONEER.

Plate 2: Sales Particulars, 1881 (DBH/11/1)

INVENTORIES OF THE MACHINERY.

The FIXED MACHINERY belonging to the Mill, and which will be sold therewith.

Water Wheel, 14 feet wide and 14 feet in diameter, calculated, with full head of water, to drive 50 horse power.

Compound Vertical Engine, high pressure cylinder 8 inches in diameter, low pressure 20 inches; length of stroke, 2 feet.

Cogged Fly Wheel, 10 feet in diameter, and pinion and one spare ditto. Air Pump, &c.

Vertical Boiler, 12 feet 8 inches high, by 5 feet 6 inches wide, with three cross tubes and blow-off cock, and mountings.

Egg-ended Boiler, for supplying steam to heat the water for the wet spinning frames and also the pipes in the drying room, 13 feet long by 5 feet in diameter, with mountings.

Substantial Shafting, Gearing, Drums, &c.

Three Double Dry Spinning Frames, with separate Cylinders.

384 Spindles, $4\frac{1}{2}$ inches pitch, 4 inches traverse; bottom roller 4 inches, top $1\frac{3}{4}$ inches in diameter; spindle blade 9-16ths; cylinder 10 inches in diameter; spindle wharves driven by leather bands.

Two Single Dry Spinning Frames, 128 spindles, with the same measurements as the above.

NOTE.—128 Spindles of the above Frames are made to spin reversed Twist, and are interchangeable.

The TENANT'S MACHINERY, which the Purchaser of the Mill will have the option of taking at a Valuation.

Two Circular Finishing Cards, 4 × 6 cylinder; 6 pairs of rollers, 7 inches and $8\frac{1}{2}$ inches in diameter; 2 doffers, 12 inches in diameter; 16's wood clothing on cylinder, with circular drawing head complete, by Fairbairn, Kennedy, and Naylor.

Two Circular Finishing Cards, 4 × 6 cylinder; 6 pairs rollers, 6 and 7 inches in diameter; 2 doffers, 14 inches in diameter; 16's wood clothing on cylinder, with circular drawing head complete, by Henchman and Atkinson.

Two Tow Drawing Frames, 3 heads, 6 bosses, 2 deliveries per head, 5 inch pitch of bosses, 9 inch reach, front rollers $2\frac{1}{2}$ inches in diameter, back roller 2 inches, screw $\frac{1}{2}$ inch pitch, gill $3\frac{1}{2}$ inches wide, 2 rows of pins one inch out of stock, 21 pins per row, 16's wire, by Fairbairn, Kennedy, and Naylor.

Two Tow Drawing Frames, 3 heads, 8 bosses, 4 deliveries per head, 4 inch pitch of bosses, 9 inch reach, front roller $2\frac{1}{2}$ inches in diameter, back ditto 2 inches, screw $\frac{1}{2}$ inch pitch, gill $2\frac{1}{2}$ inches wide, $\frac{7}{8}$ ths out of stock, 2 rows of pins, 20 pins per row, 17's wire, by Fairbairn, Kennedy, and Naylor.

Two Tow Roving Frames, 56 spindles each, 7 heads, bobbin 10 × 5, 8 inch reach, $3\frac{1}{2}$ inch pitch of bosses, front rollers $2\frac{1}{4}$ inches diameter, back 2 inches, screw $\frac{1}{2}$ inch pitch, gill $2\frac{1}{4}$ wide, 2 rows of pins, 22 pins per row, 13-16ths out of stock, 19's wire, cone motion, by Fairbairn, Kennedy, and Naylor.

One Tow Drawing Frame, 3 heads, 6 bosses, 3 deliveries per head, 5 inch pitch of bosses, $7\frac{1}{2}$ inch reach, front roller $2\frac{1}{2}$ inches in diameter, back $1\frac{1}{2}$; screw $\frac{1}{2}$ inch pitch, gill $3\frac{1}{2}$ wide, 1 inch out of stock, 2 rows of pins, 18 pins per row, by Newton and Co., Leeds.

One Tow Drawing Frame, 4 heads, 8 bosses, 4 deliveries per head, pitch of bosses $3\frac{1}{2}$ inch, $7\frac{1}{2}$ inch reach, front roller $2\frac{1}{2}$ inches in diameter, back $1\frac{1}{2}$; screw $\frac{1}{2}$ inch pitch, gill $2\frac{1}{4}$ wide, 2 rows of pins, 15 pins per row, $\frac{7}{8}$ ths out of stock, 16's wire, by Newton and Co., Leeds.

One Tow Roving Frame, 6 heads, 48 spindles, bobbin 10 × 5, disc motion, front roller $2\frac{1}{4}$ inches in diameter, back 2 inches, screw $\frac{1}{2}$ inch pitch, gill 2 inches wide, 2 rows of pins, 17 pins per row, $\frac{3}{4}$ inch out of stock, 17's wire, by Henchman and Co., Leeds.

HOT-WATER SPINNING FRAMES.

Two Double and Four Single Frames, containing 480 spindles, $3\frac{1}{2}$ inches pitch and traverse.

Four Single Frames, containing 288 spindles, 3 inches pitch and traverse.

Three Double Flax Cutters.

One Dundee Breaker, or Teaser, with two pairs of fluted feed rollers, reversible motion; cylinder $4 \times 2\frac{1}{2}$, wood covering, 9's wire.

One Double and Two Single Reels for the hot-water spinning.

Two Double Reels for the dry spinning.

Three Warping Mills complete, to warp up to 100 yards in length.

One Wood Pressing Fluting Machine, with indices and Slide Lathe attached.

One Slide Lathe for wood pressing rollers.

One Self-acting Slide Lathe for iron, 7 feet gantry, 6 inch centres.

One Drilling Machine.

One of Pooley's Patent Weighing Machines, up to 10 cwt.

One " " " " up to 15 cwt.

One Beam and Scales, with Weights, and a quantity of Sliver Cans, Drying Poles, Bobbins, Belting, and sundry Stores.

Plate 3: Sales Particulars, 1881 (DBH/11/1)



Plate 4: Looking north-west across the river Ehen to the wall on the north-west bank just below the weir



Plate 5: Looking east-north-east from above Ennerdale Mill weir to the island in the River Ehen, downstream of the weir



Plate 6: Looking east from above Ennerdale Mill weir to the island in the River Ehen, downstream of the weir



Plate 7: Looking south across Ennerdale Mill weir



Plate 8: Detail of Ennerdale Mill weir construction and wall on the north-west river bank, looking south-west

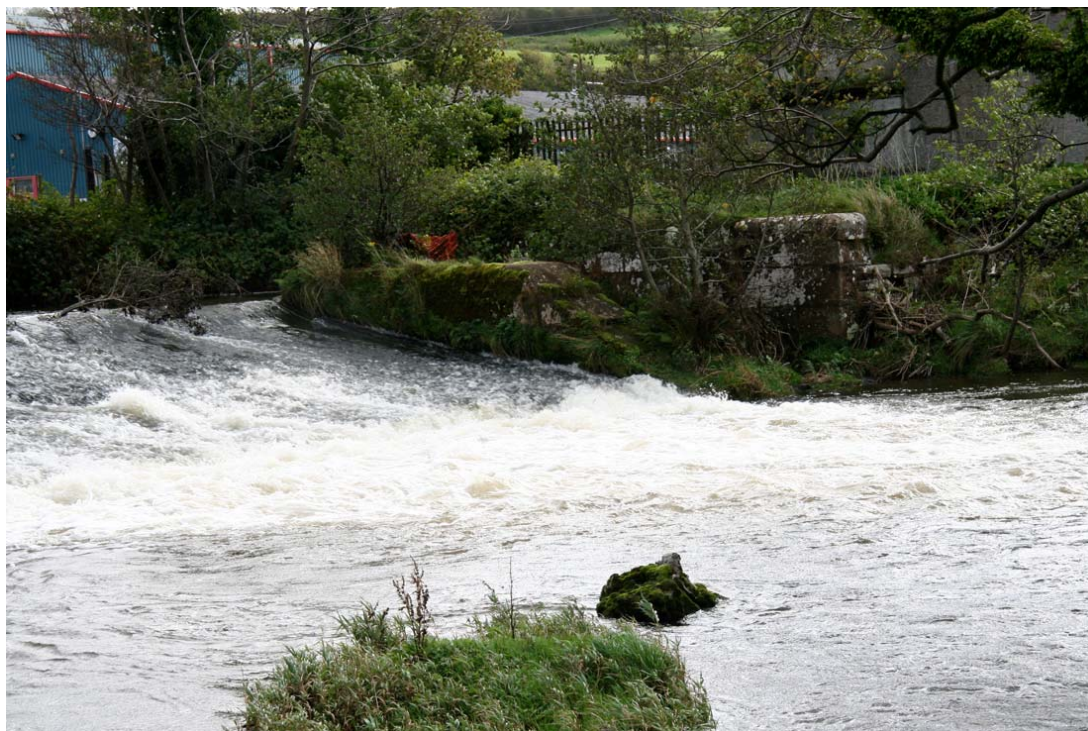


Plate 9: Area of the former sluice at the south end of Ennerdale Mill weir, looking south



Plate 10: Looking south-east to Ennerdale Mill weir



Plate 11: Remains of the tail race south of Ennerdale Mill, looking east



Plate 12: Possible nineteenth century Ennerdale Mill building, looking south. The road is located over the central mill race



Plate 13: Possible nineteenth century Ennerdale Mill buildings, looking south-west



Plate 14: Late nineteenth century house on Ennerdale Mill site, looking south-west



Plate 15: Bleach Green weir



Plate 16: Brisco Mill weir from downstream



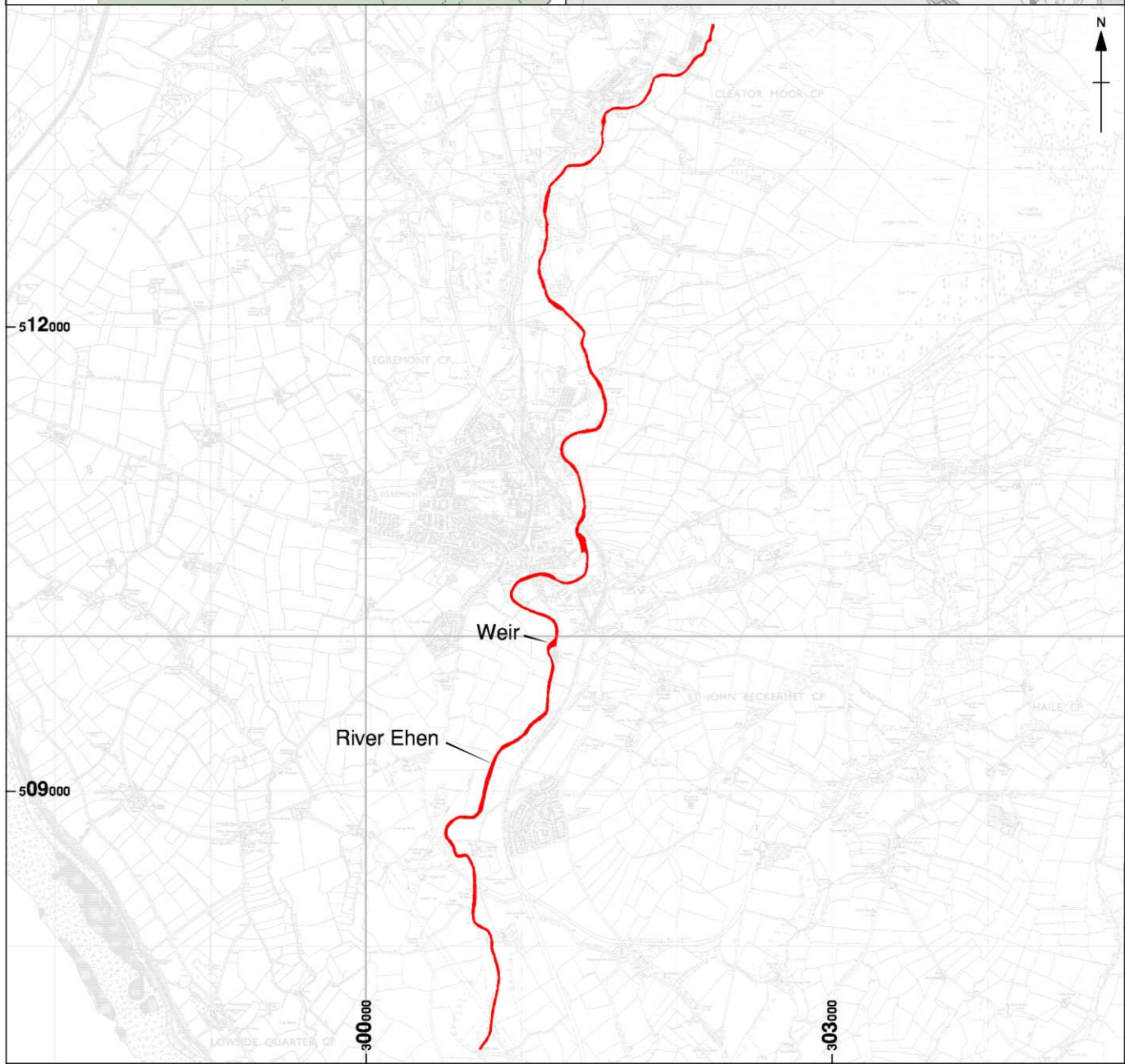
Plate 17: Brisco Mill weir, from upstream



Plate 18: Weir associated with Bridge End Tannery



scale 1:250,000



Based upon the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationery Office ©Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Oxford Archaeology Licence No. AL 100005569 (Oct 2011).

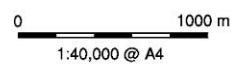
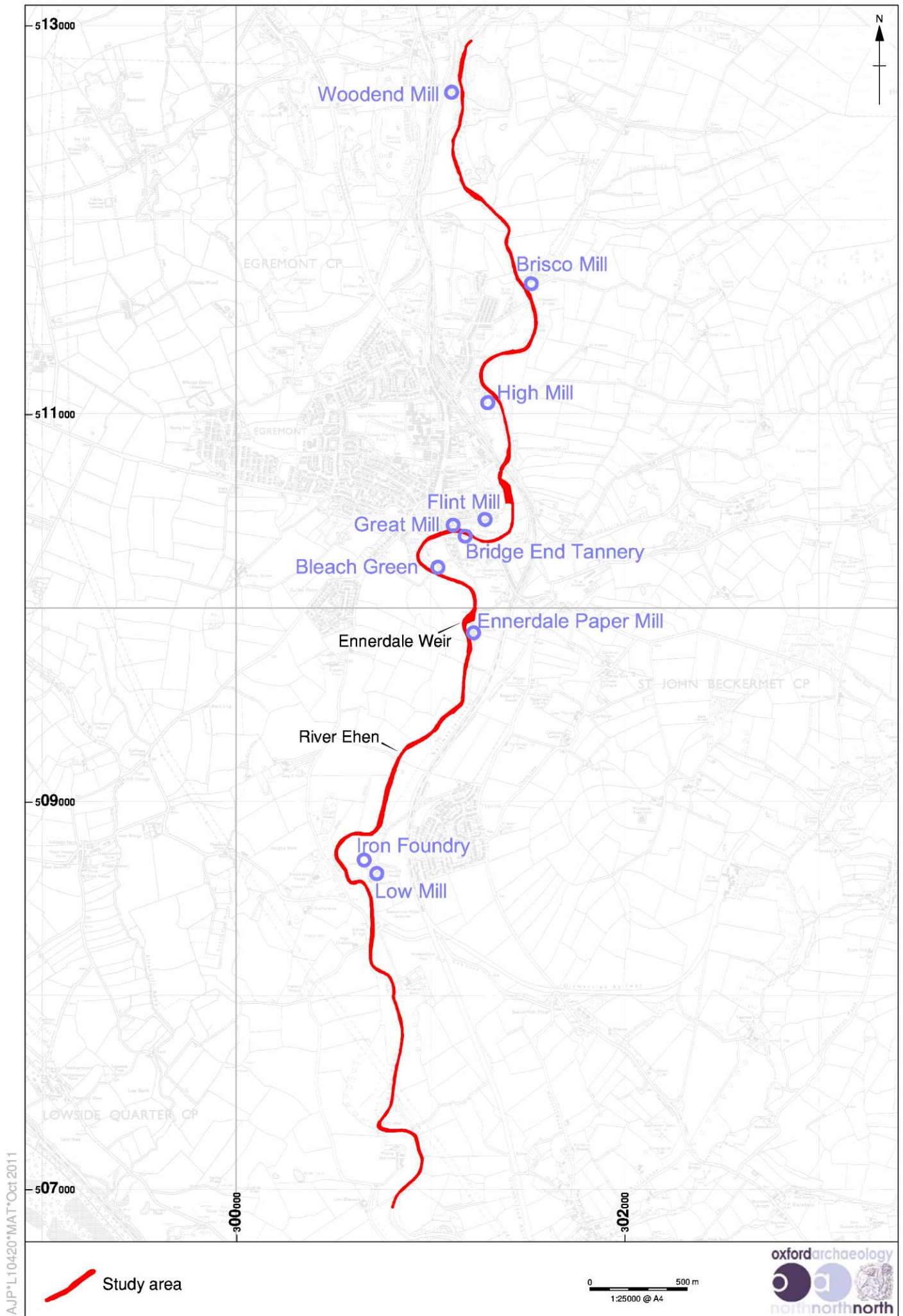


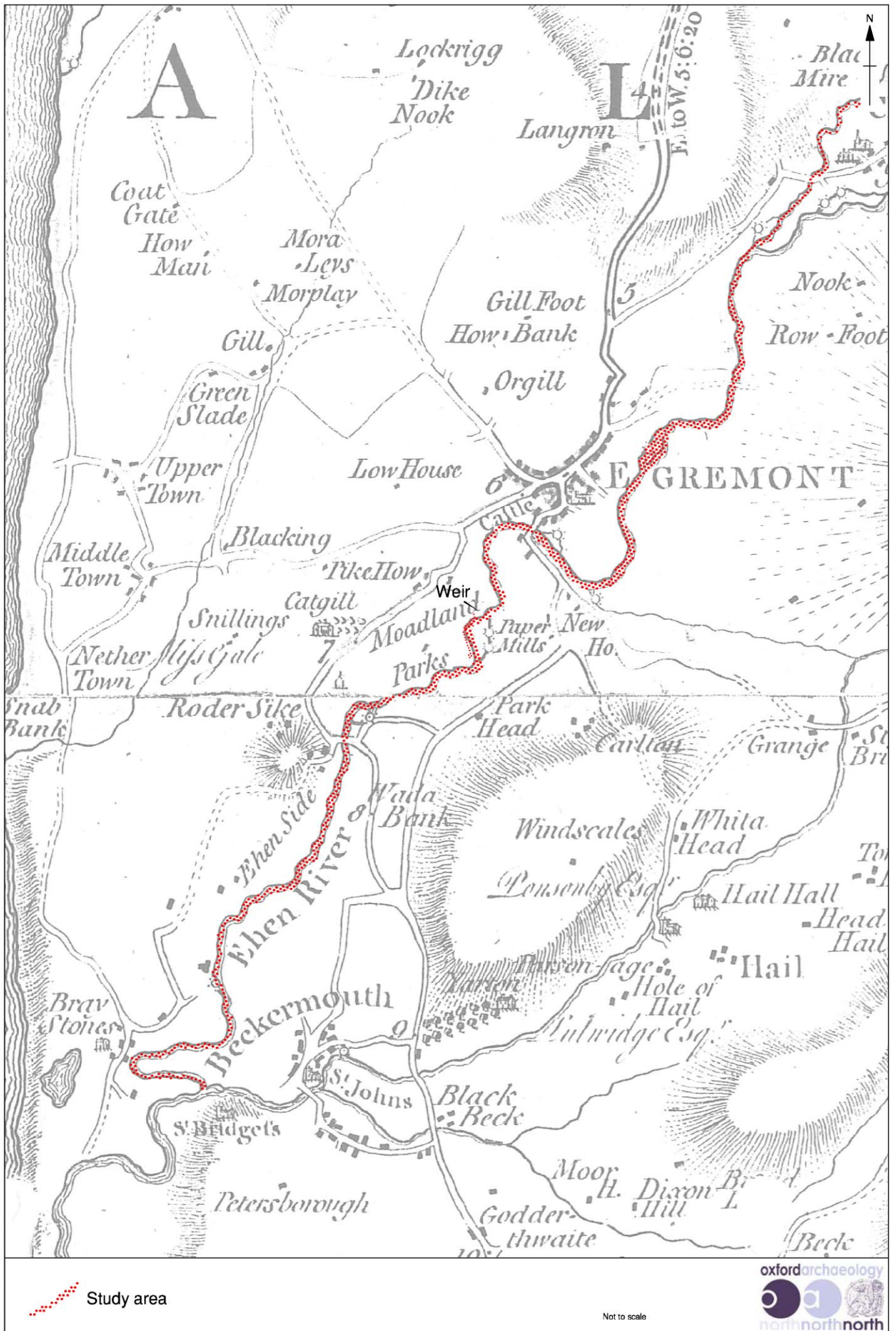
Figure 1: Site location

AJP*L10420*MAT*Oct 2011



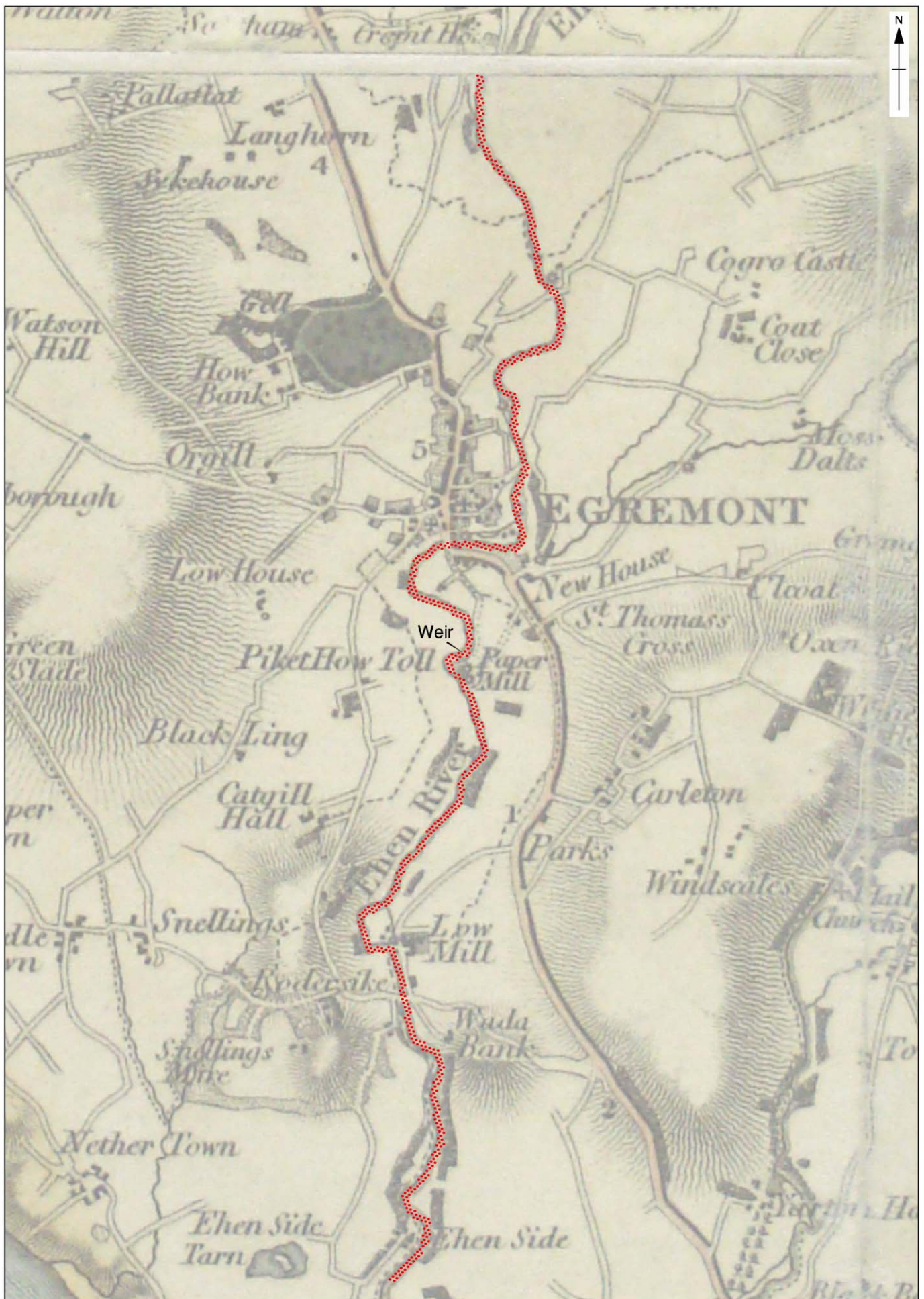
AJP*L10420*MAT*Oct 2011

Figure 2: Plan showing mills within the study area



AJP*L10420*MAT*Oct 2011

Figure 3: Extract from Hodkinson and Donald's map of Cumberland, 1774



 Study area

Not to scale



AJP*L10420*MAT*Oct 2011

Figure 4: Extract from Greenwood's map of Cumberland, 1822

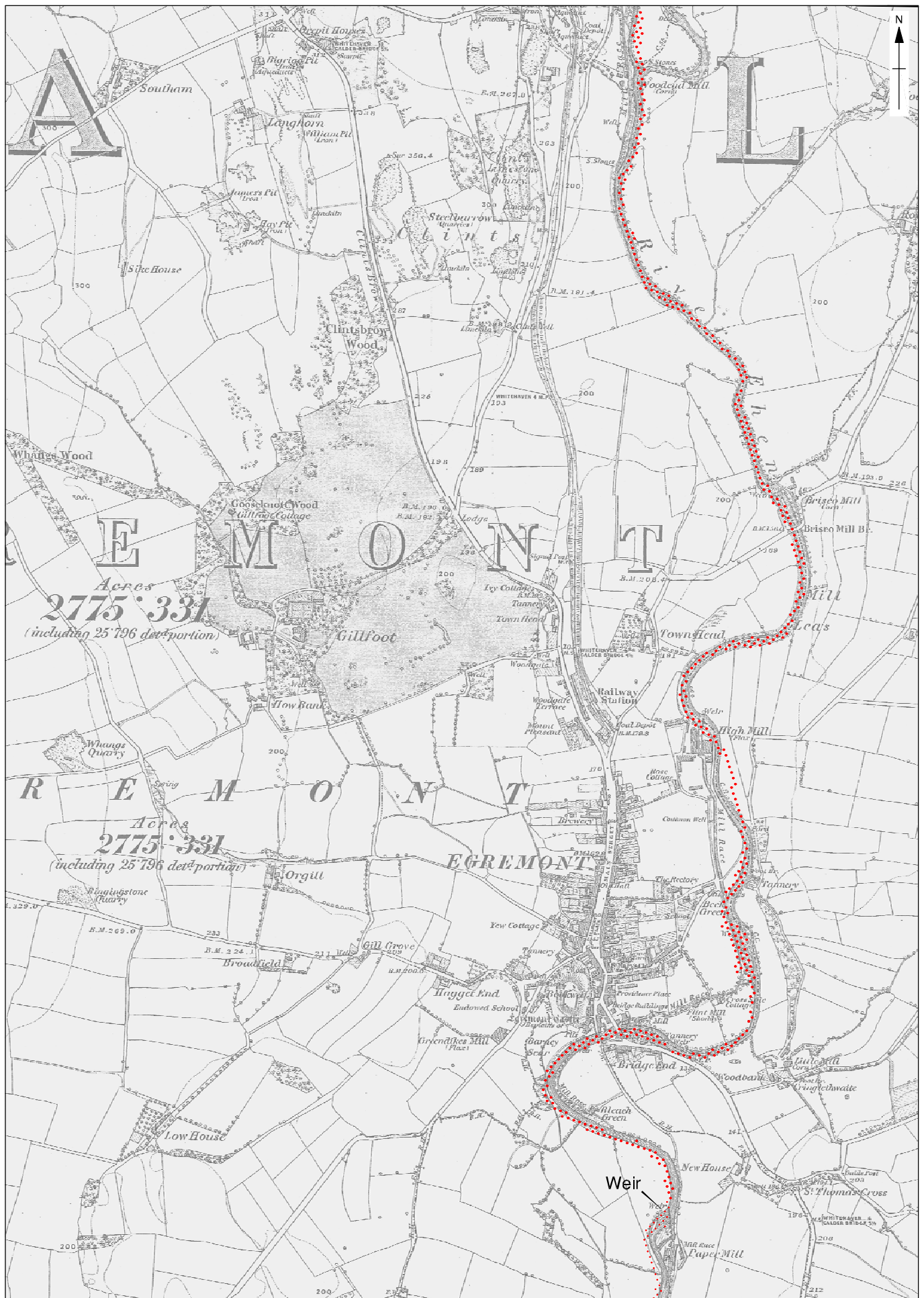


AJP*L10420*MAT*Oct 2011

Not to scale



Figure 5: Extract from Lowside Quarter tithe, 1838



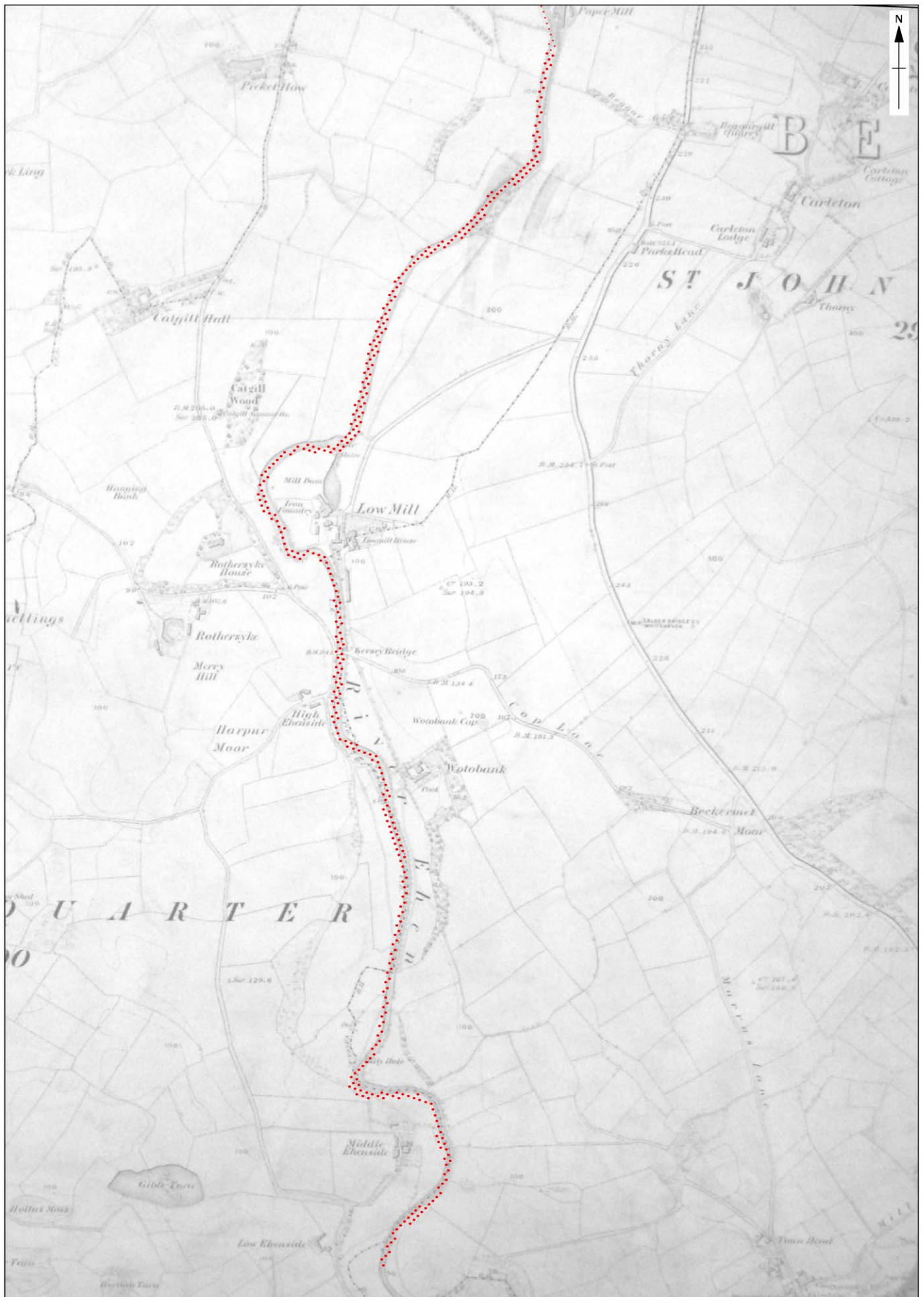
 Study area

Not to scale



AJP*L10420*MAT*Oct 2011

Figure 6a: Extract from the Ordnance Survey 6"-1 mile map, 1861, north



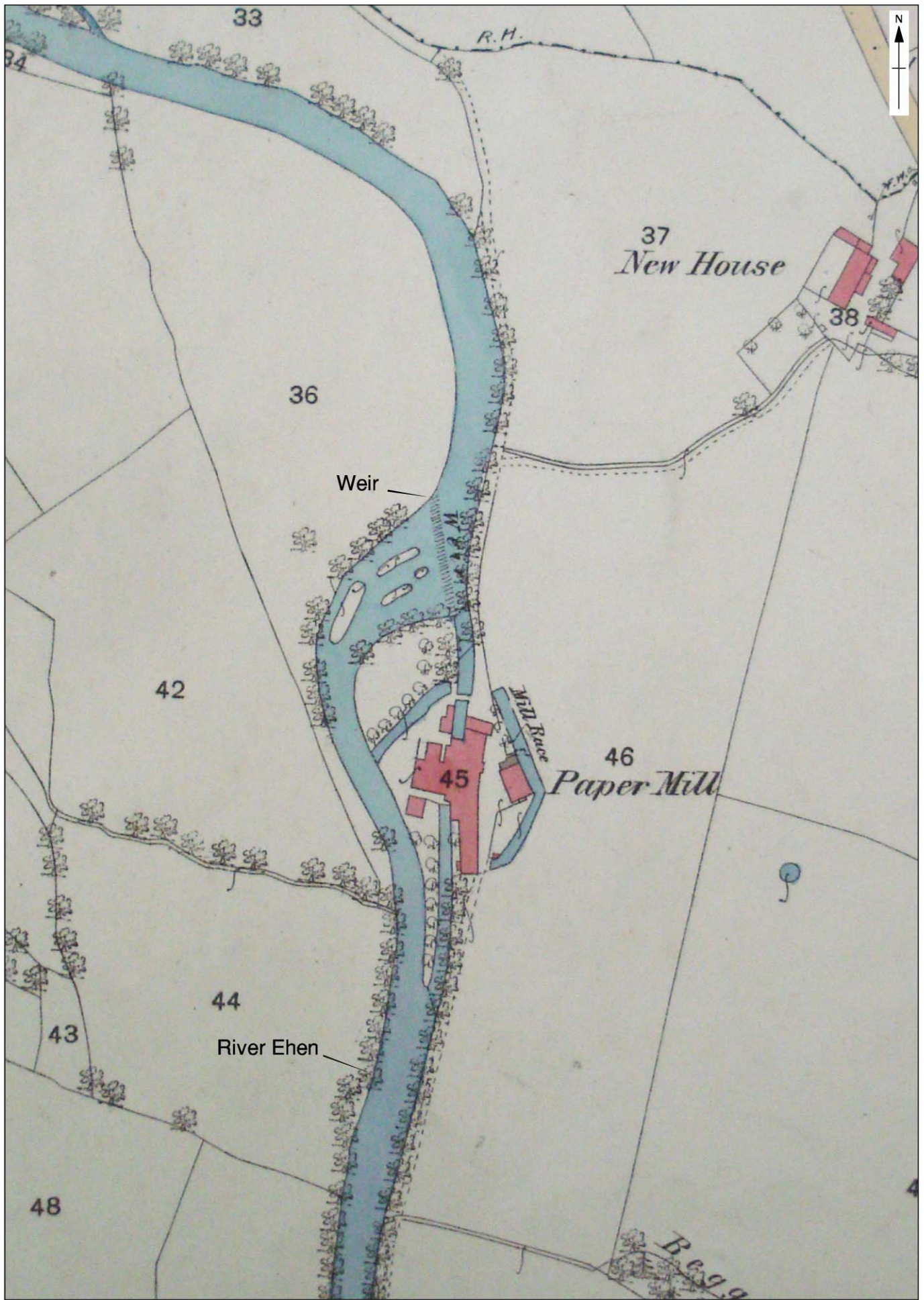
 Study area

Not to scale



AJP*L10420*MAT*Oct 2011

Figure 6b: Extract from the Ordnance Survey 6"-1 mile map, 1861, south

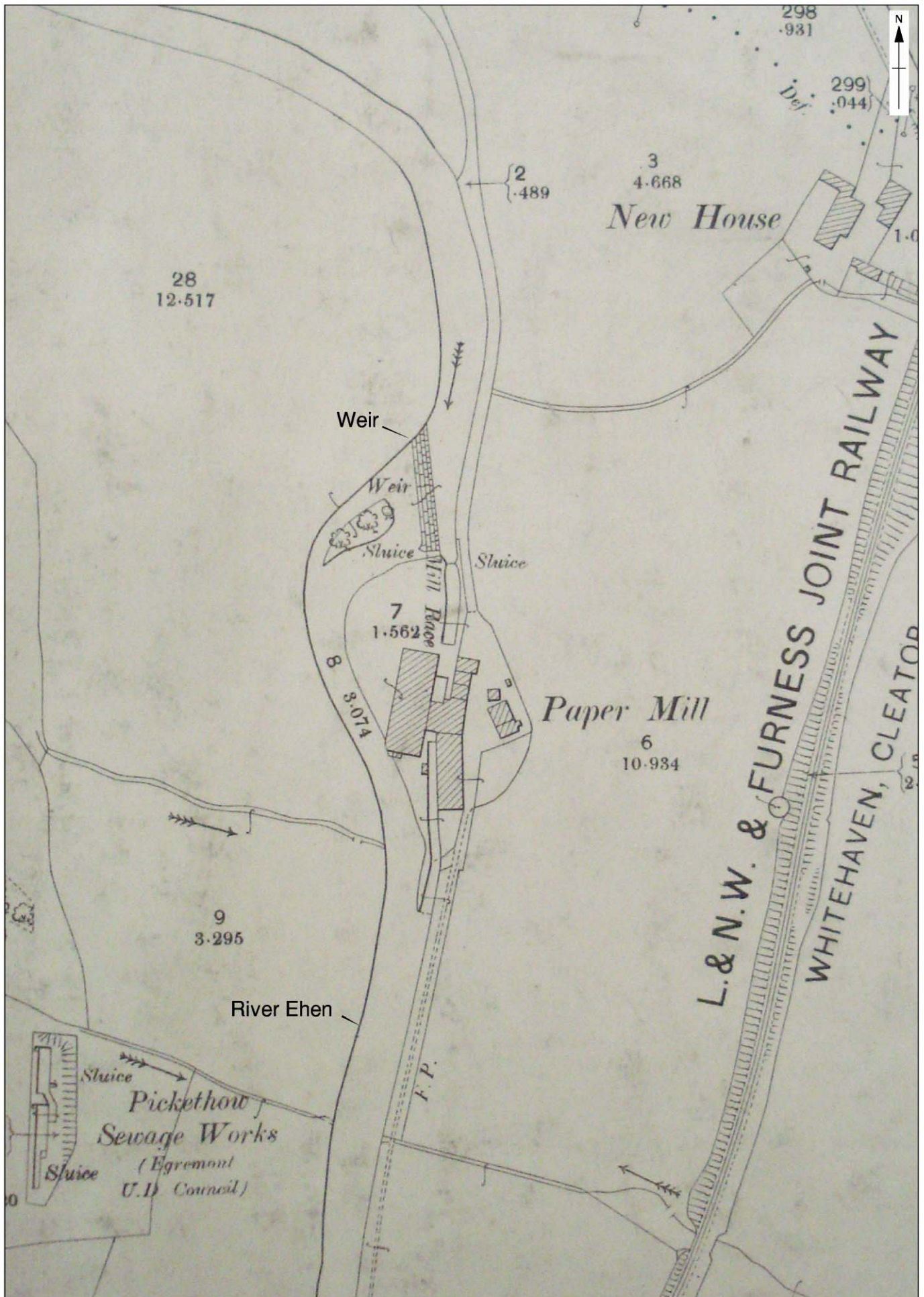


AJP*L10420*MAT*Oct 2011

Not to Scale



Figure 7: Extract from the Ordnance Survey 25"-1 mile map, 1880

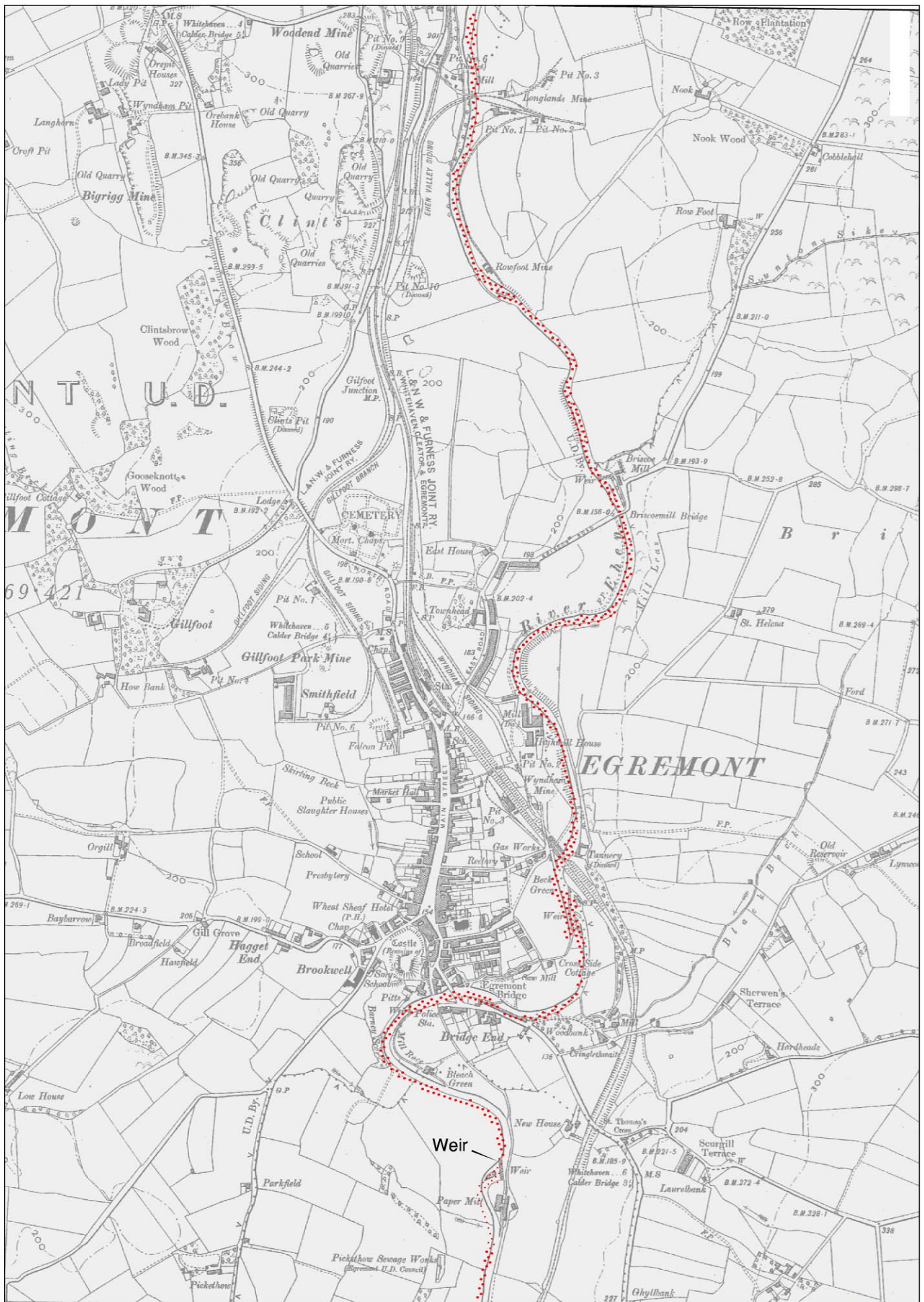


AJP*L10420*MAT*Oct 2011

Not to Scale



Figure 8: Extract from the Ordnance Survey 25"-1 mile map, 1899



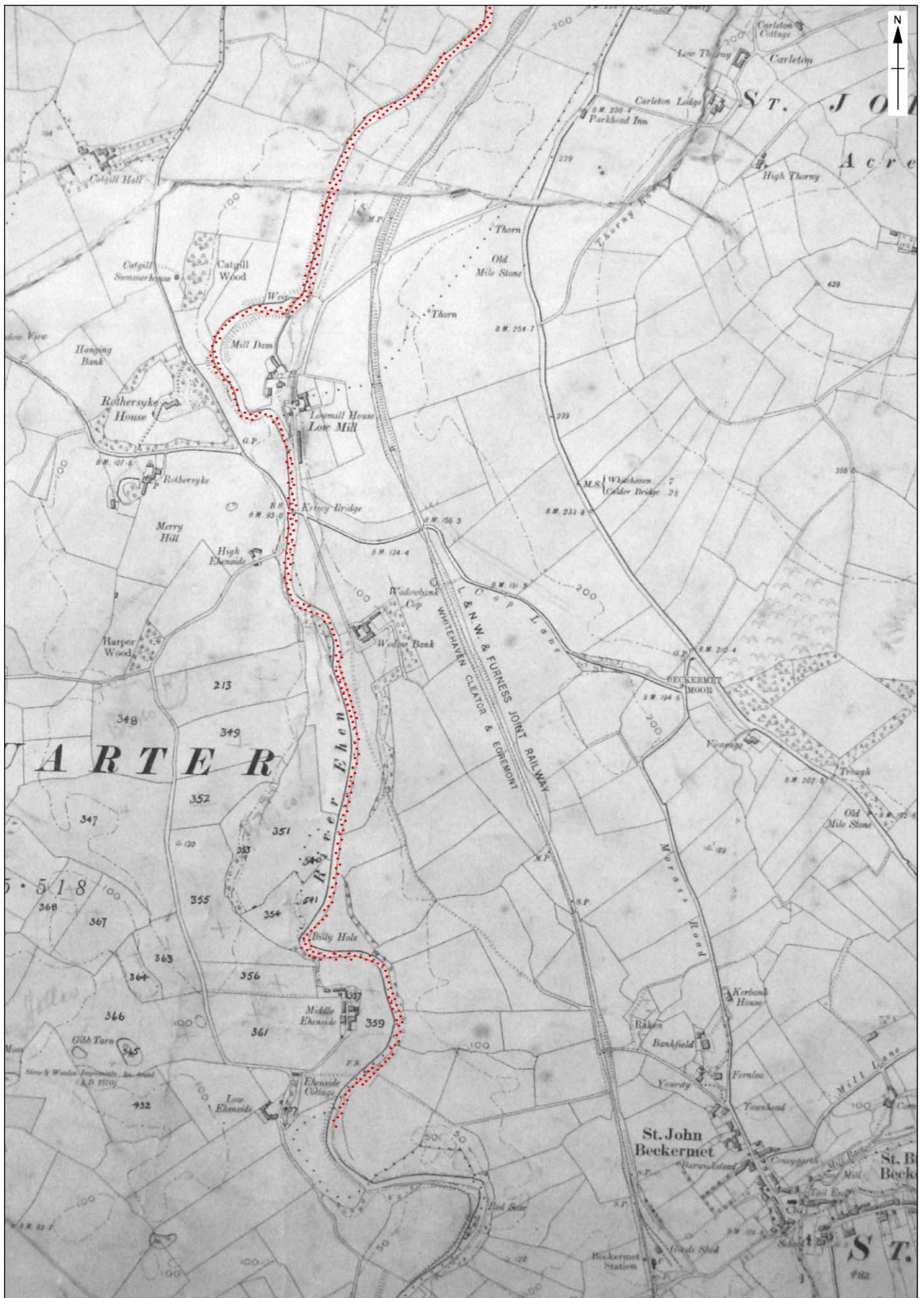
AJP*L10420*MAT*Oct 2011

 Study area

Not to Scale



Figure 9a: Extract from the Ordnance Survey 6"-1 mile map, 1900, north



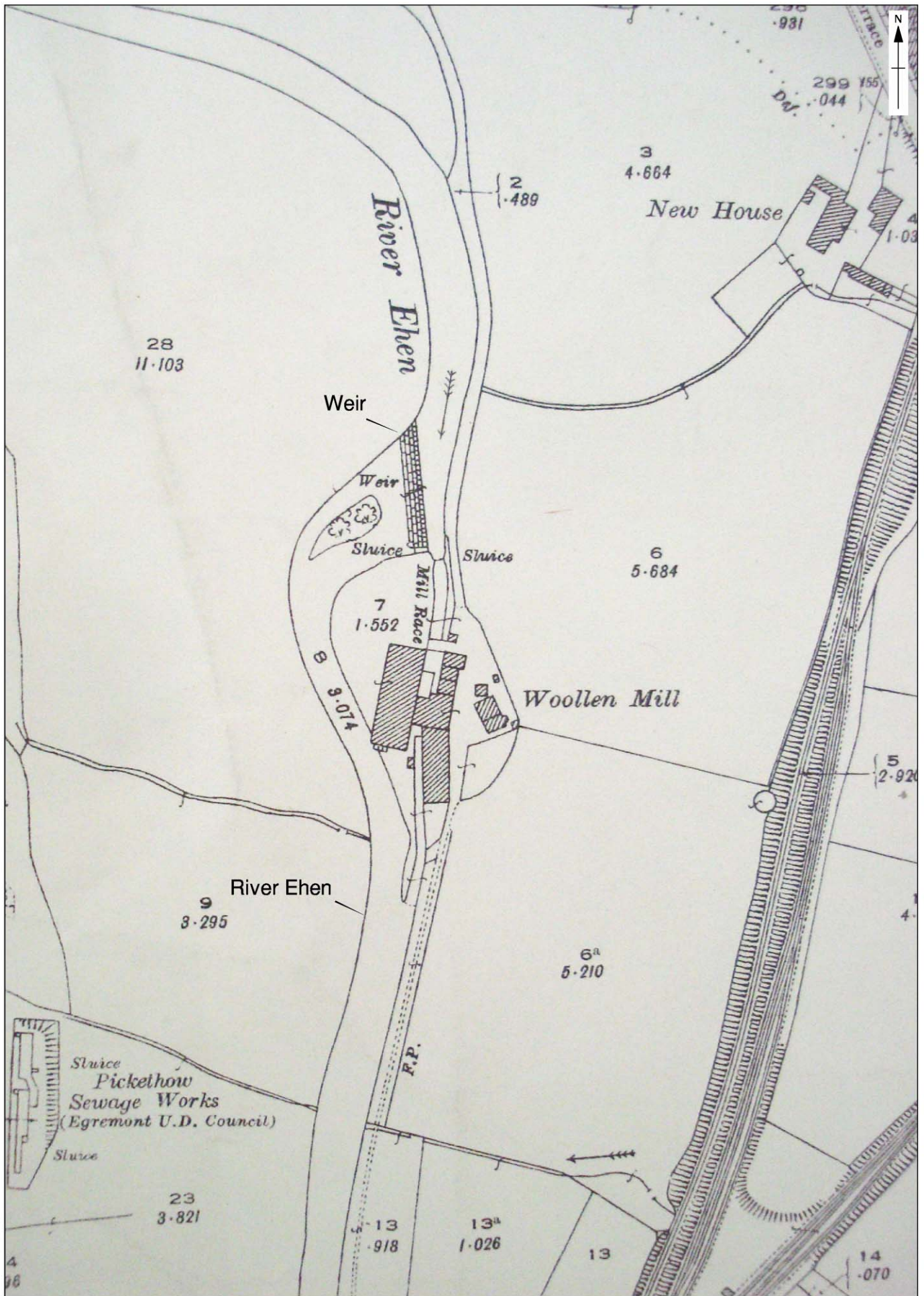
 Study area

Not to Scale



AJP*L10420*MAT*Oct 2011

Figure 9b: Extract from the Ordnance Survey 6"-1 mile map, 1900, south

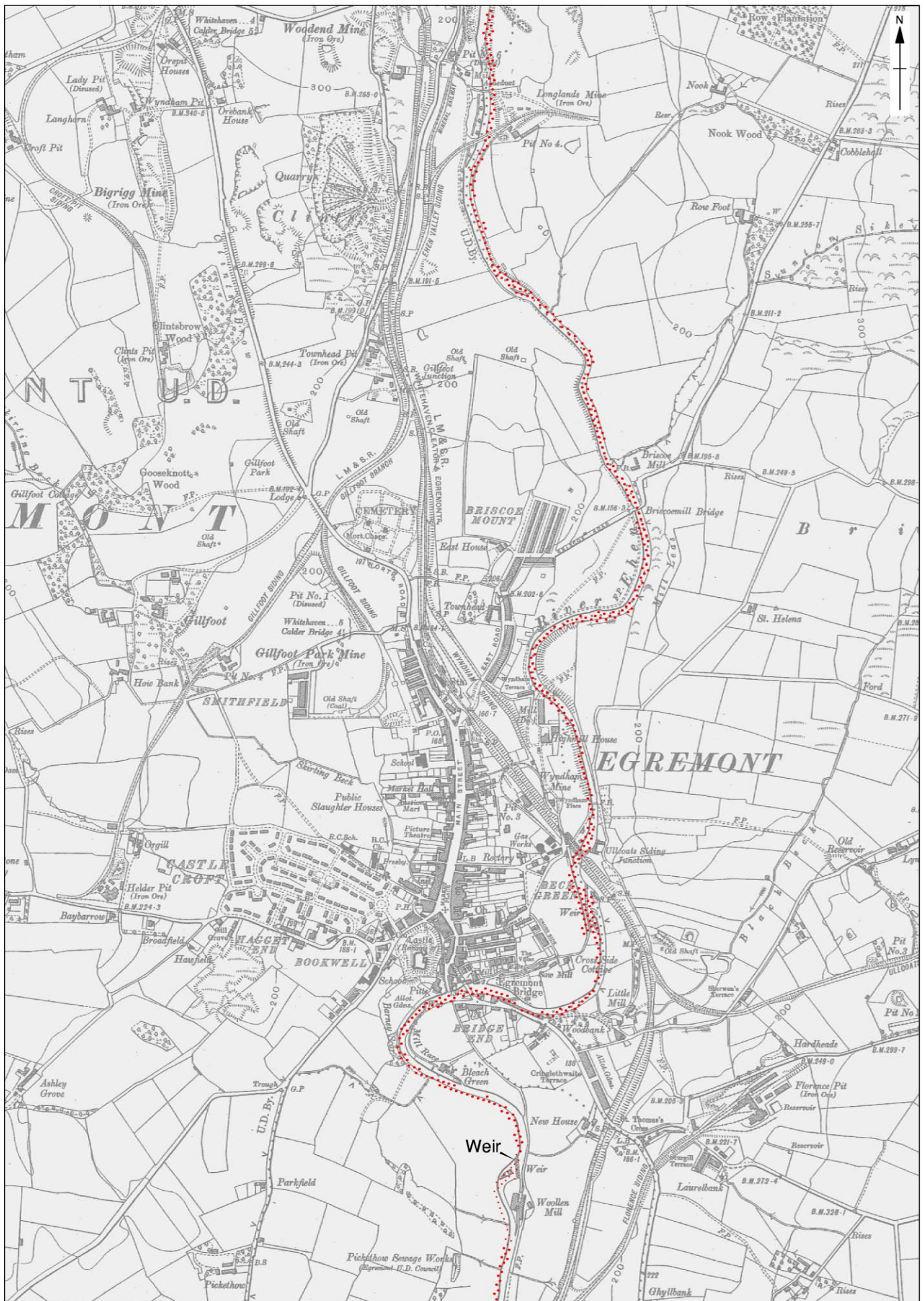


AJP*L10420*MAT*Oct 2011

Not to Scale



Figure 10: Extract from the Ordnance Survey 25"-1 mile map, 1924

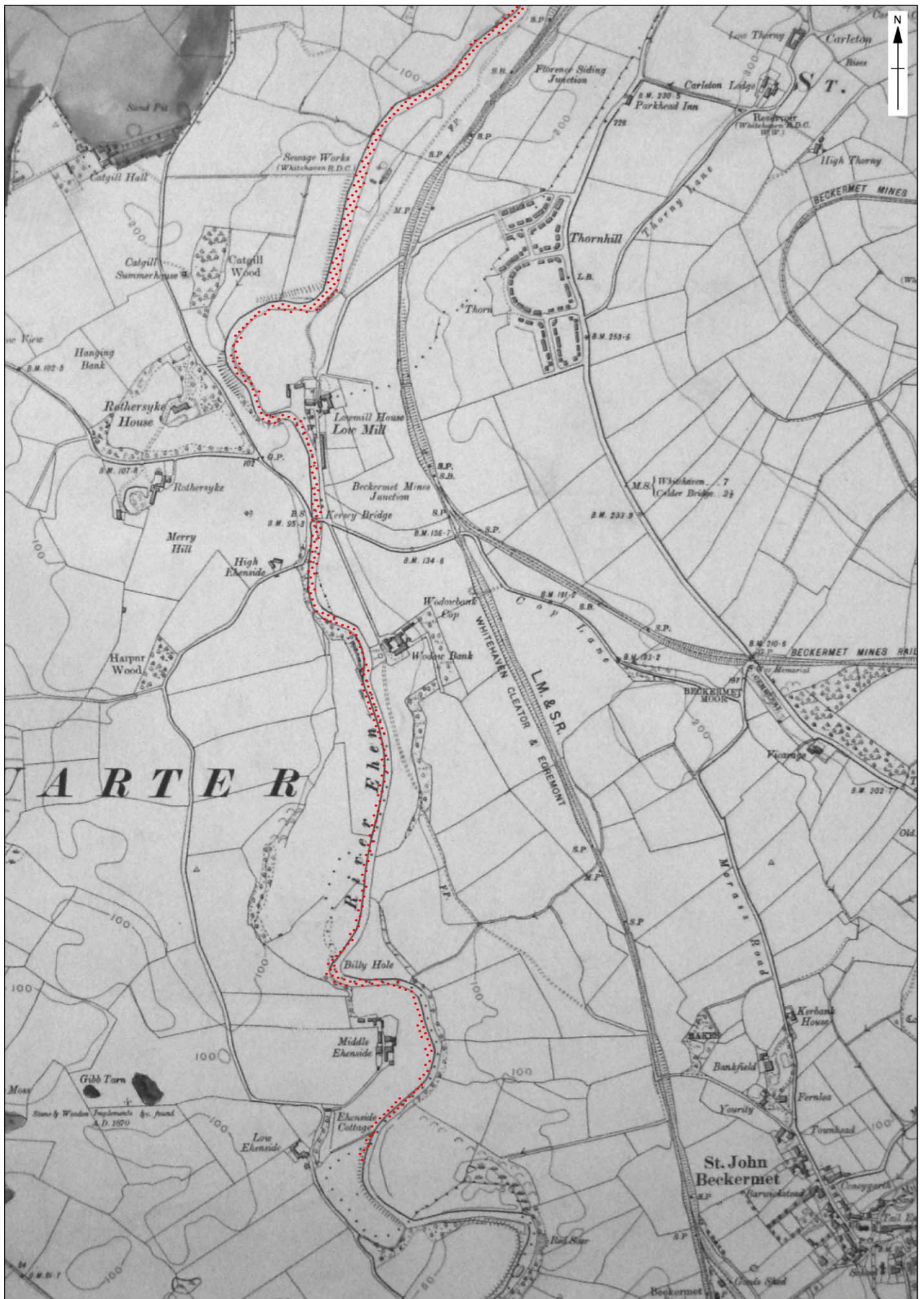


 Study area

Not to Scale



Figure 11a: Extract from the Ordnance Survey 6"-1 mile map, 1926, north



 Study area

Not to Scale



AJP*L10420*MAT*Oct 2011

Figure 11b: Extract from the Ordnance Survey 6"-1 mile map, 1926, south