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HARBOTTLE HILL MILLSTONE QUARRIES

NORTHUMBERLAND

Archaeological Survey Report

Commissioned by: Northumberland National Park Authority

Harbottle Hill Millstone Quarries
Northumberland

Archaeological Survey Report

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SUMMARY

In 1999, as part of a wider programme of research and interpretation of historic sites in Upper Coquetdale the Northumberland National Park commissioned an archaeological survey and recording project focused on the Harbottle Quarries (NT 9160 0435), together with additional fieldwalking of adjacent moorland to establish the full extent of the millstone working. The project was grant aided by the European Rural Development Fund (ERDF) and English Heritage. The site, centred on , is part of the Harbottle Hills and Harbottle Common.

The Brief for the survey and recording (NNPA December 1999) was compiled by David Heslop, Tyne and Wear County Archaeologist, and subsequently amended by Iain Hedley, Assistant National Park Authority Archaeologist. The survey element of the project was undertaken by Lancaster University Archaeology Unit (LUAU), and the documentary research by Northern Counties Archaeological Services (NCAS).

The Survey has revealed the extent of the millstone quarrying industry at Harbottle Crags to have been significantly greater than previously thought, both in volume of material extracted and in the extent of working.

Although the Survey has not produced any physical evidence for dating or phasing the use of the quarry, the scant documentary sources indicate that the industry had commenced before 1604 and had ceased by *c*1800.

In its origins Harbottle Hill is among the earliest dated millstone quarries in Northumberland, and as a consequence of this survey the most comprehensively hitherto recorded. The high quality of the preserved remains make the quarry of regional cultural significance.

ACKNOWLEDGEMENTS

Thanks go Iain Hedley (Northumberland National Park Assistant Archaeologist) for his assistance and support in the course of the project. Lancaster University Archaeological Unit would also like to thank Captain Starling of the Otterburn Training Camp for enabling access onto the MoD land and to Johnathan Farries of Forest Enterprise for facilitating access to the forestry land. The project was commissioned by Northumberland National Park Authority and was grant aided by the European Rural Development Fund (ERDF) and English Heritage.

The survey was undertaken by Chris Scurfield and Dan Ellsworth (LUAU) and the documentary research was undertaken by John Nolan (NCAS). The drawings were prepared by Emma Carter (LUAU) and the report was prepared by John Nolan (NCAS). Project management was undertaken by Jamie Quartermaine.

1. INTRODUCTION

1.1 BACKGROUND TO THE SURVEY PROJECT

1.1.1 In 1999, as part of a wider programme of research and interpretation of historic sites in Upper Coquetdale the Northumberland National Park commissioned an archaeological survey and recording project focused on the Harbottle quarry area, together with additional fieldwalking of adjacent moorland to establish the full extent of the millstone working. The project was grant aided by the European Rural Development Fund (ERDF) and English Heritage. The survey was commissioned following a moorland fire in 1994, which started on the MoD land west of Harbottle Lough and spread eastwards past the Drake Stone (Fig 2), and burned off the thick heather cover over much of the survey area. The fire revealed more of the millstone quarry than had previously been visible and focused attention on the scale and significance of the remains.

1.1.2 The brief for the survey and recording (*Appendix 1*) was compiled by David Heslop, Tyne and Wear County Archaeologist, and subsequently amended by Iain Hedley, Assistant National Park Authority Archaeologist. The brief divided the survey area into three parts. The 'Main Survey Area' was the crest of the sandstone ridge covering *c*7.44ha. lying between Harbottle Lough or Lake on the south and the forestry plantation of West Wood on the north; to the east an additional 5.1ha., and to the west another 5.15ha., were designated for 'additional field walking'. A project design in response to the brief was prepared by Lancaster University Archaeology Unit (LUAU) and Northern Counties Archaeological Services (NCAS). In the resultant project LUAU undertook the survey and the documentary research was undertaken by NCAS.

1.2 THE SITE (Figure 1)

1.2.1 The site, centred on NT 9160 0435, is part of the Harbottle Hills and Harbottle Common. The sandstone ridge on which the quarry lies rises to some 900'-950'(274-289m), and was formerly known variously as Harbottle Crags (a name now confined to the southern extremity of the sandstone ridge), Millstone Crags, or Millstone Edge.

1.2.2 To the north the sandstone ridge ends in a ragged sill, beyond which is a dense conifer plantation called West Wood planted in the early 1970s. To the south the ridge slopes gently down to a small tarn called Harbottle Lough or Lake, skirted on its northern side by a public right of way. Beyond the Lough open moorland rises to another sandstone ridge showing no evidence of quarrying. To the east and south-east, the ground falls steeply from a sandstone escarpment on which lies the natural monolith of the Drake Stone, down to the floor of the Coquet valley. The public footpath crosses the contours to join the metalled road between Harbottle and Alwinton. West of the sandstone ridge the ground falls steeply to the Barrow Burn. The public footpath meanders south-west and joins an abandoned road leading to old coal workings at Wilkwood.

1.2.3 The site is within the Northumberland National Park, and part lies within the Harbottle Moors Site of Special Scientific Interest. The study area is bisected by a north-south fence line and the eastern part is owned by Forest Enterprise, who lease part of their holding, including the millstone quarry, to the Northumberland Wildlife Trust (NWT) which has designated the area as a Local Nature Reserve. The western half of the site belongs to the Ministry of Defence (MoD) forming part of the Otterburn Training Area

(OTA). The extreme western end of the quarried zone lies within the OTA Danger Area.

1.2.4 The principal area of quarrying was almost continuous from the highest point at the east end of the crags westward to the 244m (800') contour marking the beginning of the steep slope down to the Barrow Burn, and from the rock sill on the north to the edge of the lough on the south. Within this area the crest of the ridge and virtually the entire south facing slope has been remodelled by extraction. A smaller area of quarrying was located within the eastern additional fieldwalking area between the Drake Stone and the footpath.

1.3 PREVIOUS ARCHAEOLOGICAL WORK ON THE SITE

1.3.1 While the Millstone Crags are marked and named on early nineteenth century surveys, the presence of discarded millstones at Harbottle Crags was found remarkably by antiquarian visitors only some 70 years later. The earliest known archaeological appraisal was a short description in the 1977 Redesdale Survey (Charlton and Day 1977), followed by a more detailed examination by Jobey in 1986.

1.3.2 An Ecological Survey and Appraisal was undertaken as part of a Historical Landscapes project administered by the Northumberland National Park (Middleton).

1.3.3 The site has a brief entry in the Northumberland County Council Sites and Monuments Record (SMR NT 90 SW/28). It was identified as being of national importance and recommended for statutory protection in the MPP Step 3 Report on the Quarrying Industry (LUAU 1997).

2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 A project design (*Appendix 2*) was submitted by LUAU in response to a request from Iain Hedley (Northumberland National Park) for an archaeological survey of the study area. It was designed in accordance with a brief (*Appendix 1*) by David Heslop, Tyne and Wear County Archaeologist, and subsequently amended by Iain Hedley, Assistant National Park Authority Archaeologist. Where practicable this project design was adhered to in full, and the work was otherwise consistent with the relevant standards and procedures of the Institute of Field Archaeologists, and generally accepted best practice. The results of the survey are presented within this report.

2.2 DOCUMENTARY STUDY

2.2.1 Documentary research by NCAS involved visits to the Northumberland County Records Office, Newcastle City Library Local Studies Section, the library of the Society of Antiquaries, Black Gate, Newcastle upon Tyne. Aerial photographic sources at the National Monuments Record were also consulted. The documentary search demonstrated the paucity of source material, and attempts to locate estate papers for the principal owning family - the Selbys - were unsuccessful. A visit was also made in the company of David Heslop, Tyne and Wear County Archaeologist, to a recently identified millstone quarry site at Glantlees, Northumberland, for comparison of extraction methodology and scale of working.

2.3 FIELD SURVEY

2.3.1 The survey was carried out by Lancaster University Archaeology Unit between the 21 February 2000 and 3rd March. At the commencement of the survey the site was visited by J. Nolan (NCAS) on the 21st and 25th February 2000 to define the extent of millstone working. A further visit was made by J. Nolan on the 21 May 2000 to check survey data.

2.3.2 A systematic surface inspection of the Harbottle study areas was undertaken to ensure complete coverage of the ground. The archaeological sites were located by systematic ground reconnaissance; field walking was undertaken at between 10m and 25m line intervals depending on the terrain. A set of 1:10,000 scale maps were laminated and taken into the field in order to reference known sites.

2.3.3 The sites were located by means of a Global Positioning System (GPS) techniques to locate and record the features. The GPS instrumentation uses electronic distance measurement along radio frequencies to satellites to enable a positional fix in latitude and longitude which can be converted mathematically to the Ordnance Survey National Grid. The use of GPS techniques has proved to be an essential and extremely cost effective means of locating monuments. GPS raw data (using a single receiver) is typically accurate to only +- 50m, but by the use of differential techniques it is possible to achieve much higher accuracies. The Leica system used by LUAU uses a post-processed differential system and involves the comparison between a roving receiver and a static receiver (at a precisely recorded location) and allows for the elimination of most of the residual errors. This typically results in accuracies of better than +- 0.2m. The survey recorded the outlines of the voids and the blanks; and recorded the extent of pertinent crags, communication routes and also spoil tips and debris spreads.

2.3.4 The structures were recorded by a combination of GPS survey and manual survey: structural elements such as the standing walls and structures were recorded by manual survey on draughting film, and were located by GPS. The working areas were recorded by GPS survey and superimposed with the manual survey.

2.3.5 The survey data from both the GPS and manual surveys was transferred digitally into a CAD system (AutoCAD 14) and were superimposed with topographic data digitised from OS 1:10,000 digital maps provided by Northumberland National Park Authority.

3. MILLSTONE QUARRYING: THE NATIONAL PERSPECTIVE

3.1 TERMINOLOGY OF MILLSTONES AND MILLSTONE QUARRYING (NATIONAL, REGIONAL AND SITE-SPECIFIC APPLICATIONS).

- ***Millstone:*** defined as one of a pair of circular stones for grinding corn. The distinction between a millstone and a grindstone is sometimes blurred, though the former is generally a face-grinder and the latter an edge runner. The lower stone of a pair, called the 'bedstone' was usually cylindrical, flat on both faces, and with a square hole *c*9" square for the iron casting holding the bearing of the shaft which drove the upper or 'runner' stone. The upper face of the 'runner' was usually slightly convex, and was pierced by a circular 'eye' *c*9" diameter with notches for the ends of a shaped bar - the 'rhynd' - which supported the stone on the driveshaft and transmitted the drive.
- ***Millstone quarry:*** the term is used extensively in the published literature of the industry to refer to winning from a quarry face, or to exploitation of detached boulders and lumps of rock ('daystones'). Millstone quarries may also have produced grindstones and quernstones. In this report the term is used more specifically to differentiate between the often large, irregularly-shaped extraction hollows and the discrete extraction hollows which are termed 'voids'.
- ***Center-pop:*** a pecked hole used to circumscribe the outline of the millstone and form the eye.
- ***Eye:*** the hole through the middle of the millstone, enlarged from the centre-pop; it could be square or round depending upon use as a 'bedstone' or 'runner'. At Harbottle Hill the visible eyes on quarry wasters were all round, suggesting that the basic product was a 'bedstone'.
- ***Rhynd:*** a shaped iron bar which supported the upper or 'runner' stone and transmitted drive. Also spelled 'rhind'.
- ***Monolithic:*** used to describe millstone cut from a single piece of rock.
- ***Segmented:*** millstone built up from pieces of rock and bound by iron hoops, particularly French burrs.
- ***Dressing:*** the preparation of the milling surface, normally undertaken at the mill to which the stone had been supplied. Tucker (1971) uses the terms 'lands' and 'furrows' to describe the radiating grooves and spaces between. Lands were 'cracked' with fine grooves. It is evident at Harbottle Hill that a degree of dressing took place at the quarry site after extraction of a stone, though this seems to have been limited to levelling the face and squaring the edge.
- ***Roughout:*** an incomplete millstone, usually broken or showing signs of natural flaws or damage, abandoned at the quarry site. Also described as 'wasters' or 'blanks'.
- ***Void:*** a discrete extraction hollow, usually though not necessarily representing a single millstone, and commonly with rock-fast edges.

3.2 PREVIOUS WORK ON MILLSTONE QUARRYING

3.2.1 Millstone quarries supplied milling industries, the technology of which changed little until the nineteenth or even twentieth centuries. Academic attention has tended to focus upon milling processes and structures and little has been published on the history and archaeology of millstone quarrying. There have been detailed descriptions of millstones and quarries in Derbyshire (Radley 1963-4) and in Monmouthshire (Tucker 1971), and a listing of known millstone quarries in the British Isles was first given by Tucker in 1977 (Tucker 1977) and subsequently expanded into a gazetteer (Tucker 1987). The most detailed recent account of the millstone industry in Northumberland is by Jobey (Jobey 1986).

3.2.2 Details on the technology involved in the extraction of millstones, their marketing and cost of production is difficult to come by for the eighteenth / nineteenth centuries, and even less is available for the preceding centuries. More information is available for imported stones. It is, however, clear that quarries were significant in local economies, providing full or part-time employment, for example in the Peak District of Derbyshire more than 50 millstone quarry sites have been identified and stones made of Derbyshire gritstone (millstone grit) enjoyed a wide distribution from the seventeenth century - even being used in Vale of York windmills.

3.2.4 In the medieval period mills, both water-powered and wind-powered corn mills, were often the most valuable piece of capital equipment on the manor, and frequently enforced customary usage by tenants ensured their economic success. Water corn mills and even a few millstone quarries are mentioned in the Domesday Book, while millstones have been found in archaeological contexts as early as the twelfth century. At this date they were typically *c*0.9m diameter with circular eyes and were *c*25cm thick (Tucker 1987, 167). The size of millstones increased as mills became more powerful. For corn-grinding diameters rose to 5' - 6' (1.52m - 1.83m) and such large stones, up to 2m across, seem to be attributed to the pre-1800 period; by the nineteenth century most were in the range 3'6" - 4' 6" (1.08m - 1.35m). Size apart, millstones are almost impossible to date, except for late ones which carry maker's names.

3.2.5 Local quarries supplied coarse stone for fodder grinding etc, but in time particular areas developed recognition as providing good quality corn milling stones. This particularisation was encouraged by the eighteenth century development of taste for fine ground flour with less grit and an increase in the importation of Continental 'cullin' and 'French Burr' stones. County mills, most of which served a farming estate or community, would typically have had at least one pair of monolithic stones for grinding fodder including beans and peas, and a pair of French burrs for wheat. Mills without monolithic stones are more likely to have been commercial flour mills (Tucker 1977, 3). Customs Records of imported and exported millstones between 1746 and 1777 give a fairly consistent value of £5- £7 per stone irrespective of size (Tucker 1987, 168), and this seems broadly in tune with what is known later of local market prices (*Paragraph 4.2.3*).

3.2.6 By the mid-nineteenth century there had been a move away from numerous small local mills serving rural communities, exacerbated by bulk imports of cheaper and more popular American rolled-mill flour. The introduction into Britain in the 1870s of roller-mills, using iron, steel or porcelain rollers, inevitably led to a decline in the demand for quarried millstones.

3.3 EXTRACTION METHODOLOGY

3.3.1 To cut a millstone a suitable horizontal or nearly horizontal surface of exposed rock was chosen, free from obvious flaws. The diameter of the millstone was marked out on a horizontal rock surface, possibly with a large pair of wooden mason's dividers or a measured string, using a pecked 'centre-pop'. The inscribed circle - perhaps drawn using charcoal, chalk or simply scratched - was then cut into a channel as deep as required for the millstone or down to a suitable bedding plane in the rock. The channel may have been cut with chisels or with small picks.

3.3.2 The inner edge of the channel was cut to a vertical face - forming the edge of the millstone and minimising the extent of subsequent dressing. There is no evidence to suggest that the eye was ever cut at this stage, presumably to avoid creating a point of weakness which might cause the stone to fracture in lifting, and thus saving unnecessary labour.

3.3.3 When the requisite depth of the stone had been reached equally spaced slots were cut radially into the outer edge of the extraction channel either for wooden wedges or pinch-bars used to part the millstone from the parent rock. Where stones were being won from a vertical quarry face the parting movement was in the most part horizontal; in these cases the stones could be partly formed by cutting back the rockface and it was only necessary to separate the rock-fast 'tail' of the stone.

3.3.4 After extraction flaws might be found, or develop as rough dressing of the faces and edges and eye-cutting was carried out on site. Eyes were cut at this stage, often with the stone still in its quarry pit, presumably to obviate the labour of transportation if the stone failed at this stage of the production process. The eye created a point of weakness, and no doubt accounts for many unfinished or broken stones found at the quarry site. It is reasonable to suppose that cut millstones were only removed from the quarry site when ordered by a customer; the apparently sound stones which remain at quarry sites may never have found buyers.

3.3.5 Tucker refers to 'shaping' as having been done on site. The millstone 'blank' was, when cut, already 'shaped', and it is presumed that Tucker means that the initial dressing of the faces was undertaken at the quarry. In Wales and the Peak District crosses are found cut on the faces, possibly as a guide for final face dressing.

3.3.6 Final dressing for use was probably done at the mill. Stones found on cutting to have flaws or to have developed lines of weakness seem to have been abandoned on site, so presumably there was some form of 'quality control' being exercised. Tucker considers that the system of piecework payment used in quarries would have led to some flaws being ignored by the quarrymen.

3.3.7 Transportation from quarry to place of use is not well understood. Tucker states that '*there is little doubt that in some areas the millstones were merely rolled down the slopes to a river below, probably with a horizontal pole through the eye-hole to enable some steering and control to be obtained*' (Tucker 1987, 171). In support of this suggestion Tucker cites the deep gully paths at Penallt quarries and the damaged millstones lying at the bottom of the slopes, but then acknowledges that the wastage incurred by this method is likely to have been generally unacceptable.

3.3.8 Four-wheeled carts were certainly used in some areas. An engraving of Duxon Hill quarry, Lancashire, in the 1830s (Tucker 1987, 178), shows that stones were raised on shearlegs and laid flat for transport on a simple flat-bed horse-drawn wagon. Carts used at Anglesey carried the millstone vertically between upright frames secured by a pole though the eye. Tucker suggests that a combination of both methods was employed and it is also likely that in some situations sledges were used (*ibid*).

4. MILLSTONES AND MILLSTONE QUARRYING IN NORTHUMBERLAND

4.1 MILLSTONES

4.1.1 Local stone for millstone quarrying was carefully chosen to be relatively free of natural flaws to minimise wastage in quarrying and breakage in use. The rock also needed to be hard, with sufficient texture to cut and grind without rapidly wearing smooth. The ideal material was Millstone grit, with small quartz pebbles up to 10mm across or sandstone/quartz conglomerate with large pebbles (puddingstone).

4.1.2 In Northumberland, however, the Fell sandstones, which have tabular surfaces advantageous for millstone extraction, were exploited. Outcrops like Harbottle Hill consist of coarse-grained sandstones in layers of current bedding, while those in Redesdale are finer. These qualities may have influenced the choice of quarry site and the scale of extraction.

4.1.3 Whilst such stones were good enough to meet the everyday needs of rural milling, there was also a market for high-quality imported Continental millstones. The most frequently encountered import from the middle ages onwards was the French 'burr' - made from a hard open-grained sandstone from the Paris basin. A variation was the 'dove-tail' burr. Millstones of comparable quality to the French 'burrs' were quarried at Penallt, Monmouthshire. So-called 'Blue stones', popular in eighteenth / nineteenth centuries, were normally 'Cullin' (Cologne) millstones from the Mayen area of the Rhineland. An example of a 'blue stone' can be seen at Grasslees Mill.

4.2 MILLSTONE QUARRYING

4.2.1 Besides Harbottle Crags, at least forty-one millstone quarries are known to exist in Northumberland (Jobey 1986). The earliest references to local exploitation for local needs - grants by lords of manors to their tenants to win millstones - are from the thirteenth to fourteenth century, though even as early as 1296 millstones were being transported from quarries near Slaley to the liberty of Tynemouth (Jobey 1986, 75). Quarrying continued during the centuries of the Border troubles, and in the sixteenth century rental values for millstone quarries on the Earl of Northumberland's estates varied from 2/- p.a. (Lyham Hill, 1563, 1586) to 13/4d. p.a. (Bearll, Bywell, 1525-6). The number of millstone quarries declined in the eighteenth century as imported and finer quality stones became available.

4.2.2 Little evidence for the economics of millstone quarrying in Northumberland survives, and nothing appears to be known before the nineteenth century, which is after the period at which the Harbottle Hill quarry is thought to have been active.

4.2.3 In the period 1842-7 millstones from Brockholm Quarry (probably that at Watch Law on Broomhouse Common) were sold at 12/- irrespective of size, the main market being in Scotland. Output averaged *c*20 millstones per year, though there were actual variations of between 11 and 30. If identification with Watch Law is correct, these were monolithic (ie formed a single piece of stone as opposed to being segmental) stones 3' - 5' 3" diameter (0.91m - 1.60m) and between 6" and 12" thick. Prices varied according to diameter: a 3' (0.91m) stone costing £3.0.0 and a 5' 6" (1.68m) stone costing £8.0.0 (Linsley 1990, 180). In 1858 at Collier Law (Co. Durham) prices ranged from £8 - £11 per pair. The cost of production is unknown, and it is not clear whether the seemingly high sale value can be considered an indicator of a profitable industry.

4.2.4 Harbottle Hill was not the only millstone quarry serving the Redesdale and upper Coquetdale area - other extraction sites have been noted at Long Crag and Barrow Hill, some ¾ -1 ¼ of a mile respectively to the west. These might have been the source of a single unworked roughout found at Ridlees Farm.

4.2.5 In 1663 there were as many as twelve mills operating in Redesdale (Hodgson, 84). By 1825 only three - Elsdon, Grasslees and Linbriggs - were still in use. The decline in local milling can be linked with the decline in agriculture in the area. Hodgson saw this as a consequence of '*climatic instability, proximity to fine corn lands of Scotland and a turnpike running through it are reasons for decline in agriculture in Redesdale. Meal and flour can be brought in from outside at a lower price than locally produced'* (*ibid*, 83-4).

5. HARBOTTLE HILL DOCUMENTARY STUDY

5.1 HISTORICAL BACKGROUND

5.1.1 The sandstones of the Redesdale area were considered suitable for production of coarse millstones for grinding corn. At Harbottle Crags the pebbly grit of 'Millstone Edge' on the steep south and west facing slopes above the Lough was quarried for millstones and hone stones for sharpening sythes (NCH, XV, 8). As well as close-set surface extraction voids there are a number of deeper quarries, some with faces over 2m deep, where the strata has been worked back; vertical extraction increased intensity of production.

5.1.2 Jobey states, without citing any specific reference, that the Harbottle Hill quarry was working at least as early as the sixteenth century (Jobey 1986; site 19). This inference may however be validly drawn from the first known documentary reference in 1604, at which date the quarry was evidently a '*going concern*'. One mill is known to have existed in the area before the seventeenth century - at Holystone in 1539 (NCH, XV 469), and it is reasonable to suggest that this, if not others, was supplied with millstones from Harbottle Hill.

5.1.3 The 1604 Survey of Debatable and Border Lands refers to Harbottle Cragg as demesne land. It was held by one Persivall Potte, together with *'The digginge of mylstones on Harbotle Cragg'* (Sanderson 1891, 105). The Survey refers to *'Ther is a Quarrie of Millstones'* held by one tenant at the rent of 3/4d, and having a yearly value of £10, and that the tenant of the '*Quarrie of Myllstones*' claimed to hold it by custom, though the Commissioners did not consider this valid (*ibid,* 111).

5.1.4 Two 'Percival Potts' are listed in the 1604 Survey under Holystone parish. Although the tenant of the millstone quarry is sometimes identified as *'Percevall Pott of Yardhope',* it is more likely that this was the Persivall Pott, listed as a customary tenant in *'Hollistones'*, holding one house and one acre of arable land at a rent of £2.4.0d. p.a. *'and one mill'* (Sanderson 1891, 93).

5.1.5 Harbottle Crag is the only millstone quarry mentioned in the 1604 survey, suggesting that it was the closest to the former Border. In the absence of comparable sites no meaningful assessment of the productivity implied by the 1604 annual value can be made. It is however in the upper range of sixteenth century Percy estate rentals (Jobey 1986, 75-79).

5.1.6 On the 12 January 1614 Lord Howard of Walden was granted the manor of Redesdale including *'certain demain lands in Harbottle; also all that our park of Harbottle, now or lately parcel of the foresaid manor of Cookedale, formerly in the tenure of sir Robert Bowes, knight, and Robert Collingwood, and by a particular thereof, of the annual value of 53s. 4d.: all that our mill of Harbottle, of the annual value of 66s. 8d…'* (Hodgson 1827, 2, 78 note b)**.** As part of his seigneurial rights Howard was also possessed of the minerals - including quarries - underlying his estate.

5.1.7 Harbottle Crag was held by Percevall Pott again in 1618:- *Fee farmes. HARBOTTLE CRAGGES: Percivall Pott for the ground called Harbottle Cragge, at the feast of St. Luke the Evangelist*, 3s. 4d. (Hodgson 1832, 337).

5.1.8 No mention of the Harbottle Crag millstone quarry has been found in the Howard estate papers, which in any case show a marked lack of documentation for the upland Northumberland estates. If, as must be assumed, the Howards were exploiting the Harbottle Crag site as part of their manorial income, some reference would be

expected. The absence of any such reference is all the more curious since the Naworth Castle Household Books of Lord William Howard record the receipt in 1633 of £10 per annum rent from a *'milne-stone quarrie'* on Penrith Fell (SS 68, 285).

5.1.9 In 1637 Theophilius Lord Howard conveyed the rectory and church or Holystone to John Sanderson of Healy and Andrew Rutherford of Harbottle, who in 1639/40 and 1642 conveyed much of the estate to William Selby of Biddlestone (Dixon 1903, 245).

5.1.10 In 1651 a rental of the *'Manner de Ridsdall'* lists *'Harbotle Craige'* as being worth the yearly rent of 3/4d. and occupied by *'Micheall Potts'* (NRO ZAN B25/VI/34). Since the rental value is the same as that given for the quarry in 1604 and 1618 it is assumed that this refers to the quarry rather than the farm, and that no attempt was being made to exploit the rents.

5.1.11 In the second half of the seventeenth century there were perhaps fifteen water corn mills operating in Redesdale and Coquetdale, at least three of which - Harbottle (possibly the same as Holystone), Linbriggs (possibly the same as Barrow) and Harehaugh - are near enough to have been supplied with stones from Harbottle Crag (Figure 8 and *Appendix 4*).

5.1.12 By 1717 the Manor had descended to Thomas Selby, described as being of the City of York, Esq. A noted catholic, Selby's estate was forfeited following the 1715 Jacobite Rebellion and in an account of the estate in 1717 the site was referred to as *'A quarry or crag, called the Millstone-crag, in my own possession.'* (Surtees Society 131, 1918, 34). The water-corn mill at Holystone was also a Selby possession (Hodgson 1908, 125), reinforcing the earlier suggested link with the quarry (*Paragraph 5.1.2*).

5.1.13 The quarry was evidently being worked in 1769 (Wallis 1769, 60), but there is no indication of the existence of a quarry on any published eighteenth century county mapping. This is hardly surprising given the small scale of such plans, which even omit so prominent a feature as the Drake Stone, which was first marked on Armstrong's map (1769) (Figure 3). It is thought that by the eighteenth century the Harbottle Crag quarry was supplying many of the mills in Coquetdale, if not further afield, particularly with stones for processing barley; Harbottle Crag millstones are recorded as being used in mills at Holystone, Barrow and Netherton. Production at Harbottle seems to have ceased about the beginning of the nineteenth century (BNC 1887).

5.1.14 When the Enclosure of Harbottle Common was first proposed in 1806 Harbottle Craggs, containing an estimated 28 acres, together with the *'Quarries and Mines of Stone within and under the same'* were the property of Thomas Selby Esq., presumably of Biddlestone. Confusingly the Act also states that the Duke of Northumberland as *'Lord of the Barony or Manor of Ridsdale'* is seized of *'mines, minerals, quarries and royalties within and under the said Common, moor or waste'*. The late appearance of Selby ownership suggests that at this date the quarry was not considered part of the demesne lands of Harbottle Castle since the Castle and manor had been purchased by Luke Clennell in June 1731 (Welford 1895, 589).

5.1.15 The Act of Enclosure seems to have provoked long-running boundary disputes lasting for at least the next twelve years. Between 1806 and *c*1811, when a plan of Allotments on the common was prepared (ZAN BELL 60/1) (Figure 3), the *'Millstone Craggs'* passed into the possession of Thomas Clennell Esq. as part of Harbottle Mansion House Estate. On this plan the crags are shown enclosed with a boundary marked by *'stones'* and stakes. Within the enclosed area, which broadly corresponds to present boundaries, two *'large stones'* are shown and one other *'stone'*. There is a separate valuation which gives the enclosed area of the crags as 20.650 acres. On the plan of

the Common as finally divided (NRO QRA 32/1) (Figure 4) the quarry area is described as *'Harbottle Millstone Crags'*. It is possible that use of the quarry lapsed with the transfer of ownership of the crags. The last of the Selby estate in Holystone, the mill and other property, was conveyed to Percival Fenwick Clennell of Harbottle Castle by the Selby trustees in 1876 (Hodgson 1908, 125).

5.1.16 By the end of the nineteenth century the millstone quarry was fading from memory: *'A number of large round blocks of sandstone is to be seen lying about on the top of the hill; these are rejected mill-stones, which puzzle strangers very much as to their origin'* (Dixon 1903, 196). Dixon recounts a local tradition that there was once a plan to drain the Lough, abandoned when the workmen fled on hearing a voice saying *' Let alone, let alone, or I'll drown, The Peels, Harbottle, and bonny Holystone'*. It is possible that there is an association between this improbable legend and the activities of the millstone quarryers.

5.1.17 In 1986 Jobey reported on the evidence for millstone quarrying along the whole of the slope above the north shore of Harbottle Lough, extending into the M.o.D area, and less extensively on the slopes above the east shore, just north-west of the Drake Stone. Scythe sand and hone stones were also said to have been obtained from the same area (NCH 1940, IX, 8). At this date much of the quarry was still covered with dense heather, but Jobey noted *'There are many extraction channels and hollows, deeper quarry faces, and over sixty whole, broken, or attached millstones scattered over the area, most of them measuring 4'7" to 5' d. (1.4-1.5m). Hollowed ways, probably sledge-tracks, lead down the steep slopes towards Harbottle.*' *(Jobey 1986, 76-7).*

6. THE MILLSTONE QUARRY SURVEY

6.1 THE QUARRY

6.1.1 This section is based upon LUAU survey data and site visits by John Nolan. The survey covered three areas defined in the project brief (*Appendix 1*), referred to in the following section of the report as areas A-C:

Area A - the 'Main Survey Area' of known extraction activity

Area B - 'Additional Field Walking Area' to the east

Area C - an 'Additional Field Walking Area' to the west

6.1.2 Evidence of millstone extraction was found in both Areas B and C, the greatest concentration being in the latter. Another area of intensive working, the extents of which are masked by deep heather, lies just beyond the extreme western boundary of Area C, some 60m west of Site 251 (approximately NGR NT 9121 0430). This area was not covered by the survey but the area is shown in Fig 2.

6.1.3 The quarry exploited exposed bedrock and apparently at least one 'daystone' (Site No. 128). It has been suggested (Middleton nd, 1) that the quarry was worked 'progressively' from east to west, since the most suitable rock is nearer to the surface at the eastern end making extraction easier, and it may be assumed that the best, most accessible and most visible stone would be worked first. Whilst this may have been the case on the main areas of working (Survey Areas A and B) it cannot be convincingly demonstrated, for example by changes in millstone size or extraction methodology. Moreover it does not take into account the isolated extractions to the south-east, from what appear now to be difficult to work outcrops near the Drake Stone in Area C.

6.1.4 The Harbottle Hill quarry products, represented by unfinished, broken or abandoned millstones, ranged in diameter from under 1m (e.g Site 152A) to a maximum of 2.5m (e.g Site 120A), though the majority of the stones for which dimensions were recorded were between 1.3 and 1.4m in diameter. The average size was smaller than at Glantlees, where many stones were in excess of 2m across. No evidence was found for the production of hone stones as stated in several sources. Hones are known to have been produced at some small millstone quarries elsewhere in the country and may have been a by-product using quarry waste. If this was the case at Harbottle Hill their manufacture need not have left any identifiable traces.

6.1.5 ***Working Methods:*** the circle groove defined during the initial working (Section 3.1.1) became the inner edge of a channel, varying between 82mm and 165mm wide, which was cut down into the rock as far as the required depth of the stone, usually 0.3m (Figure 6b). This was cut with nearly vertical sides until close to the bottom where there was a degree of undercutting of the inner face. Apart from the grooves left by cutting-out the channel, there is no other evidence for the actual form of tool used at Harbottle. Pieces of quarry waste and even abandoned roughouts, scored with deep, narrow V-shaped grooves from sharpening tools were noted in the course of the survey (e.g Sites 9, 11, 19 and 145). These are clearly associated with the extraction industry, though it is not clear from the grooves what type of implements - picks or chisels - were being sharpened.

6.1.6 With the channel completed, the critical process of separating and lifting the 'blank' or roughed-out stone from its bed began. The methodology adopted varied slightly depending upon the situation of the stone; where it lay in an extraction hollow the

stone had to be raised vertically, whereas once a quarry face had been established, however, stones could be separated sidewards. In many cases extraction hollows show approximately four wedge or pinch-bar slots. The use of wooden wedges, soaked in water to cause them to swell and shear the millstone from its bed, is attested elsewhere. It is difficult, however, to understand from the evidence of the slots at Harbottle Hill how such wedges would have been employed, though there would have been an ample supply of water readily available in the Lough. The quarryers at Harbottle used no more than four sockets per stone; at Glantlees some extraction voids show seven sockets and elsewhere as many as eight have been noted.

6.1.7 At Harbottle Hill the sockets are wide, and slope down from the rock surface to the bed of the extraction channel (Figure 6c). Apart from slight undercutting at the base of the channel, the edge of the rough-out millstone was vertical and there are no slots into which a wooden wedge could be inserted to exert pressure. It is thus suggested that pinch-bars (or goat's-foot levers) were used instead and that concerted leverage, equally applied by a minimum of four quarrymen and almost certainly assisted by hammering on the end of the pinch-bars - would be sufficient to shear the stone evenly from the rock matrix. Unequally applied pressure, either from bars of wedges, may account for some of the fractured stones.

6.1.8 In deep extraction pits and quarries once separation was achieved successfully the rough-out was raised from the rock bed by a combination of levers (possibly the same pinch bars as were used to shear the stone) and the use of chocks - which were simply fragments of quarrying waste (Figure 6d). Where stones were won from an established quarry face as much as half the circumference might be cut free-standing. In these cases pinch-bar sockets were only needed where the stone was still completely rock-fast, and it may be suspected that horizontal chiselling was applied to the exposed side to shear the stone from its bed and the parted millstone would then be moved sideways.

6.1.9 Discrete voids left by millstone extraction ranged from 1m across to 4m across, the majority being between 1.5m and 3m diameter and the most frequent being 2m. Allowing for the extraction channel these probably represent stones of 1.3-1.4m diameter. Because of the additional rock removal needed to form the extraction channel and, it may be suspected, sometimes also to reach suitable quarrying stone, the size of void cannot be taken as an accurate indicator of the size of the millstone which has been extracted.

6.1.10 Where recorded, the millstone 'eyes' are all circular and most frequently 0.16m in diameter. The radius of the eye was taken from the centre-pop, and the hole cut approximately half-way through the stone before the entire millstone was turned over and cutting began again from the other side (Figure 6d). The clean, straight sides of completed eyes suggest use of a reamer rather than simply chiselling, at least in the final finishing. Cutting the eye created a point of weakness - exacerbated by the need to reverse the stone to complete the cut - and inherent flaws could lead to fracture at this late stage of production (e.g. Site 148A).

6.1.11 The absence of squared eye-holes, needed for the lower or 'bedstone' of a mill, is notable. Since it seems an unlikely degree of specialisation that the quarry only produced 'bedstones', it seems reasonable to suppose that the basic product was cut to the pattern of a top or 'runner' stone and that the eye was subsequently enlarged and squared if a 'bedstone' was required. The absence of square-cut eyes in the visible quarry wasters seems to indicate that this adaptation took place off-site, possibly at the mill.

6.1.12 After cutting the eye, stones which had survived the extraction process were smooth-dressed on their working faces with short, narrow, chisel or pick tooling (e.g. Sites. 156A, 185). This would appear to represent the final stage of on-site manufacture prior to transportation to the purchaser.

6.1.13 ***Structures:*** within Survey Area A are three insubstantial single-celled dry-stone structures, constructed of millstone quarrying waste in old quarry pits (Sites 23, 42 and 147). Site 23 measured 2m x 2m internally and had a south-east facing entrance; Site 42, measured internally 2.4m x 1m and has an east facing entrance, and Site No. 147 which also has an eastern entrance, measures 2m x 3.5m. Similar buildings in other quarries have been referred to as 'worker's shelters' or tool stores. The parallel is assumed to be valid, though at Harbottle Hill there is no positive evidence beyond their situation, construction material, and the possibly fortuitous presence of a sharpening stone outside the entrance of Site 147, to positively link them with the millstone industry.

6.1.14 Short sections of drystone revetments or low walls, apparently built of quarry waste, were noted in the survey (e.g. Site 9 and 142). The date and function of these is unknown, and they may post-date quarry usage. Within Area C, and close to an area of extraction hollows, a short length of dry-stone rubble wall (Site 251) was interpreted in the survey as a grouse butt, though this feature and low linear arrangements of small to medium stone rubble in the vicinity may be associated with the MoD usage.

6.1.15 Two possible quarrymen's marks were noted during the survey. The letters 'RD' are deeply cut into a shelf of sandstone close to Site 106, and an abandoned roughout (Site 52) completed with the eye, has deeply incised 'II' on its upper surface. The style of lettering in both cases could be eighteenth century.

6.1.16 ***Communications:*** a number of north-south hollow ways or trackways *c*3-4m wide cross the southern slopes of the millstone quarry ridge, apparently leading to the Drake Stone foot road (Figure 7) were observed. It is likely that these were routes used for leading millstones off the quarry area. The extant remains give no evidence for the actual method of transport involved, but with millstones weighing perhaps 4cwt (198kg) the peaty, broken and rock-strewn state of the ground would argue against the use of sledges.

6.1.17 Transportation to customers in Redesdale, Coquetdale can be conjectured as having made use of the 'Drake-Stone Foot Road' which ran from just west of Harbottle village, along the northern edge of Harbottle Lough and continued almost due westwards (Figure 7). The ground which the road crossed appears now to be impossibly stony and broken - particularly the section between the quarry and Harbottle - with frequent deep moss and peat pools. It is of course impossible to judge how much this has degenerated in the 200 years since the quarry presumably ceased operating.

6.1.18 The course of the foot road is approximately followed by the present footpath. Earlier sections of this route are represented by two deep hollow ways on the east side of the Millstone Crags, one lined with high banks of rubble perhaps from cutting the track, which debouch onto the almost level ground beside the Lough. On the western side of the Lough the road continues, with two more well constructed hollow-ways forming inclines which cut escarpment ridges. Both sections of hollow-way are stone-revetted along their sides and some 4m wide. Near the beginning of the easternmost incline and some 50m from the nearest extraction hollows are fragments of two millstone roughouts (Site 172), suggesting casualties in the early stages of transportation.

6.1.19 The labour of cutting such hollow-ways would have been unnecessary had the 'foot road' only been carrying foot or packhorse transport. Their presence suggests deliberate engineering to provide a graded trackway for wheeled vehicles and strongly argues a direct association with the millstone quarry.

6.1.20 Aerial photographic coverage of the Harbottle Hills site also show numerous braided track-ways leading up from (or down to) the Fair Field of Harbottle and skirting the north-eastern part of the site (CPE/SCOT/319 frame 3195). Other braided trackways lead off to the west, apparently crossing the line of the later coal road to Wilkwood, possibly heading for the drove road leading from Elsdon Gate to Gamel's Path. More trackways climb the escarpment to the south, perhaps leading to the Cock Law-Holystone road.

6.1.21 ***Boundary markers:*** the indication of 'stones' on the Millstone Crags, marked on early nineteenth century plans of Harbottle Common and in some cases acting as boundary markers, was at first thought to indicate formal boundary stones. Nothing was located at any of the recorded sites during the fieldwalking, and it is likely that these references were to distinctive, large natural boulders.

7. DISCUSSION

7.1 DATING THE QUARRY WORKINGS

7.1.1 There is no evidence in the physical remains which can be used to independently date the quarry working, nor can it be convincingly demonstrated from the extant remains that millstone working has progressed across the crag over time. It may be presumed that the best stone would be worked first, and that working would begin nearest to the place of use, suggesting that the easterly extraction remains are the earliest. However even as early as *c*1604 the quarry might have been serving a wider market than Holystone and the immediate environs of Upper Coquetdale, and that random working of the most suitable outcrops across the whole site may have been underway from the beginning of exploitation. The documentary evidence seems to confirm the view that the quarry was out of use by the early nineteenth century.

7.1.2 It was hoped that a distribution of differing sizes of millstone rough-outs would also assist dating and phasing of quarry usage, but the survey has not shown spatially significant patterns in the recorded dimensions. The largest number of roughouts were between 1.3 -1.4m in diameter, a size found commonly in other quarries spanning a wide range of working dates. This may simply mean that in all recorded quarries the surviving abandoned roughouts and waste represent the most recent usage, and that evidence of earlier workings has been blurred or overlain.

7.2 SCALE OF THE WORKINGS

7.2.1 The survey recorded 137 millstones, discarded or unfinished millstones and at least 476 voids or quarry pits; this can only be taken as a partial record of the total working remains since much evidence is obscured by heather or buried within rubble-choked, flooded and overgrown quarries and voids. It is however clear that there is a marked contrast in the overall density of extraction between Harbottle Hill and other recorded quarries. At Glantlees millstones were extracted from readily accessible exposures, and the small number of wasters may either be indicators of rigorous quality control at source and/or a generally low level of extraction. A similar pattern is apparent at Beanley Moor. Quarries of this size and density of extraction suggest a more leisurely pace of working and an even more parochial market than that suspected for Harbottle Hill, or perhaps a shorter time-depth of use.

7.3 TRANSPORTATION FROM SITE

7.3.1 The mechanics of moving completed millstones from the quarry area is not interpretable from the field evidence. It is also difficult to avoid assessing the problem of transportation from the viewpoint of a modern perception of the landscape, in which Harbottle village is the nearest and largest settlement, served by a well-made road along the Coquet valley and thus apparently an obvious immediate destination for the products of the nearby millstone industry. The distribution evidence for Harbottle Hill products (Figure 8) suggests that whilst the needs of Coquetdale and adjoining parts of Northumberland to the north and east were almost certainly served by transport this way, customers at Grasslees Mill and Redesdale would have been supplied by other routes. The cost of land carriage along the valley floor to such sites would have been prohibitive.

7.3.2 It is unlikely that sledges would have been robust enough or practicable for moving the weight of stone any distance along such roads; waggons are more likely, though the route down to Harbottle must always have been steep and rocky, with abrupt breaks of slope. For outlets in Redesdale and beyond transporting stones down to Harbottle would have involved unnecessary additional cartage along the Grasslees valley. It is more likely that the foot road to the west was, at the time when the quarry functioned, maintained and usable by wheeled transport, and provided direct communication with the upper parts of Redesdale and beyond. The trackways leading south, probably heading for the Cock Law-Holystone road, may have been the route taken by stones going to Grasslees mill.

8. RECOMMENDATIONS

8.1 FURTHER RECORDING

8.1.1 Because of the paucity of available documentary sources relating to the Harbottle Hill site and comparative data from other local millstone quarries, the survey does not significantly contribute to a better understanding of the chronology of the millstone industry in Northumberland. More comparative fieldwork is needed, particularly on a millstone quarries which can be more closely dated by documentary evidence, in order to establish if particular tooling marks or extraction techniques can be assigned to particular periods. However, since millstone quarrying on a local level is a relatively low technology industry it may be suspected that techniques, and therefore the physical evidence for extraction, changed little if at all over time.

8.2 INTERPRETATIVE THEMES AND EDUCATION

8.2.1 In accordance with Section 4 of the Project Brief, a number of themes for educational projects and interpretation emerge from the Harbottle Crags millstone quarry survey. These are summarised below:-

- local exploitation of natural resources.
- manorial customs - local mills were owned by the lord of the manor as were the mineral resources e.g quarries for millstones.
- costs of land transport and distribution of products - were 'local' markets really local?
- communication - transport routes across now empty landscapes.
- food supply: culture and change at local and national level - the decline in local millstone production mirrors refinements in consumer taste and demand.
- levels of technology - some industries, such as millstone quarrying, have a low-technology requirement and did not evolve much over time in contrast to others.
- hidden pasts - how much about the millstone quarry was known? How much can archaeology through intensive fieldwalking and documentary research increase our awareness and knowledge of the past?
- concepts of 'industrial' landscapes - Millstone Crags does not appear now to be an post-industrial landscape, which it is.
- concepts of Border society; stability and strife - the millstone quarry was in existance by 1604 and, by extrapolation, was being worked prior to that date when popular concepts are that the Borders were savage, backward and driven by raiding and conflict. Does this popular image fit with the presence of an industrial concern serving the domestic needs of a possibly widespread community?

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9.2 UNPUBLISHED SOURCES

9.2.1 *Aerial photographs*:

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NCLLSS. Harbottle Lock (*sic*). Description and Views. Attractive watercolour dated 1866 showing Drake Stone and Lough from the west.

9.2.2 *Northumberland Records Office (NRO)*

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NRO QRA 32/1, Harbottle Common Award, 1817.

NRO DT 255 L, Tithe Award, Holystone, 1847. 4 chains = 1". Award 9 May 1848.

NRO ZAN Bell 59/17, Harbottle Common dispute re. lands of Thomas Clennel 1806, 1816-18. Not relevant - west of West Wood.

NRO ZAN Bell 60/1-11

NRO ZAN Bell 60/1, Valuation of Harbottle Common

NRO ZAN Bell 60/3, Plan of Harbottle Common as divided. Printed and coloured version of 60/23.

NRO ZAN Bell 60/19, are tracings and drafts of the Division/enclosure plan.

NRO ZAN Bell 60/23, Division of Harbottle Common. Ink on paper, watermarked WHATMAN 1811

NRO ZAN Bell 60/24, Owners of allotments on Harbottle Common, n.d. but related to enclosure.

NRO XAN B25/VI/106, Selby of Biddlestone

NRO 304 1-14, Selby of Biddlestone.

NRO 650 KZ, Abst of title to estate 1630

NRO 4702, pedigree, of Harbottle.

Plan of Harbottle Common in the Parish of Alwinton and County of Northumberland as divided and allotted 1817. William Bates and Edward Clint Commissioners and Thomas bell Surveyor.

9.3 PUBLISHED MAPS (IN CHRONOLOGICAL ORDER)

1695 Speed. - No relevant detail
1716 John Warburton. - No relevant detail
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1820 Fryer, J, Map of Northumberland (Marks Lough and road to north)
1827-8 Greenwood, Marks Harbottle Lough, Drake Stone, road to north, and indicates the area of crags.
1832 G and J Cary, Northumberland. Virtually same as Fryer.
1897 OS 25" 1897 2nd edition Sheet XLIII.1 and 2 Surveyed 1863 revised 1896.
1923 OS 25" 1923 3rd edition Sheet N XL 7 Surveyed 1862, revised 1921,
1925 OS 6" 1925 3rd edition Sheet N XL, NE and NW Harbottle

APPENDIX 1
PROJECT BRIEF

APPENDIX 2
PROJECT DESIGN

APPENDIX 3
MILLSTONE QUARRY SITES RECORDED IN NORTHUMBERLAND.

Sources: Wallis 1769; Charlton and Day 1982; Jobey 1986.

Location	***NGR***	***Stone diam.(m)***	***Earliest date***	***Source***
Amersidelaw Moor	NU 078 270			Jobey
Ashholme (near)	NY 6858 6958		1828	
Beanley Moor	NU 0918 1018	<1 - 1.43	14th C	Jobey
Bearl, Bywell	NZ 054 641		16th C	Jobey
Berryhull	NT 938 403			Jobey
Broom Ridge	NT 968 371	1.3		Jobey
Byrness Hill	NT 774 033			Charlton and Day 1982
Corbridge Fell	NY 985 624		14th C	Jobey
Corby's Crags	NU 128 102			Jobey
Crag Shield	NY 808 774			Jobey
Doddington North Moor	NT 994 359			Jobey
Fenton Plantation	NU 001 340			Jobey
Glantlees	NZ 127 054 (approx.)			Heslop
Gunnerton	NY 75 92		1886	Jobey
Harbottle Crags	NT 9160 0435	<1 - 2.5	1604	Sanderson
Harehope Hill	NU 087 205	1.2		Jobey
Hepburn Crag	NU 075 246	1.3		Jobey
Hunterheugh Crags	NU 117 168	1.35 - 4		Jobey
Jenny's Lantern	NU 120 151	1.2 - 1.5		Jobey
Kenton	NZ 222 678			
Little Mill Hill	NU 078 006	0.87 - 0.8	?1768	Jobey
Kyloe Wood	NU 045 383			Jobey
Lyham Hill	NU 075 310		1563	Jobey
Long Crag	NT 917 043			Charlton and Day 1977
Millstone Burn/Cleugh	NU 11 05		1539	Jobey
Millstone Crag	NY 68 92			Jobey
Millstone Edge	NY 862 902			Jobey
Millstone Hill, Chatton	NU 088 261		before 1808	Jobey
Millstone Hill/Minsteracres	NZ 020 540			Jobey
Millstone Plantation	NY 683 619		1769	Wallis
Mount Pleasant	NU 113 030	1.4		Jobey
Old Bewick	NU 073 216		1769	Wallis
Old Rothbury	NU 047 020	1.4		Jobey
Prudham	NY 885 688			
Peterstone Flow	NY 976 916	1.5		Jobey
Ridlees Farm	NT 845 059			Charlton and Day 1977
Rothbury East Mill (near)	NU 068 016		1769	Wallis
Slaley	NY 97 57		13th C	Jobey
Tecket	NY 86 72		1769	Wallis
Wydon Eals (near)	NY 683 619		1769	Wallis
Watch Hill, Broomhouses	NY 703 623	1.4-1.6	*c*1667-1840	Jobey
Watch Law/Brockholm	NY 703 618		1842	
Whitfield Lough (near)	NY 71655 7232543	1.4-1.5	1769	Wallis

APPENDIX 4
RECORDED WATER CORN MILLS IN REDESDALE AND COQUETDALE (Fig 7)

Sources: Dixon, 361; Charlton and Day 1982, 164-8.

* indicates reputed use of Harbottle Hill millstones

Site	**Earliest date**	**N.G.R**
Barrow*	1712	NT 9136 0632
Biddlestone	1717	
Birdhope (=Birdhopcraig)	1705	NY 8291 9900
Byrness	1687	NT 7718 0223
Caistron	1632	NU 0025 0115 approx.
Cant's Mill	1689	NY 9210 9292
Cartington		
Clennell's Mill	1726	unknown
Corsenside		
Cottonshope	1803	possibly same as Byrness
Cragg		
Davyshiel (Hopefoot)	1695	NY 8870 9493
Elishaw	1604	NY 8646 9511
Elsdon	1604	NY 9364 9375
Grasslees	1671	NY 9541 9791
Harbottle demesne (=Holystone?)	1604	unknown
Harehaugh	1604	NY 9751 9986
Hair Walls	1755	
Hatherwick	1755	unknown
Hole (=Cresswell Lees)	1698	NY 8985 8909
Holystone*	1539	NT 9548 0269
Kellyburn	1604	NY 84 95
Linbriggs (= Barrow?)	1663	unknown
Little Mill		
Netherton*		
Overacres	1742	NY 9140 9242
Smalbourne	1604	NY86 93
Snitter		
Thrum		
Trewhitt		
Todlaw (=Stobbs)	1748	NY 9528 9275
Tosson		
Troughend	1604	NY 8778 9290
Whiskershiel	1604	NY 9528 9275
Woodburn		

APPENDIX 5
FEATURE LIST

No	*Form*	*No. voids*	*Diam.*	*Thick.*	*Eye diam.*	*Comment*
1	hollowway					
2	hollowway					
3	millstone		0.75	0.4		eye not visible
4	void	2	1.25			
5	millstone		1.25	0.35		broken, eye not visible
6	voids	7				
7	void					
8	void	2	1			2-5m deep
9	structure					inc. sharpening stone
10	millstone		1.2	0.25		
11	voids	3				2 extraction phases in one
12	voids	7				
13	millstone		1.4	0.3	0.07	broken, check eye dims
14	voids	8				3 extraction phases
15	millstone		1.43	0.28		broken, no eye
16	millstone		1.35	0.26	0.17	broken
17	millstone		1.4	0.17		broken, no eye
18	voids	3				
19	voids	8	2.5			2 extraction phases
20	voids					
21	millstone		1.6	0.3	0.23	broken, completed. assoc with 22
22	voids	2				multi
23	structure					2x2m
24	voids	9+				multi
25	millstone		1.4	0.3		broken, eye not started
25a	millstone					in situ, just begun, no dims.
26	void	?				assoc with 25
26a	millstone					in situ, just begun, no dims.
27	quarry					
28	millstone		1.4	0.43	0.17	complete and parted
29	millstone		1.27	0.28	0.18	complete, eye formed
30	voids	2				extraction phases
31	voids	1				1.5m deep
32	millstone		1.45	0.3		center-pop, no eye, tooled edges, cracked
33	voids	7				2 extraction phases in one
34	quarry					
34a	millstone					buried, no dims. possible
34b	millstone		1.41			in situ, begun but not parted
34c	millstone					
35	quarry					
35a	millstone					broken, eye just begun
35b	millstone					
36	millstone		1.35	0.33	0.15	broken, eye not complete, bevelling upper edge
37	millstone		1.43	0.25	0.16	broken, eye fully formed
38	quarry					
39	quarry					
39a	millstone					no dims. recorded in survey
40	quarry/voids	2				one has 2 extraction phases
41	quarry/voids	6				
42	structure					no dims
43	quarry					

No	*Form*	*No. voids*	*Diam.*	*Thick.*	*Eye diam.*	*Comment*
44	quarry/voids	3				

44a	millstone		1.3	0.4		
45	quarry					no record
46	quarry					no record
47	quarry/voids					no record
48a	millstone		1.3	0.3		no eye
48b	millstone		1.3	0.25		no eye
49	voids	4				
49a	millstone					in situ, just begun
49b	millstone		1.4			no centre-pop visible
50	voids	13				3 extraction phases
51	quarry					
52	millstone		1.5	0.3	0.19	marked II
53	millstone		1.56	0.36	0.25	
54	voids	6				
55	void	1				0.5m deep
55a	millstone					
56	void	1				0.6m deep
57	quarry					
58	quarry					
58a	millstone		1.35	0.3	0.16	
58b	millstone					broken
58c	millstone			0.3		none no eye
59	quarry					
60	voids	2				
60a	millstone			0.3		broken
60b	millstone			0.3		broken
61	millstone		1.4	0.15	0.16	
62	quarry/voids	4				
63	millstone		1.4	0.2	0.16	broken with eye just begun
64	quarry	1				
64a	millstone		1.1	0.25		eye not visible
64b	millstone				?	in situ not parted
64c	millstone				?	fragment only
65	quarry/void	1				
66	quarry/void	1	2.5			75cm deep
67	quarry/void	1	1.5			20cm deep
67a	millstone				?	in situ
67b	millstone				?	in situ
68	voids	2	1.5			20cm deep
69	voids	2	2			1.25m deep
70	voids	2				
70a	millstone				?	in situ
71	void	3				75cm deep
72	quarry					
72a	millstone		1.45	0.3		in situ, no eye visible
72b	millstone					in situ
72c	millstone					fragment only
73	void	1	1.5			30cm deep
74	voids	2	2			1m deep
75	quarry	1				
76	quarry/voids	2				
76a	millstone				?	in situ
76b	millstone				?	fragment
77	void	1	2			1m deep
78	void	1	4			75cm deep

No	*Form*	*No. voids*	*Diam.*	*Thick.*	*Eye diam.*	*Comment*
79	void	1	2			
80	voids					
81	voids					
82	void	1				

82a	millstone					
83	voids	5+				70cm deep, 5 extraction phases
84	voids	5+				1.5m deep
84a	millstone		1.6	0.37		in situ, nearly formed
84b	millstone		1.3	0.25		in situ, no eye, half-formed
84c	millstone		1.4	0.3		no eye
84d	millstone		1.4	0.16		no eye, ex-situ
85	quarry	1				
86	quarry/voids	2				
86a	millstone		1.5			
87	voids	4+				
88	voids	4				25cm deep
89	quarry/voids					0.4 deep Multi extractions
89a	millstone		1.3			no eye note, poss form void in 89
90	void	1	2			25cm deep
91	voids	3	1.6			25cm deep
92	voids	2				
93	void	1	2.3			40cm deep
94	quarry	1				
94a	millstone		1.4	0.36	0.16	eye half cut, broken in turning to cut other half
94b	millstone		1.5	0.31	0.19	broken
95	quarry/voids	4+				
96	quarry	1				
97	quarry/voids	5+				
97a	millstone					buried and overgrown
97b	millstone					buried and overgrown
97c	millstone					buried and overgrown
98	quarry/voids	3+				2 extraction phases
99	quarry					75cm deep
99a	millstone					fragment only
99b	millstone					in situ
100	quarry/voids	5+				2 extraction phases
100a	millstone		1.3	0.32		in situ, no eye
100b	millstone					broken
100c	millstone		0.4			fragment/flake
101	quarry	11+				4 phases of extraction
102	millstone		1.3	0.23	0.13	eye started; diagonal tooling
103	quarry	2+				
104	quarry	6+				pinchbar socket
104a	millstone			0.27		two frags poss same stone, no eye or centre-pop
105	quarry	7+				
106	quarry	7+	2.5			
107	quarry	3+				initials 'R D' associated
108	millstone		1.2	0.35		sub-round
109	quarry	2+				
110	quarry	2+				
110a	millstone		1.3	0.36	0.06	cracking, eye was cut from both sides, underside dressed, upper begun
110b	millstone					heather covered
111	millstone		1.3	0.3	0.16	Broken before/while eye completed;
112	void					
113	voids	2				

No	*Form*	*No. voids*	*Diam.*	*Thick.*	*Eye diam.*	*Comment*
114	voids	3				
115	voids	2				
116	millstone		1.4	0.27		none
117	void		1.8			pinchbar socket 16cm wide
118	voids	2	1.8	0.25		
119	quarry					1m deep
120	voids	5	1.8			60cm deep

120a	millstone		2.5			in situ ?
121	void	1	1.8	0.3		
121a	void	1	1.7	0.3		single pinchbar socket
122	quarry/voids	3	1.8	1.75		
123	millstone		1.35	0.4		broken
124	quarry/voids	2		1		
125	voids	2+				
126	voids	2	1.8	0.2		poss 4 pinchbar sockets
127	voids	4				(3 blanks)
127a	millstone		1.45			in situ, no centre-pop, pinch-bar sockets formed
127b	millstone					in situ, half formed
127c	millstone					in situ, half formed
128	millstone		1.3	0.3		no centre-pop visible, poss a 'daystone'
129	voids	1+				'cup-marked' stone
130	voids	2				40cm deep
131	void					
131a	millstone		1.3	1		assoc with void 131
132	quarry/voids	2+	4	1		
133	millstone		1.3	0.35		
134	quarry			1.5		
135	voids	2+				
135a	millstone		1.3	0.25	0.16	
136	void	1	3.5			60cm deep
137	voids	2	2	0.7		
138	voids	4	2	0.6		
139	void	1	1.5	4		
139a	millstone		1.4	0.3		assoc with 139
140	quarry	5+				
140a	millstone		1.48	0.22	0.15	called QS on sheet, eye cut, overlies 140B
140b	millstone					under 140A, can't measure
141	voids	2	2.5	0.3		
142	structure					plinth, drystone 1.2X.6x.3m. Purpose unknown
143	void	1				
144	Pit/voids	3				2.5m deep, 3 extractions
145	quarry	8+				Sharpening stone on edge
145a	millstone				?	in 145 possibly not a millstone
145b	millstone		0.9			fragment
146a	millstone		1.1	0.3	0.20	damaged. Eye cut
146b	millstone		1.45	0.14	0.16	damaged. Eye cut
147	structure					2x3.5m drystone shelter? Sharpening st. outside
148	voids	2				assoc with 148A
148a	millstone		1.3	0.3	0.16	like 110A
149	voids	2+				2m deep. Worked before 151?
150	voids	1+				1.2m deep
150a	millstone		1.1	0.35		
151	spoilmound					
152	voids	1	1			extraction phase
152a	millstone		1	0.25		
153	structure					drystone, curved, 2.5 long
154	void	1	2.5			0.5m deep

No	*Form*	*No. voids*	*Diam.*	*Thick.*	*Eye diam.*	*Comment*
155	millstone		1.3	0.3	?	broken, poss extraction void 155 to N, no eye, no centre-pop
155a	void	1				poss from 155
156	quarry/voids	2+				
156a	millstone		1.3	0.25	0.19	surface closely cross-pecked, edges cut to 8cm then abandoned
157	quarry/voids	1+				
158	voids	5+				1m deep
159	quarry					1.4m deep
160	voids	3				1.5 deep

161	voids	2+				
161a	structure					drystone. windbreak/hide?
162	void	1				
163	voids	3+				2 extraction phase
164	voids	3				1.6m deep, poss 3 extraction phases
164a	millstone					unfinished 'blank' in situ, centre-pop 2cm
165	millstone		1.3	0.2		unfinished, no eye, centre-pop, in extraction hollow
166	void	1				
166a	millstone		0.9	0.15		
167	quarry/voids	2				
167a	millstone		1.1	0.2		
168	voids	3			?	2 extraction phase
169	millstone		1.4	0.2	?	broken. Eye formed
170	quarry					1.3 deep
171	quarry	3+				1.1m deep
172a	millstone(s)		1.45			half only
172b	millstone		1.25	0.25	0.13	half only
173	quarry/void		3.5			1m deep. Multi extractions
174	quarry	2+				
174a	millstone		1.4			in situ not parted, unfinished
174b	millstone		1.3			in situ not parted, unfinished, peat-covered
174c	structure					drystone wall on edge of quarry
175	quarry/voids	3+				
175a	millstone				?	in-situ, no centre-pop, not parted, unfinished
175b	millstone		1.3	0.3		none broken, eye not formed, peat-covered
176	quarry/voids	3+				
177	quarry/voids	5+				
177a	millstone		1.3	0.32	0.16	Eye formed, bevelled, no face tooling
178	quarry/voids	4+				
178a	millstone					in situ, not parted, unfinished
178a	millstone					in situ, not parted, unfinished
179	voids	3+				
180	voids	3				
181	quarry/voids	3+				
182	quarry/voids	2				
183	quarry/voids	3+				spoilbanks on both sides
184	quarry	2				
185	void	1				
185a	millstone		1.2	0.23	0.16	broken
186	void	1	2			0.2m deep. 1 extraction
187	void	3				one extraction
188	voids	2				
189	void	1	2.5			0.4m deep
190	quarry	1				
191	quarry	1				
192	millstone		1.4	0.32	0.17	
192a	millstone		0.74			in situ, not parted, unfinished poss. not a millstone
193	quarry	1				
No	*Form*	*No. voids*	*Diam.*	*Thick.*	*Eye diam.*	*Comment*
193a	millstone		1.2			in situ
193b	millstone					in situ
194	voids	2+				
194a	millstone		1.36			in situ, not parted, centre-pop
195	voids	2				
196	voids	2				
197	voids	3				
198	void	1	3			
199	voids	2+				
200	voids	2				
201	voids	2				
202	voids	3				
203	quarry/void	1	2	0.4		

204	void	1	2.3	0.6		
205	voids	3				1 phase of extraction, assoc with 205A, pinchbar
205a	millstone		1			in situ assoc with 205, buried
206	voids	2	2.4			50cm deep
207	voids	3				
207	voids	2	2			50cm deep
208	quarry/voids	6+				
208a	millstone		1.3	0.28		centre-pop, no face tooling
208b	millstone		1.14		0.16	broken in half, eye cut
209	quarry					
209a	millstone		1.48	0.2		centre-pop, parted then abandoned
209b	millstone		1.2			in situ not parted
210	quarry					
210a	quarry					
210b	millstone					broken half
211	quarry					
212	void	1	1.5			
213	void	1				
214	quarry?	1				
214a	millstone					broken
215	quarry	1				
215a	millstone					in situ not parted
216	void	1	2			0.7m deep
217	quarry	1				
217a	millstone					in situ not parted
218	quarries	2+				pinchbar sockets
219	void	3				
220	quarry/voids	3				
221	quarry/voids	3				
222	void	1	1.5			30cm deep
223	quarry	3+				extraction moves to north
224	millstone		1.3	0.35		chocked, no eye, very rough
225	quarry	2				
226	quarry	3				
227	void	1	2			
228	void	1	2			
229	quarry	2				
229a	millstone		1.4			in situ, no eye or pop visible, not parted – paired working
229b	millstone		1.3			in situ, centre-pop, not parted - paired working
230	quarry/void	1+				
231	void	1	3			50cm deep
232	void	1	1.75			
233	voids	2+	3			
233a	millstone		1.3	0.24		in situ, centre-pop, not parted
No	*Form*	*No. voids*	*Diam.*	*Thick.*	*Eye diam.*	*Comment*
234	quarry/voids	5+				
235	millstone					blank
235a	millstone		1.3			in situ, no eye, not parted
235b	millstone		1.4	0.3		in situ not parted
236	voids	2				
237	quarry/voids	3+				
237a	millstone		1.42	0.15		centre-pop, buried, no face tooling
238	quarry/voids	3+				
239	quarry/voids	2+	2.5			50cm deep
240	quarry/voids	5				pinchbar socket
240a	millstone			0.18		fragment
241	millstone		1.2	0.3	0.16	eccentric fragment, eye cut
242	quarry/voids	7+				
242a	millstone					
242b	millstone					in situ not parted
242c	millstone?					

243	voids	2				25cm deep
244	quarry	1				
245	voids	4				
246	quarry/voids	3	2.5			50cm deep
247	void	1				
248	quarry/voids	3+				
249	voids	2				
250	void	1				
251	structure					semi-circular. Grouse butt/squaddie hide
252	millstone		1.4	0.3	0.16	eyes formed
252a	millstone		1.4	0.4		center-pop
253	millstone		1.8			
253a	millstone		1.9			

ILLUSTRATIONS

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0 2500 5000
metres

Figure1: Location Map

Fig1

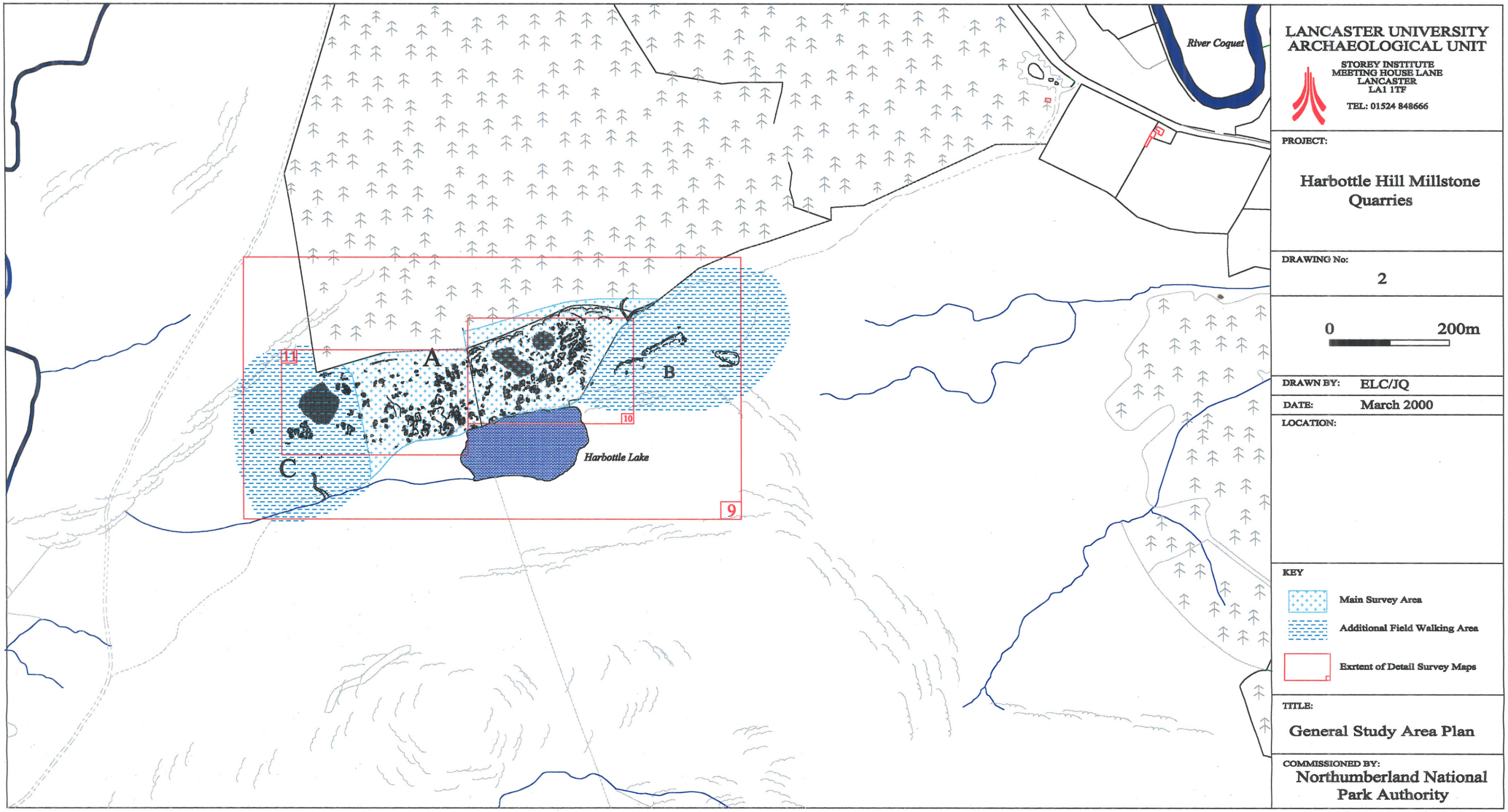


Fig 2 General Site Plan and Extent of Study Area

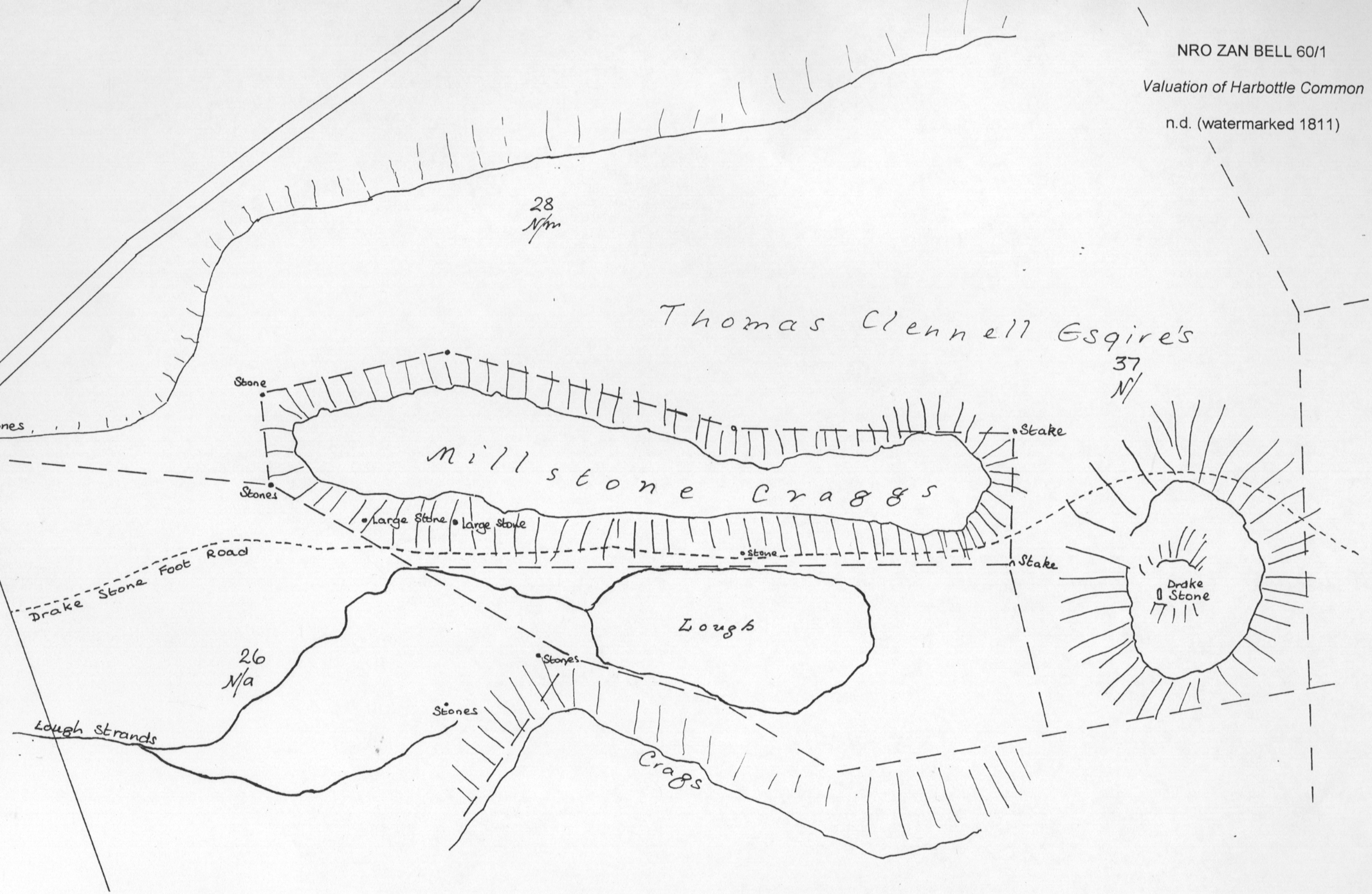
Above - Armstrong, 1769/70 (enlarged)

Below - Greenwood 1827-8 (enlarged)

NRO ZAN BELL 60/1

Valuation of Harbottle Common

n.d. (watermarked 1811)



No.	Content	Value p/a	Value
26	48.210	N/A	72.315
crags - 27	20.650	N/A	20.650
28	55.610	N/A	69.512
37	42.953	N/A	42.953

3rd Allotment

for the Peels Estate, in the Township of the Peels

Figure 4

NRO QRA 32/1

Plan of Harbottle Common in the Parish of Alwinton and County of Northumberland as divided and allotted

A.D.1817

William Bates and Edward Clint Commissioners and Thomas Bell, Surveyor

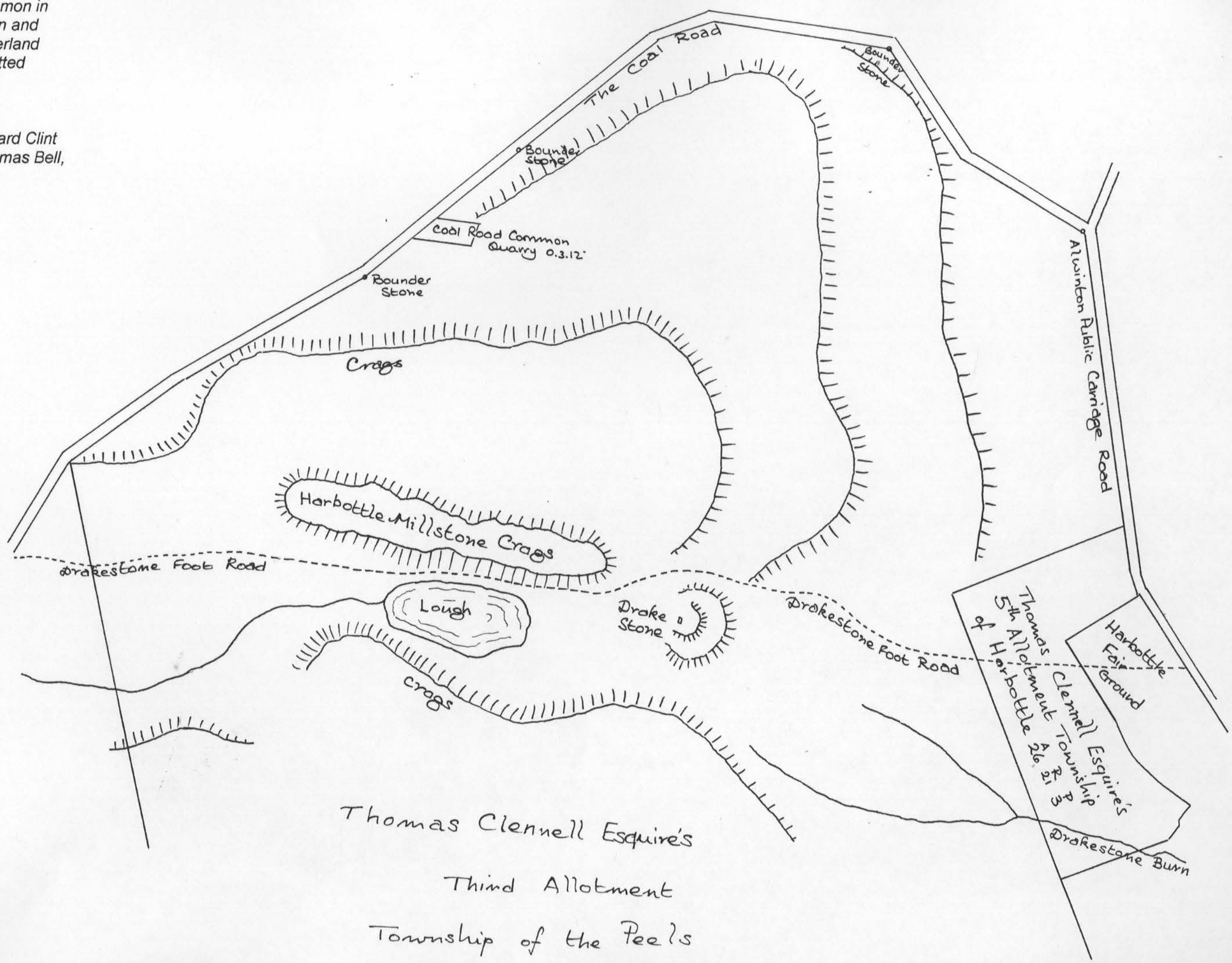
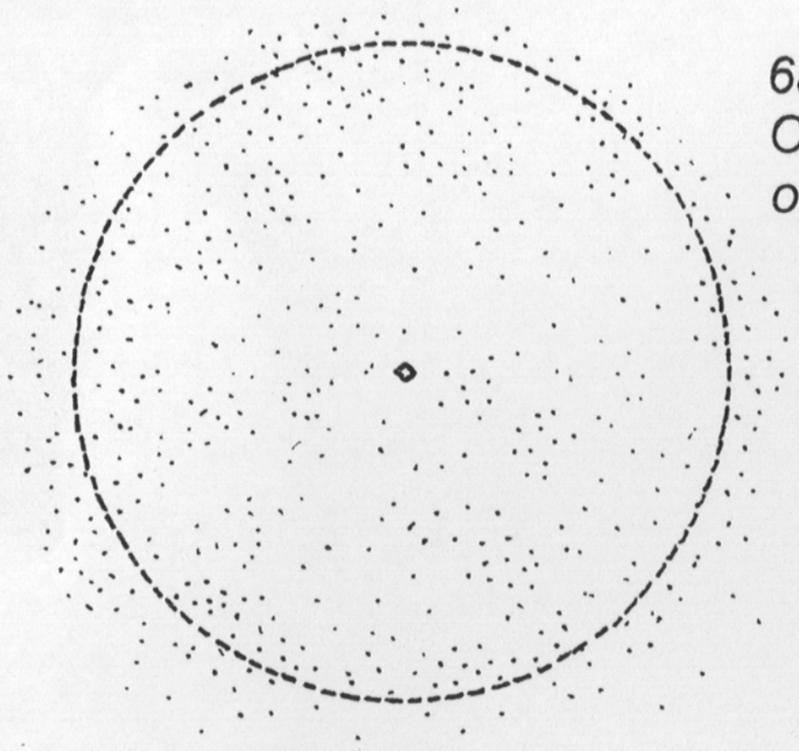
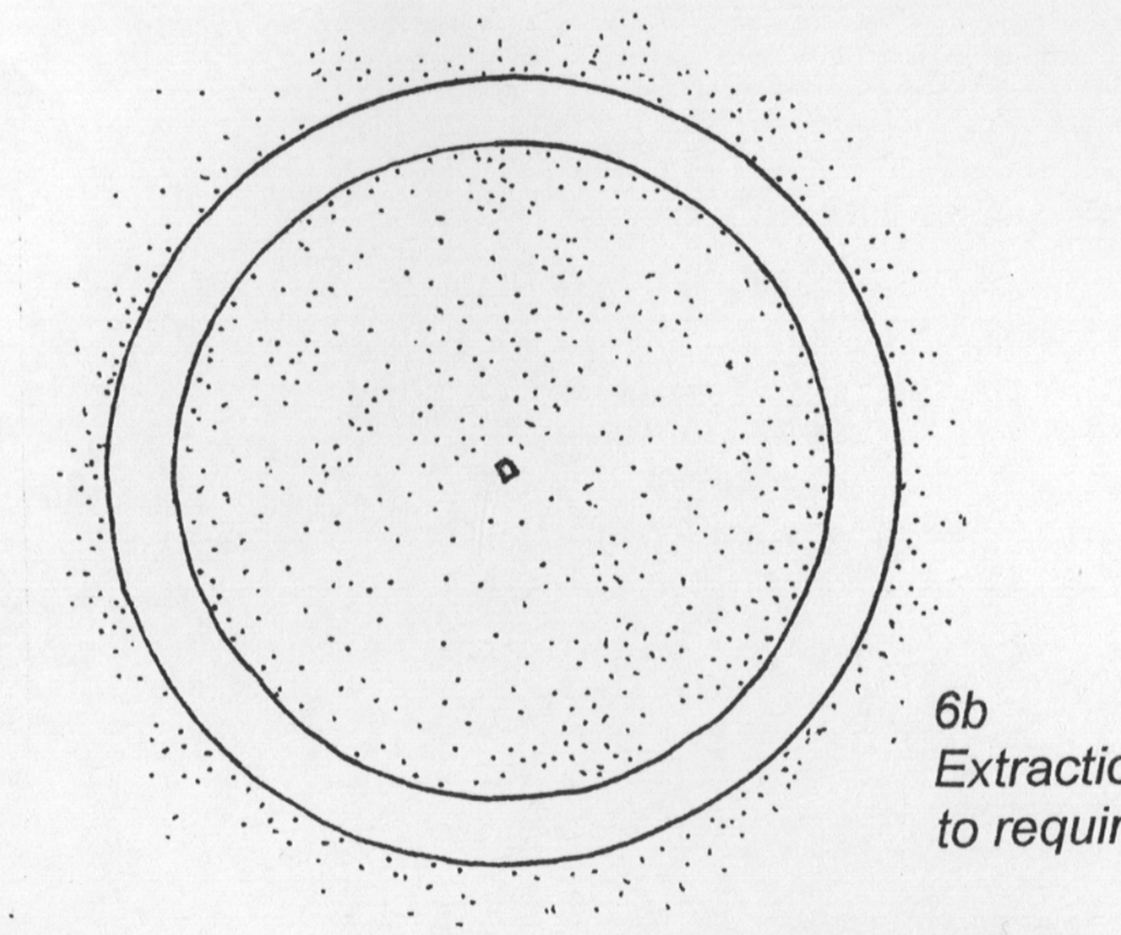


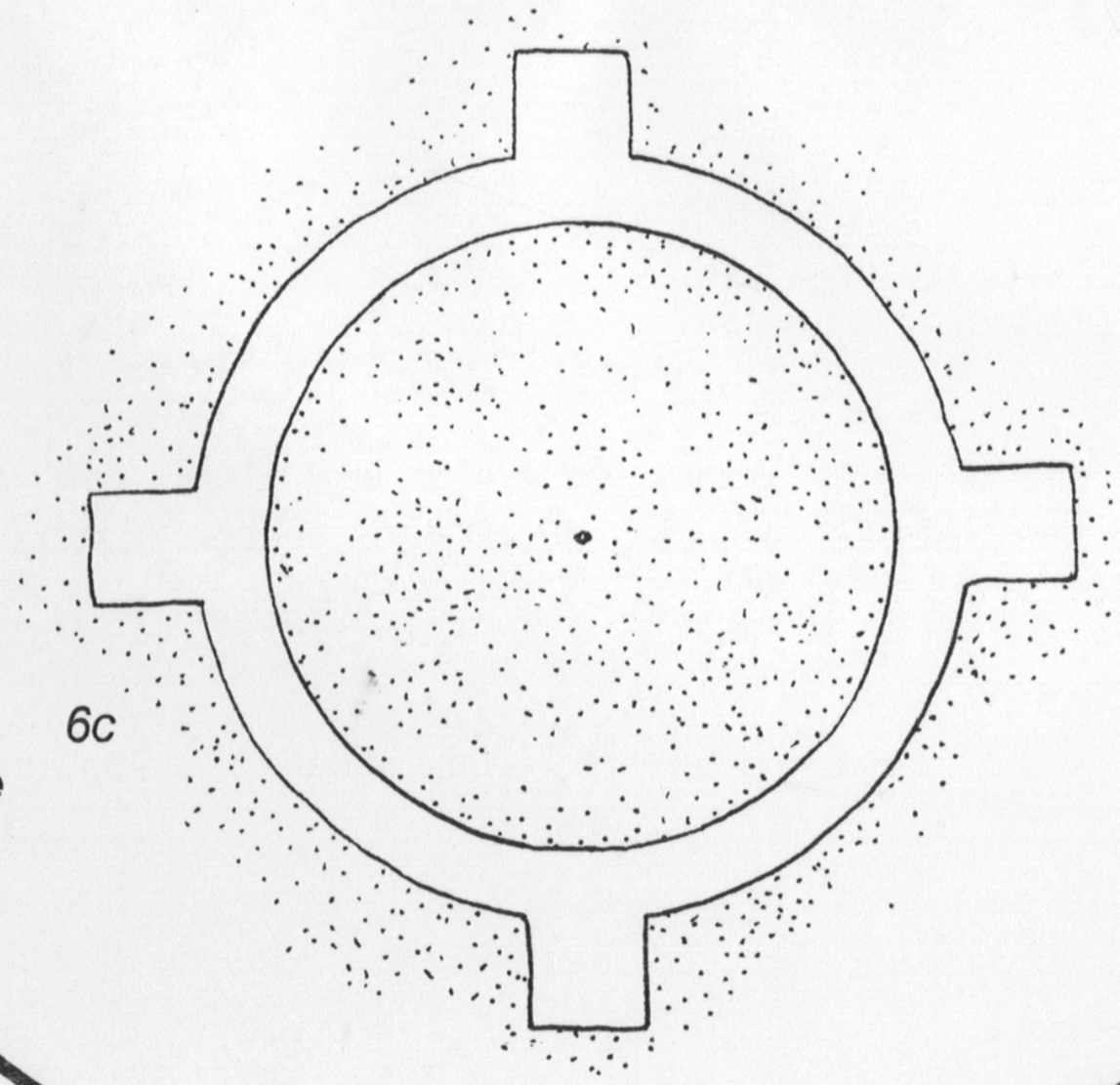
Figure 5



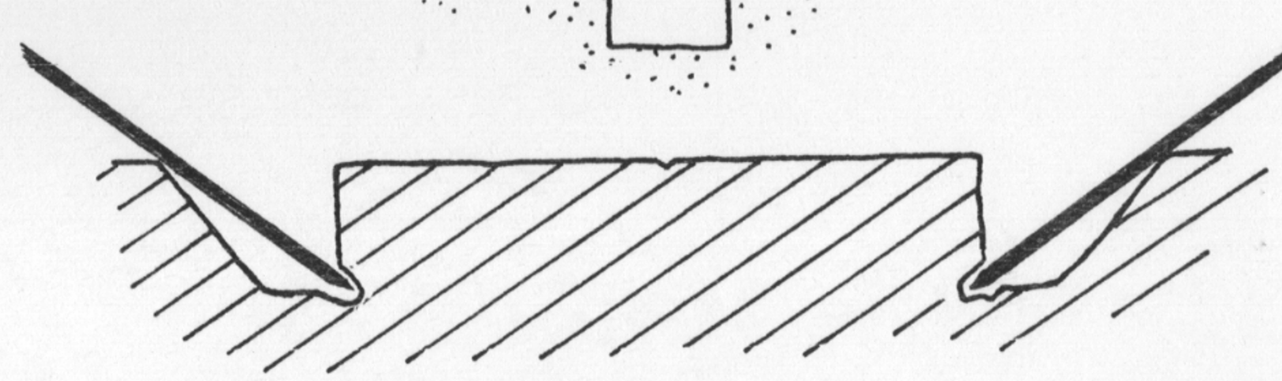
6a
Circumference marked out from centre-pop

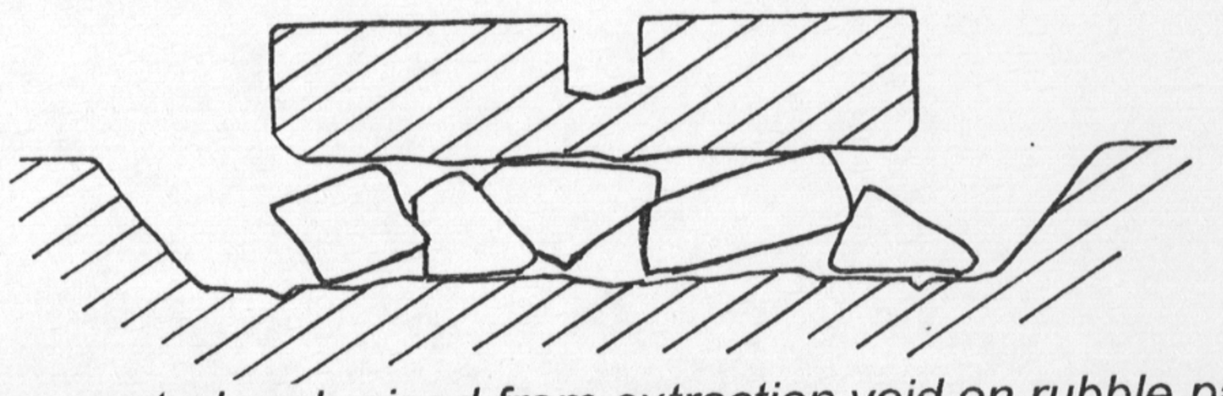


6b
Extraction channel cut to required depth of stone



6c
Pinch-bar sockets cut; base of stone slightly undercut to receive pinch-bar points





6d
Stone parted and raised from extraction void on rubble packing; the eye is partially cut and the stone will be turned over to complete the hole

Figure 6 Key stages of millstone extraction.

Fig. 7: Trackways from aerial photographs shown in red

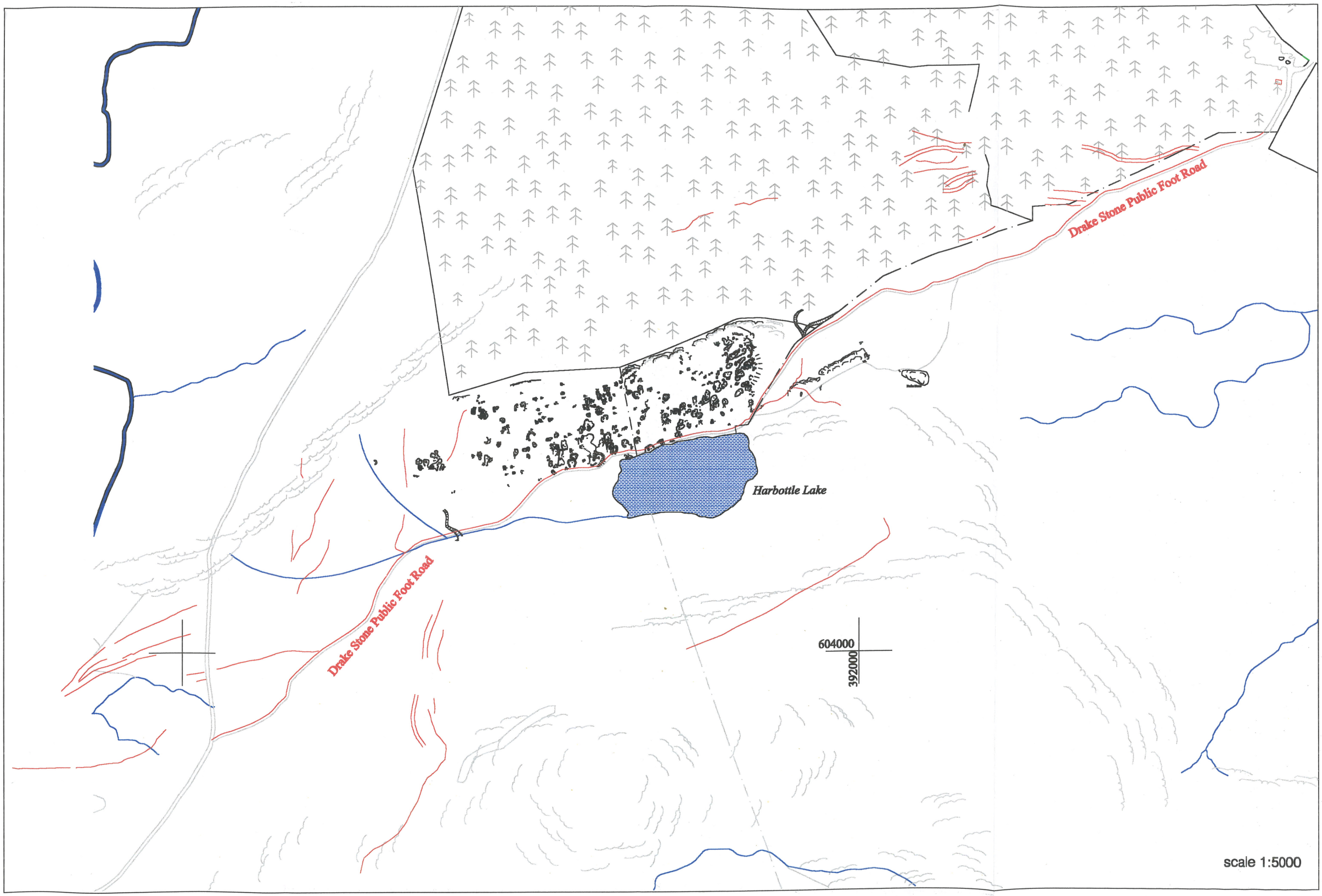
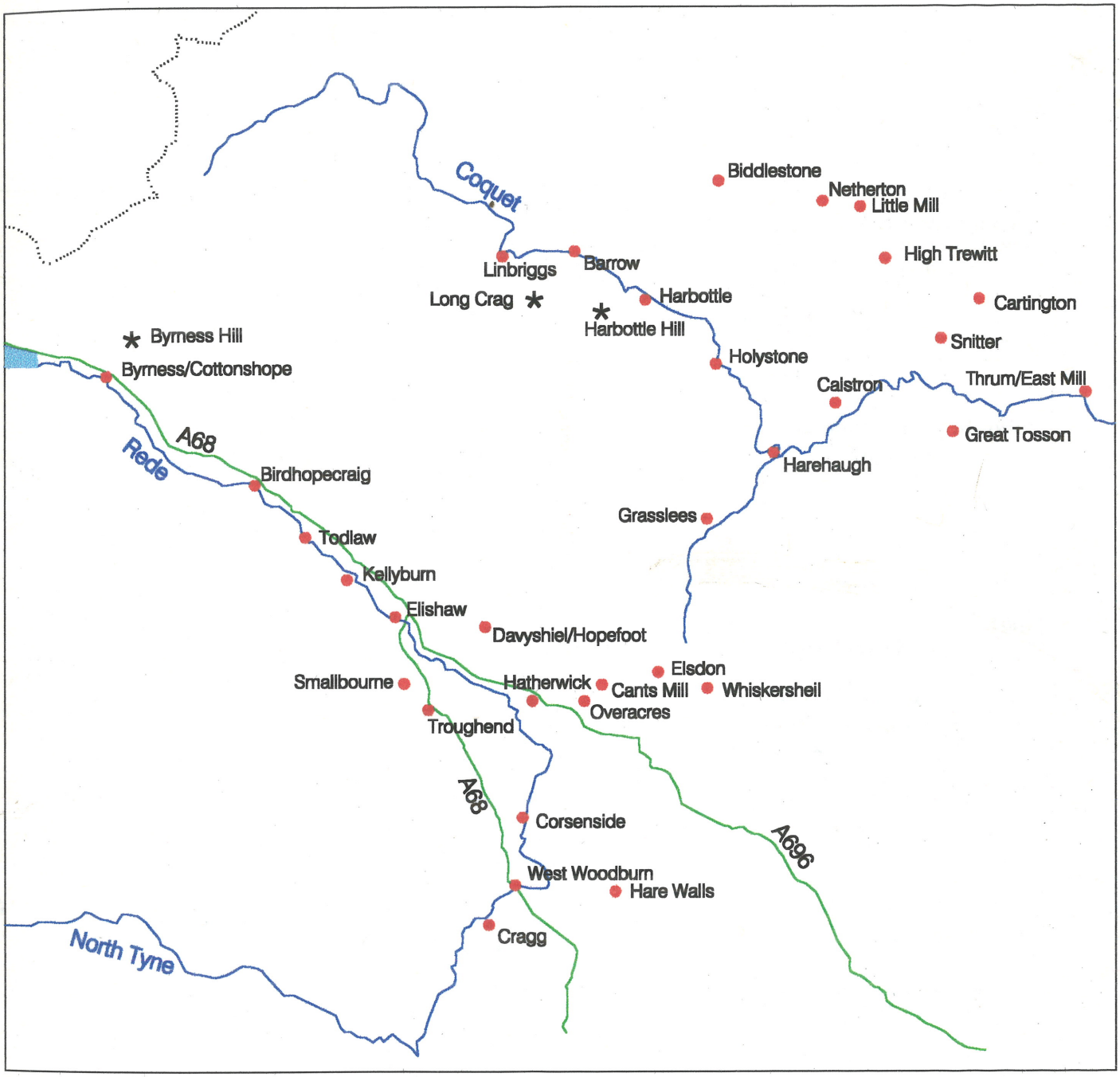
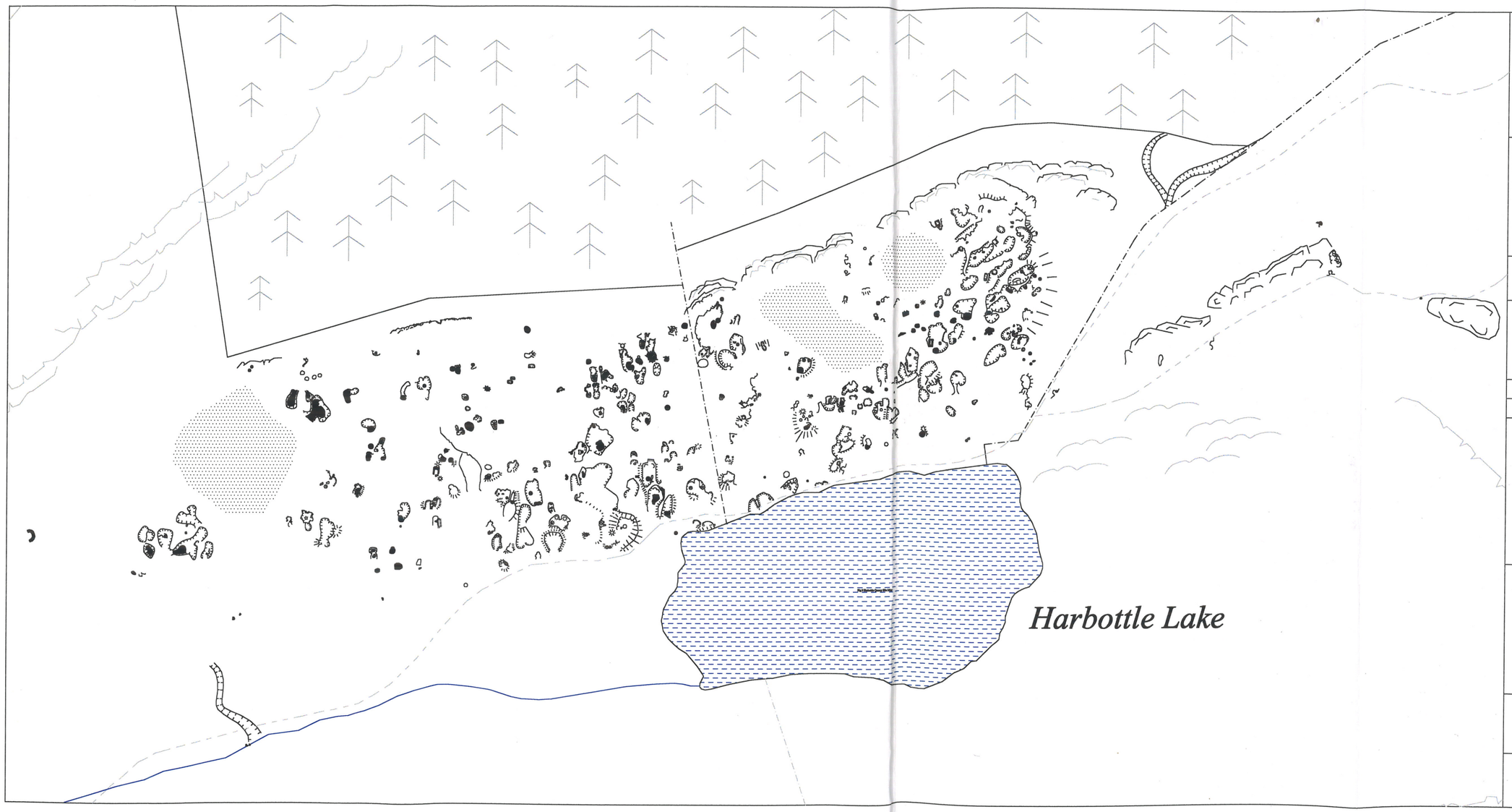


Fig. 8. Mill sites in Coquetdale and Redesdale





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TEL: 01524 848666

PROJECT:

Harbottle Hill Millstone Quarries

DRAWING No:

9

0 100m

DRAWN BY: ELC/JQ

DATE: March 2000

LOCATION:

KEY

Dense Vegetation Obscuring Workings

TITLE:

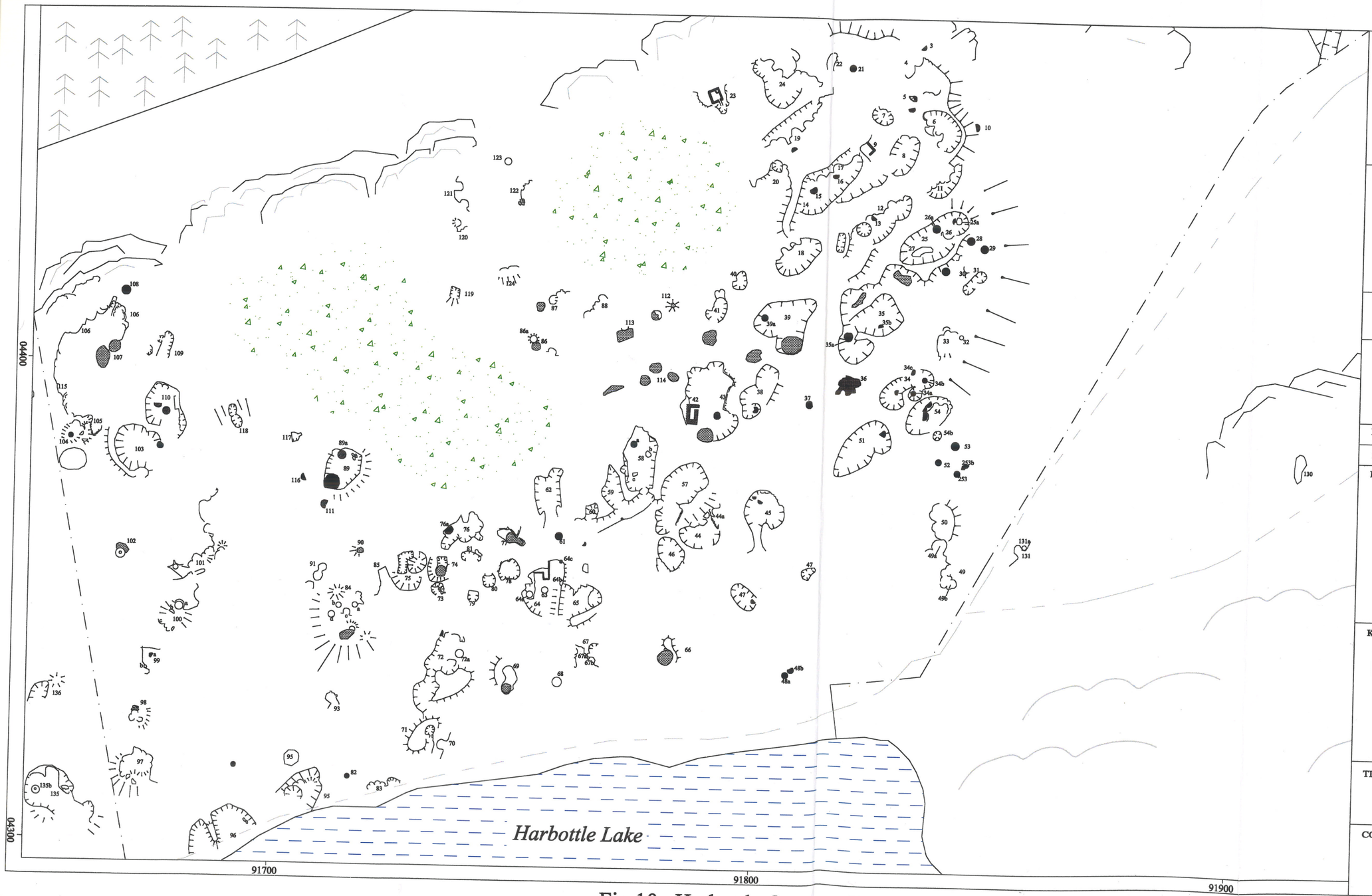
Site Map

COMMISSIONED BY:

Northumberland National Park Authority

Fig 9 Harbottle Quarry Site Map

HARFIG9.



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LA1 1TF

TEL: 01524 848666

PROJECT:

Harbottle Hill Millstone Quarries

DRAWING No:

10

0 40m

DRAWN BY: ELC/JQ

DATE: May 2000

LOCATION:

KEY

Dense Vegetation Obscuring Workings

Millstone Blank

Water filled void

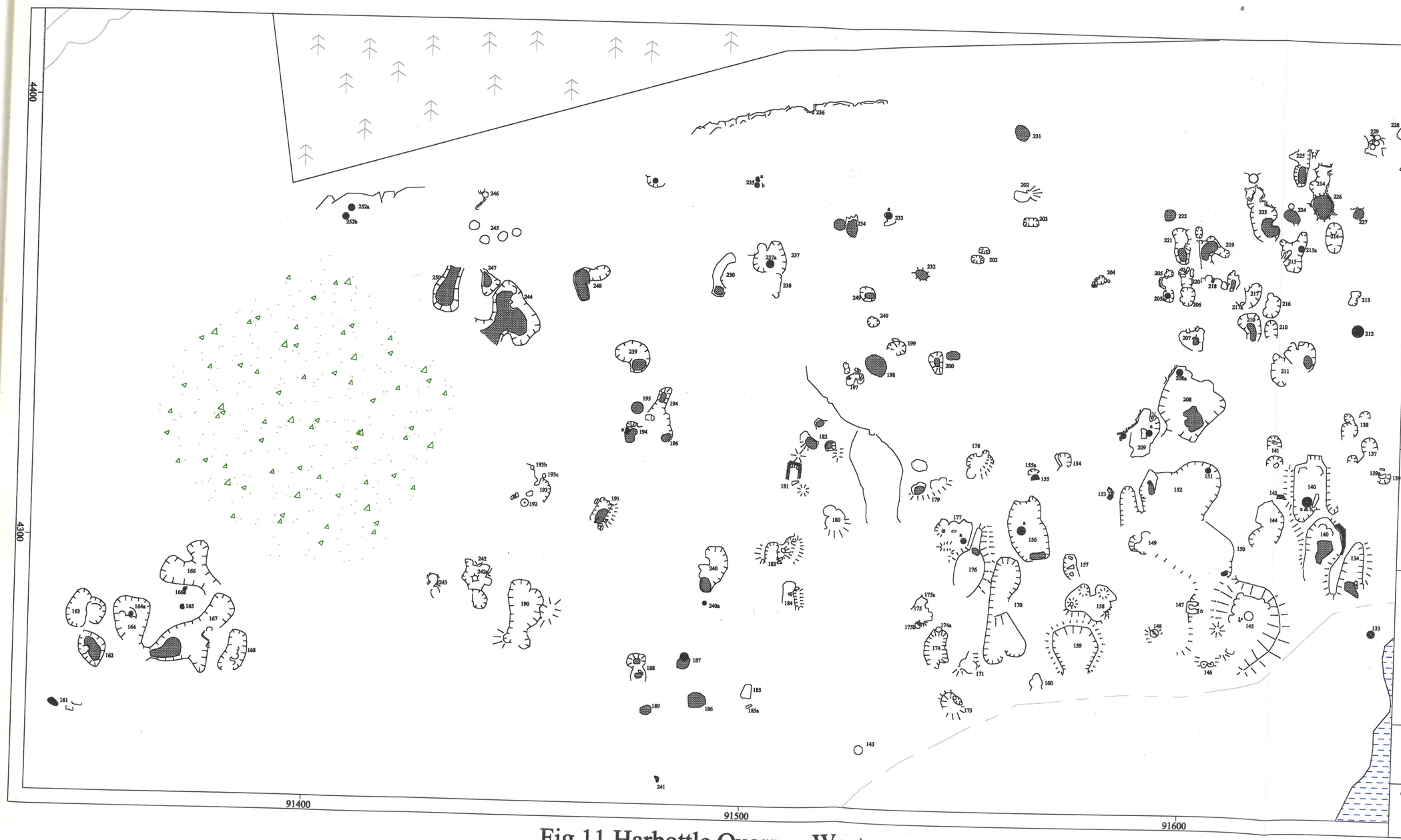
TITLE:

Harbottle Quarries - East

COMMISSIONED BY:

Northumberland National Park Authority

Fig 10 Harbottle Quarry - East



LANCASTER UNIVERSITY ARCHAEOLOGICAL UNIT

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LANCASTER
LA1 1TF

TEL: 01524 848666

PROJECT:

Harbottle Hill Millstone Quarries

DRAWING No:

11

0 40m

DRAWN BY: ELC/JQ

DATE: May 2000

LOCATION:

KEY

Dense Vegetation Obscuring Workings

133 Millstone Blank

Water Filled Void

TITLE:

Harbottle Quarries - West

COMMISSIONED BY:

Northumberland National Park Authority

Fig 11 Harbottle Quarry - West

PLATES

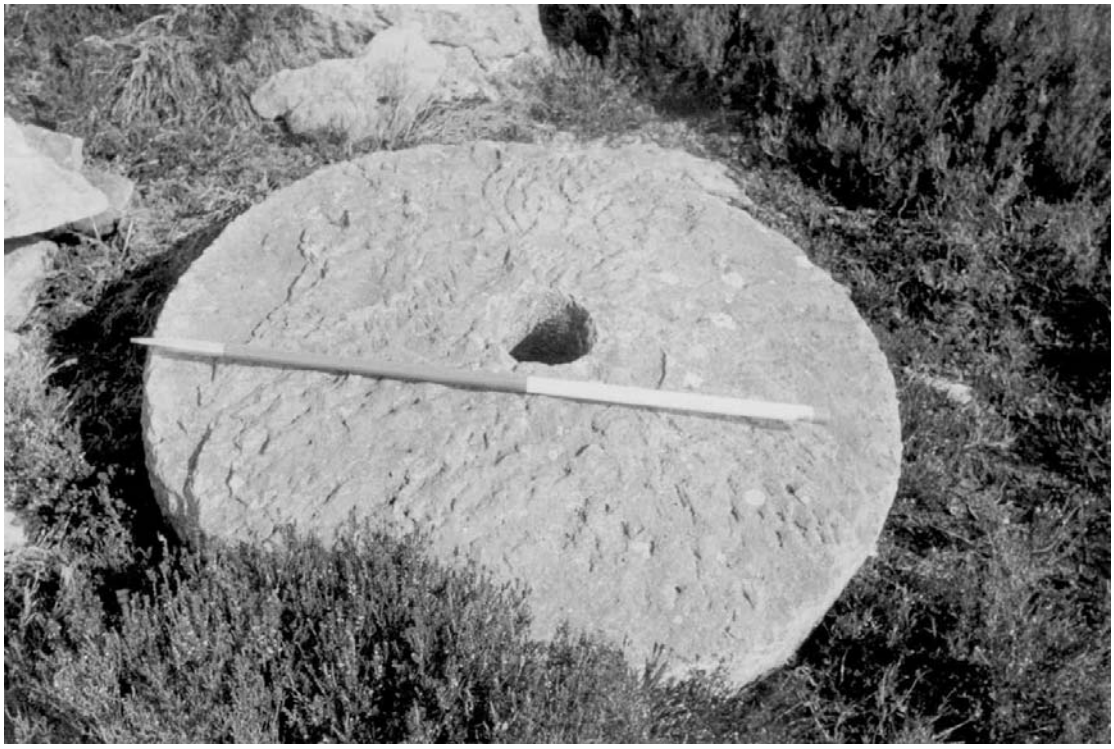

Plate 1 Site 192 – Rough-out abandoned at an advanced state of production

Plate 2 Site 146 – Two Rough-outs

Plate 3 Site 189 – Circular void

Plate 4 Site 147 - Sub-circular structure beside workings with adjacent sharpening stone