

GRINTON LEAD SMELTING MILL,  
COGDEN GILL, SWALEDALE,  
NORTH YORKSHIRE

ARCHAEOLOGICAL INVESTIGATION AND  
RECORDING DURING  
INTERNAL CLEARANCE WORKS



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**ARCHAEOLOGICAL INVESTIGATION AND RECORDING DURING  
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## EXECUTIVE SUMMARY

*In February 2019, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Mr Miles Johnson, Senior Historic Environment Officer of the Yorkshire Dales National Park Authority (YDNPA), to undertake a programme of archaeological investigation and recording during internal clearance works at Grinton lead smelting mill, Cogden Gill, Swaledale, North Yorkshire (NGR SE 04877 96425 centred).*

*The clearance work was required to facilitate a wedding reception inside the mill on the 27th July 2019. The scope and scale of the project was defined by an EDAS Written Scheme of Investigation (WSI) which was drawn up in consultation with the YDNPA. The project was wholly funded by the YDNPA. The clearance work was undertaken wholly by hand between February and June 2019, and this was monitored by EDAS through a series of separate site visits. In the event, it was decided not to reduce the floor level in the bellows room and so, with the exception of a few small investigations, this remained undisturbed. Final site visits were made by EDAS on 5th and 12th June 2019 to record the flagstone floor uncovered in the furnace room.*

*The flagstone floor, which was exposed across the majority of the furnace room, was clearly of several different phases and preserved several different internal features. The bases of the western and central ore hearths were revealed, and significantly also the lower part of the eastern slag hearth which had previously been obscured. By combining the information gathered as a result of this project with historical research into the development of the smelt mill and a previous survey undertaken in 1996, it has been possible to suggest how changes to the flooring may reflect alterations undertaken at the mill prior to 1774, in 1820-22, and in the early 1890s. The relevance of the different internal features to lead smelting practices, for example the possible quenching of slag at the ore hearths, has also been explored. No clearance work was undertaken in the bellows rooms, and so the existence or extent of any flagstone flooring here remains unresolved. It is assumed that it either remains partly in situ at a lower level, or that it was subsequently robbed out after smelting ceased, since it is hard to imagine a room housing a waterwheel with its attendant splashing, the supports for a geared crank, and foundations for the bellows, only being provided with an earthen floor.*



# 1 BACKGROUND INFORMATION

## Reasons and Circumstances of the Project

- 1.1 In February 2019, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Mr Miles Johnson, Senior Historic Environment Officer of the Yorkshire Dales National Park Authority (YDNPA), to undertake a programme of archaeological investigation and recording during internal clearance works at Grinton lead smelting mill, Cogden Gill, Swaledale, North Yorkshire (NGR SE 04877 96425 centred) (see figure 1).
- 1.2 The clearance work was required so that a wedding reception could be held inside the mill on 27th July 2019, and Scheduled Monument Consent (SMC) was granted on 18th September 2018 (Historic England reference S00197565). The archaeological investigations were defined by a Written Scheme of Investigation (WSI) which was drawn up in consultation with the YDNPA (see Appendix 2). The project was wholly funded by the YDNPA and the site work was undertaken between February and June 2019.

## Site Location and Designations

- 1.3 The Grinton lead smelt mill complex is located c.2km to the south of Grinton village, on the east side of the Cogden Gill at the junction of Smales Gill and Lemon Gill (see figure 1). The smelt mill is aligned north-east/south-west with a detached peat store placed at approximately 90 degrees to this (see figure 2); for ease of description below, the mill is considered to be aligned north-south.
- 1.4 The smelt mill is both a Grade II Listed Building (National Heritage List for England (NHLE) 1318580), first listed on 13th February 1973, and a Scheduled Monument (NHLE 1016203), first scheduled on 15th May 1974; the Scheduled Monument area includes the mill, the flue, the fuel (peat) store and associated earthworks. The dual listing means that the Scheduled Monument legislation takes precedence.
- 1.5 The smelt mill is also listed on the YDNPA Historic Environment Record (site MYD4538) and Historic England's National Record of the Historic Environment (NRHE - Pastscape) (monument 48831; NMR SE 09 NW 39).

## Previous Architectural and Archaeological Investigations

- 1.6 The smelt mill and peat store were surveyed in 1948 by Robert Clough (1980, 110-111), although it is generally considered that his part-reconstructions are not always accurate (see figure 3). The peat store was surveyed as part of a limited programme of excavation undertaken during a consolidation and reroofing project (Francis & Cranstone 1992). The bellows frame is also discussed by Raistrick (1975, 46-47), Woodall (1980, 293-294) and Lamb (1992, 35) while the complex as a whole is described in detail by White (Tyson, Spensley & White 1995, 107-127). A survey of the mill was also produced by Turnbull (1994).
- 1.7 Turnbull's survey was significantly enhanced by EDAS in 1996 (Dennison 1998). This work included a re-survey of the interior of the building (ground floor and upper level plans) (see figure 4), a detailed survey of the surviving timberwork within the bellows room, a new ground floor plan of the adjacent peat store, and a new survey of the earthworks surrounding the mill complex (see figure 2); the last was extended in September 1997 to include the smelt mill flue and chimney, and a

small reservoir. Of direct relevance to the current project was the supervision of a limited programme of clearance inside the mill, together with the excavation of a small number of exploratory sondages. These revealed the base of a second sandstone keeper for the western ore hearth, parts of the flagstone floor as previously implied by Clough, and exposed a well preserved east tuyère hole, together with bolts and ties and a second draught hole, probably associated with a slag hearth; it was also later established that the flue vaulting was keyed into, and was therefore contemporary with, the north wall of the mill. A second EDAS project in 2002 monitored and recorded consolidation works to the Lemon Gill culvert (Dennison 2002).

- 1.8 Most recently, using information gathered from the EDAS 1996 work, Richard Lamb has produced an important paper discussing the workings of the slag hearth and blowing mechanism of the mill, in the context of its technological development (Lamb 2017).

### **The Proposed Works**

- 1.9 Details of the proposed clearance and other works were contained in a document produced by the wedding participants, which was submitted with the application for SMC ('Application to Hold Wedding Reception in Grinton Smelt Mill').
- 1.10 A summary of those proposed works which were relevant to the archaeological investigation and recording are as follows:
- the manual excavation of the existing thick layer of sheep manure that covers the floor of the smelt mill, in both the furnace and bellows rooms, to reveal the underlying stone-flagged floor (if present);
  - in areas where stone flags are shown not to be present, temporary wooden boards will be used as flooring, or the existing surface will be compacted down to create a solid floor;
  - all excavated material will be removed from site to a neighbouring farm using tractor and trailer - this will access the site along the existing track, passing between the flue end and peat store and pull off onto the flattish area to the west of the former smithy buildings and south of the smelt mill, if wet, track matting will be used;
  - minor repairs will be carried out to the remains of the wooden launder where it enters the smelt mill building, by using supporting tanalised batons (the remaining structure of the launder is increasingly fragile, and this intervention should ensure that it survives);
  - the reinstatement of a small number of slipped roofing slates - the roof was entirely relaid with new laths in 1988;
  - minor works to reinstate loose stonework on two of the front window openings, using an appropriate lime mortar mix with the work being undertaken by an accredited conservation builder/craft mason.

## Scheduled Monument Consent

1.11 Scheduled Monument Consent (SMC) was granted for the internal clearance work on 18th September 2018 (Historic England reference S00197565). A number of conditions were attached to the SMC, as follows:

- (i) The works to which this consent relates shall be carried out to the satisfaction of the Secretary of State, who will be advised by Historic England. At least 4 weeks' notice (or such shorter period as may be mutually agreed) in writing of the commencement of work shall be given to Hannah Saxton, Assistant Inspector of Ancient Monuments, Historic England, 37 Tanner Row, York, YO1 6WP, or *hannah.saxton@HistoricEngland.org.uk* in order that an Historic England representative can inspect and advise on the works and their effect in compliance with this consent.
- (ii) The specification of work for which consent is granted shall be executed in full.
- (iii) No works to which this consent relates shall be begun until the Secretary of State, advised by Historic England (informed by The Yorkshire Dales National Park Authority), is satisfied that adequate funding has been secured to ensure the completion of the proposed minor repairs.
- (iv) Photographs to a scale and quality to be agreed in writing shall be prepared of the monument before the start and after completion of the works (including a few pictures of the bride and groom looking fabulous on the day, we love a good wedding) [*sic*] and a set of prints [together with copies on disc if in digital format] shall be sent to Historic England (F.A.O. Hannah Saxton, contact details above) within 3 months of the completion of the works (or such other period as may be mutually agreed).
- (v) This consent may only be implemented by Miles Johnson, Yorkshire Dales National Park Authority.
- (vi) Original material shall be reused wherever possible in the repair works.
- (vii) Any replacement material shall be of a type, texture and colour which matches the original material.
- (viii) All pointing and mortar work shall be in a mixture and finish to match the existing in composition, colour, texture and style.
- (ix) If required, any vegetation growing in the masonry shall be cut off level with the surface of the stonework and the roots poisoned or carefully removed.
- (x) All those involved in the implementation of the works granted by this consent must be informed by Helen Clark or Jonathan Kellett that the land is designated as a scheduled monument under the Ancient Monuments and Archaeological Areas Act 1979 (as amended); the extent of the scheduled monument as set out in both the scheduled monument description and map; and that the implications of this designation may include the requirement to obtain Scheduled Monument Consent for any works to a scheduled monument from the Secretary of State prior to them being undertaken.

- (xi) Equipment and machinery shall not be used or operated in the scheduled area in conditions or in a manner likely to result in damage to the monument or ground disturbance.
- (xii) This consent shall cease to have effect on 30th July 2019.
- (xiii) Nothing shall be fixed to the building, other than using temporary insertions in existing openings as described in the supporting documentation.
- (xiv) Nothing shall be driven or dug in to the ground, other than to facilitate the removal of sheep manure within the building. Removal shall be undertaken with care, particularly in areas where the stone floor does not survive, which should be cleared to the level of the floor. The manure must be removed from site and cannot be stored within the scheduled area.
- (xv) If required due to weather conditions, track matting to be laid down within the scheduled area to ensure no excessive ground disturbance caused by vehicles accessing the site.

### **Aims and Objectives**

- 1.12 The requirements of the archaeological investigation and recording at the Grinton lead smelting mill, as stated by the YDNPA and re-iterated in the EDAS WSI (see Appendix 2), were to:
- (i) monitor the removal of the sheep manure from the inside of the building (both furnace room and bellows room) to ensure that any archaeological material or features that might be exposed can be adequately recorded;
  - (ii) produce a detailed 'Level 3' survey of the exposed floors and any other details that might be revealed, to provide further information relating to the key parts of the smelt mill infrastructure, such as the footings of the original and re-sited ore hearth, the location(s) of wheel pits and associated axle bearings, and infrastructure supporting the drive for the bellows etc;
  - (iii) produce a survey report and archive, appropriate to and commensurate with the results obtained.

### **Fieldwork Methodologies**

#### *Documentary Research*

- 1.13 No original documentary research was carried out as part of the project. However, all available existing material relating to the history and development of the smelt mill complex was collected and collated, to inform the subsequent recording work. Liaison was also undertaken with Richard Lamb, who has a particular knowledge of the site, so that any remains that were uncovered could be properly interpreted.

#### *Archaeological Monitoring of Clearance*

- 1.14 The clearance work to the interior of the mill was undertaken wholly by hand by some of the wedding participants, at intervals between February and June 2019. This was monitored by EDAS through a series of separate site visits, on the 25th February 2019, 1st March 2019 and 25th April 2019. During these site visits, EDAS assisted with the clearance work and advised which areas were more archaeologically sensitive and so would need closer monitoring. Liaison was also

maintained with those undertaking the clearance, to ensure there was notification if any features of archaeological interest were revealed.

- 1.15 Where structures, features or finds of archaeological interest were exposed or disturbed, EDAS were allowed time to clean, assess, and quickly hand excavate, sample and record the remains as necessary and appropriate. In the event, it was decided not to reduce the floor level in the bellows room and so, with the exception of a few small investigations, this remained undisturbed. Final site visits were made by EDAS on 5th and 12th June 2019 to record the floor uncovered in the furnace room.
- 1.16 Following standard archaeological procedures, each discrete stratigraphic entity (e.g. a cut, fill or layer) was assigned an individual three digit context number. A total of three archaeological contexts were recorded. In-house recording and quality control procedures ensured that all recorded information was cross-referenced as appropriate. All archaeological work was undertaken in accordance with guidelines produced by the Chartered Institute for Archaeologists (CIfA 2014a). The locations of any finds were also recorded. A small number of finds were recovered from the clearance work (metalwork and three bricks), and they were cleaned and recorded in accordance with current guidelines (e.g. English Heritage 2008), and then left on site; the finds were not of particular importance or significance.

#### *Post-Clearance Archaeological Survey*

- 1.17 Once the internal clearance work had been completed, a new internal floor plan of the smelt mill was produced, to produce a Level 3 survey (as defined by Historic England 2016, 26).
- 1.18 The existing 1:50 scale floor plans produced by EDAS in 1996 were obtained from YDNPA archives, and were utilised to produce a new set of 1:50 scale floor plans of the building. These new drawings show all significant architectural detail such as openings (blocked or unblocked), constructional detail, fixtures and fittings etc, any evidence for phasing, and for historical additions or alterations to the building relevant to its original and subsequent use, as well as anything that was revealed by the clearance work, or which had deteriorated since the 1996 survey. Areas of missing and/or damaged original or secondary floor surfaces were also recorded. Other exposed features were recorded in more detail (e.g. at 1:20 or 1:10 scale) as appropriate. All drawings were produced by hand measurement according to Historic England guidelines (2016, 13-17).
- 1.19 General photographic recording of the site and the smelt mill's internal spaces, together with close-up photography of significant details, was undertaken using an SLR digital camera with 12 mega-pixel resolution, with artificial lighting where necessary (jpeg format). A number of general external shots were also taken to place the building into context. The guidelines produced by Historic England (2015; 2016, 17-21) were followed and each photograph was provided with a scale, subject to access. Most photographs were taken in colour, although some black and white shots were also taken for comparison. All the photographs were clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and are cross referenced to film and frame numbers. The digital photographic record taken during the site recording is referenced in the text below using italics, the numbers before the stroke representing the film number and the number after indicating the frame (e.g. *2/001*); a number of the photographs are also reproduced below as plates. A photographic register

detailing (as a minimum) the location and direction of each shot was also completed (see Appendix 1).

- 1.20 Sufficient notes were taken on site in order for a detailed description of the building complex to be prepared, in combination with the drawn and photographic records.

### **Reporting and Archive**

- 1.21 An EDAS archive archaeological survey report has been produced, based on the results of the documentary collation and the information obtained during the fieldwork. This report assembles and summarises the available evidence for the site in an ordered form, synthesises the data, comments on the quality and reliability of the evidence and, if necessary, how it might need to be supplemented by further field work or desk-based research. The report is also illustrated by reduced versions of the field plots, historic maps and plans, and a selection of photographic plates. The report also contains various appendices, including photographic registers and catalogues. An electronic version of the report was produced, as a pdf file, for distribution to all interested parties, including Historic England and YDNPA. In accordance with the SMC conditions, Historic England also received a set of photographic prints, at 6" x 4" size, in archival-stable wallets together with electronic copies on a CD/DVD in jpeg format and a photographic register.
- 1.22 An appropriate entry was submitted to the OASIS (On-line Access to the Index of Archaeological Investigations) project, including the deposition of a digital copy of the report with the Archaeology Data Service, via the OASIS form, upon completion of the project.
- 1.23 A fully indexed and ordered field archive has been prepared, following the guidelines produced by the Museum and Galleries Commission (MGC 1994) and the Chartered Institute for Archaeologists (CIfA 2014b). The archive comprises primary written documents, plans, sections and photographs, and an index to the archive (EDAS site code GSM 19). The site archive was deposited with the YDNPA at the end of the project.

## **2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

- 2.1 The historical and archaeological background to the Grinton lead smelt mill complex has already been researched and discussed in some detail (Tyson, Spensley & White 1995), and so the following provides a brief summary from this source (unless otherwise stated), to place the recorded observations into context.
- 2.2 The Grinton mill is only one of a number of lead smelting mills which were built in this part of Swaledale, the others being Grovebeck Mill, New Mill and Scotts Mill (Smith 1997). None of these survive to any great degree and the Grinton mill represents the best preserved example of all the lead smelting mills within the Yorkshire Dales National Park. No specific date for its construction is known, but it was probably built by Reginald Marriott in the early 18th century, possibly between 1705-10, after he purchased the rights to the surface wastes in the Manor of Grinton. Marriott had previously sent most of his lead ore to a smelt mill at Marrick and the fact that he had obtained the rights of turbary (peat cutting) in the area, as well as owning some coal mines and stone quarries, meant that he was in a good position to build and operate a new mill at relatively low cost. The location for this new mill took advantage of the plentiful water supply provided by a spring and the

Cogden Gill, and was close to the developing lead mines on Grinton How. For this reason, the mill is also known as the How or Low Mill.

- 2.3 The first documented reference to the mill occurs in 1722-23, and in 1733 the mill and its utensils were included in a proposed sale to the London Lead Company. However, this sale never materialised and in 1756 the mill was sold by Hugh Marriott's wife to Caleb Readshaw, a Richmond merchant with interests in other mines in the Dales (Tyson & Gill 1992, 152); at this time the mill was described as "the smelting mill with a little house or chamber and backside thereunto". The first account of production at the mill occurs in the 1750s, with 194 fadders (213 tons) of lead being smelted between August 1758 and September 1759. A map of the Manor of Grinton made in 1768 by George Jackson depicts the mill as a single building without a chimney or a separate peat store (Richard Lamb, *pers. comm.*). A slightly later map of 1774 shows a T-shaped building with water courses, although no chimney or flue beyond the peat store is indicated (see figure 5A). In 1776 the tools and utensils at the mill were valued at £60 3s 7d, and the accounts suggest that Readshaw leased the mill rather than working it himself.
- 2.4 In 1791 the mill was sold by Caleb Readshaw Morley, the grandson of the Caleb Readshaw mentioned above, to James Fenton and Edward Wilkinson who became the new Manorial Lords. In 1803 the mill was sold again, to Christopher and Mathew Whitelock of Cogden Hall who were shareholders in the Grinton lead mines at this time. Between 1820-22 ore from the Grinton mill was being sent to some of the other nearby smelt mills, probably Scott's Mill at Grovebeck, and this has led to the suggestion that the Grinton mill was being rebuilt at this time. Further evidence for this is provided by an 1830 report by the Crown's Agent, John Bower, which mentions that Robinson, Whitelock and Company had recently erected a new mill on the waste at Grinton.
- 2.5 The Ordnance Survey 1st edition 1857 6" map (sheet 52, surveyed 1854) shows the complex as comprising a T-shaped mill, with small annexes on the west and south sides in the south-west corner, a rectangular peat store with a range of structures attached to its west end and extending to the south, and a flue (named as a 'funnel') running to the top of Sharrow Hill; no chimney is depicted or named (see figure 5B). A second small L-shaped range of buildings is shown between the peat store and the reservoir, and a second reservoir is suggested by a 'sluice' on the hillside to the west.
- 2.6 In 1876 the Crown sold the Grinton mineral rights to the Charlesworth family of Chapelthorpe Hall in Wakefield, who had purchased the manor in 1855. A list of equipment at the mill is given as: "250 loads of peat. 2 ore hearths, slag hearth and furnace. Bellows, weighing Beam etc. Water Wheel, Spur Wheel and Crank. 4 metal rollers, spindles and levers". In the 1881 prospectus for the Grinton Mining and Smelting Company Ltd, the agent John Rodwell noted two Scotch hearths, a slag hearth, a roasting furnace, three water wheels, and bellows etc which required repair. In 1890 it was reported that these repairs were complete, and included the erection of a new Scotch hearth, a slag hearth and a roasting furnace which took less than half the amount of water than had been needed to drive the waterwheel for blast purposes. In 1892 it was also reported that a long length of new flue had been built (or possibly repaired).
- 2.7 Gill notes that the Grinton Mining and Smelting Company gave up working the mines in 1893, supporting Raistrick's date of 1893 as being the closure of the mill (Gill 1992, 129). The company itself was dissolved in December 1895. Lamb notes that the apparently extensive repairs and new works of 1890 occurred rather

late, given that the mill closed only a few years later, and it may be that some of these works were never actually completed (Richard Lamb, *pers. comm.*).

- 2.8 The Ordnance Survey 1st edition 1893 25" map (sheet 52/8, surveyed 1891) depicts the complex largely as shown in 1856, although in more detail (see figure 5C). The smelt mill appears to have lost its south-west annexes, although two stub walls are shown on the east end of the south wall. The alignment of the flue is shown as running east past the peat store, and it is now named as a 'flue'. The range of buildings extending to the south between the mill and the peat store is depicted as having two equally-sized cells at the south end. Two stub walls also extend from the south wall of the southern cell. The range of buildings to the south, named as a 'Smithy', is depicted as a row of four roughly equally-sized cells, with a smaller cell extending east from the east side and an internal structure in the southernmost cell; this range is larger than that shown on the 1856 6" map, and the northern cell may well have been added. A line representing a culvert is shown extending from a sluice in the centre of the reservoir dam, running in front of the smithy range and across the flue to enter the north end of the smelt mill. The site is similarly depicted on the later 1913 Ordnance Survey 25" map, although only the mill, peat store and smithy range are shown as being roofed, with the range between the mill and peat store shown as foundations (see figure 5D).
- 2.9 Since the end of smelting, the buildings have been used for agricultural purposes. Early photographs show sheep hurdles adjacent to the peat store and a sheep dip was added to the interior of the smelt mill in the furnace room in 1924. The structures deteriorated over time and a Building Preservation Notice was served in 1972 to prevent further deliberate demolition for building stone, as had occurred with the office/smithy range. Subsequent consolidation works include emergency repairs undertaken by the Department of the Environment in 1977-78 and the re-roofing of both the mill and peat store in 1987 by the National Park Authority.
- 2.10 As noted above, more recent work at the complex includes a limited programme of excavation at the peat store, undertaken during a consolidation and reroofing project in 1992-93, and a survey of the mill building in 1994, which was subsequently enhanced by EDAS (Francis & Cranstone 1993; Turnbull 1994; Dennison 1998); the last included some limited excavation in both the furnace and bellows rooms to establish the presence of any flagstone floors. A second EDAS project in 2002 recorded consolidation works to the Lemon Gill culvert (Dennison 2002).

### 3 RESULTS OF THE ARCHAEOLOGICAL MONITORING

#### Removal of Manure and Soil (see figure 6)

- 3.1 Vehicles used to facilitate the removal of collected manure and spoil were parked adjacent to the south side of mill [1/198] (see plate 1). At the start of the internal clearance work, the floor surface in both rooms of the smelt mill was formed by a thick deposit of compacted dry sheep manure and soil of varying depth [1/176, 1/178, 1/180, 1/182-1/185, 1/188-1/197] (see plates 2 and 3). During the previous 1996 survey, a local temporary bench mark (TBM) was established on the sill of the east window of the south wall of the furnace room (95.92m OD), and a comparison between this and the measurements taken during the current survey meant that it was possible to establish the depths of sheep manure. The material varied from between c.0.40m thick in the centre of the furnace room (with an average surface height of c.95.38m OD prior to clearance) to over 0.75m thick beneath the arch of the west ore hearth (with an average surface height of



c.95.74m OD prior to clearance). Clearance began on the west side of the furnace room [1/200, 1/203-1/205, 1/208-1/210, 1/213, 1/214, 1/218-1/222] (see plate 4), then progressed towards the east side [2/243, 2/244, 2/246-2/250], and finally finished in the areas immediately in front of the hearths [3/347-3/349, 3/351-3/360] (see plate 5).

- 3.2 The variations in depth of the sheep manure across the furnace room were echoed by variations in the nature of the deposit. It was certainly not homogeneous, and gave the impression of being deposited at different rates in different areas, and perhaps also having been partly cleared out before; in some areas of the furnace room, the manure was completely clean, whereas in others plastic and other modern debris were present even in the lowest levels. In addition, beneath the former furnace arches, the manure contained a much higher proportion of rubble where this had collapsed from the walling and flues above. The area where a sequence of deposition was best preserved was between the ore hearths, to the south of the wall formerly separating the two structures. Here, the uppermost deposit (001) was mid-brown to light orange-brown in colour and extended to 0.22m below ground level (BGL). It overlay a thin band of dark brown manure (002) which extended to 0.28m BGL. Beneath the dark brown band, there was a layer of mid-brown silt soil (003) with frequent inclusions of lime mortar, which extended to 0.40m BGL, at which point it met the flagstone floor [1/215, 1/216] (see plate 6).
- 3.3 The deposits recorded during the clearance compared closely to those exposed during the previous survey work in 1996 (Dennison 1998, 19-21). Then, in the furnace room, a single sondage revealed four separate layers of compacted sheep manure or soil, with a total depth of between 0.25m to 0.28m, overlying a flagstone floor. Simple augering suggested that the flagstone floor implied by Clough to exist across the entire furnace room remained in place. Within the bellows room, three sondages were excavated in 1996. One, placed over the wheel pit, found no evidence for the side of the wheel pit and demonstrated that infill extended to more than a depth of 0.50m BGL. One of the other two sondages produced evidence for a possible cobble and rubble floor at 0.15m BGL. Augering suggested that a hard surface was present at depths of between 0.15m and 0.20m BGL across parts of the bellows room. The stone slab on which the western timber uprights of the bellows frame rested was revealed, and augering suggested that a similar slab was present between the eastern timber uprights at a depth of c.0.15m BGL. The slab beneath the western uprights was exposed again as part of the current clearance works, but then re-covered [3/361]. Other than this, only a very small amount of clearance work was undertaken in the bellows room, comprising minor levelling by raking the soil/manure surface [4/180-4/183] (see plate 7).
- 3.4 Very few finds of historic interest or other significance were revealed during the current clearance works; indeed, there were few finds generally, including modern plastic materials. Four pieces of corroded ironwork were discovered, one in the vicinity of the central ore hearth, two from close to the slag hearth location and one from the general clearance. The first measured 0.19m long by 0.08m wide and appeared to form part of a cast-iron plate, with a curved profile to one side [5/241] (see plate 8). Of the pair from close to the slag hearth, one wrought-iron piece was c.0.30m long and was formed by two tapered arms which joined to form a single piece, from which a threaded bolt projects [5/239] (see plate 9). The bolt had a very corroded octagonal nut still in place, and the piece may once have formed part of a bifurcated stay. The second wrought-iron piece measures approximately 0.20m long and is clearly a two-handled tool, perhaps tongs related to agricultural activities or more likely smithing (Richard Lamb, *pers. comm.*); the flattened

handles are connected by a short bolt held in place by hexagonal nuts [5/240] (see plate 10). Only one handle retained its head, which is also flattened and square in plan, so that it grips rather than cuts. Finally, from the general clearance, a piece of a cast-iron bar was recovered, measuring 0.345m by 0.15m by 0.05m. It was rectangular in cross-section, with rounded edges, and with a fracture across one end. None of the ironwork has an obvious connection to lead smelting, and the two cast-iron pieces do not resemble any of the iron components that would be expected from either an ore hearth or a slag hearth (Richard Lamb, *pers. comm.*).

- 3.5 Three firebricks were recovered from very close to the position of the slag hearth. Each was hand-moulded, yellow in colour, and with average dimensions of 230mm by 115mm by 60mm. One bears the stamp 'COWEN' [5/236] (see plate 11), which refers to Joseph Cowen and Company, who operated brickyards at Blaydon Burn on the outskirts of Newcastle-upon-Tyne from the 19th century up to the 1960s (Sallery 2019; Veitch 2019). The second bears the stamp 'N CAP' [5/237] (see plate 12), which refers to Newton Cap Colliery and Brickworks, near Bishop Auckland, County Durham. A firebrick works was set up here in the early 1880s by Henry Stobart and Partners, and it continued to operate into the 1980s, by which date it was owned by the Hepworth Iron Company (Sallery 2019). The third brick is stamped 'L & M' [5/238]; it has not been possible to trace the maker, but it is most likely a North-East brickyard, probably associated with a colliery.
- 3.6 After clearance and cleaning, it was noted that an *in situ* brick in one of the piers of the slag hearth is stamped 'STOBART'. It is very similar to an illustrated example found in the vicinity of the aforementioned Newton Cap Brickworks. However, Stobart bricks produced here were generally marked 'N.C' or 'N-CAP' like the *ex situ* example found at Grinton, and it is suggested that the 'STOBART' stamp may refer to Stobart's earlier firebrick works at nearby Old Etherley Colliery, which had been working since the 1850s (<https://www.flickr.com/photos/97926191@N08/12743310633>; Sallery 2019). The colliery appears to have been active by the 1840s when owned by Henry Stobart and Company and it was formerly known as George Pit. Brick works are noted in connection with it in 1894, and it closed in 1917 (<http://www.dmm.org.uk/colliery/e028.htm>). It is interesting to note that bricks with the same stamp were used to build the draw-opening of a lime kiln in Great Punchard Gill, Arkengarthdale, some 11.8km north-west of Grinton smelt mill (Richardson & Dennison 2019).

### **The Furnace Room Flagstone Floor** (see figures 6 to 9)

- 3.7 In the following description of the exposed flagstone floor, a number of features have been assigned unique letter identifiers (e.g. (A), (B) etc). In addition, the flags have also been colour-coded depending upon the amount of wear they display (with the least worn displaying little or no wear, and the most worn being broken into numerous pieces less than 0.10m across), how they are dressed, and their geological make-up. These various aspects of the floor are brought together in the later Discussion and Conclusions chapter to consider how they contribute to any interpretation of the building's history.
- 3.8 Following the clearance work, it was discovered that the flagstone floor survived across much of the furnace room, as suggested by the 1996 investigations and also as implied by Clough [4/124, 4/125, 4/127, 4/128] (see plate 13). Nevertheless, Clough drew the flagstone floor as if laid in a very uniform manner (see figure 3), which it is not, and so it still remains unclear as to whether any of the floor was actually visible when he visited in 1948 or if he marked on the flags schematically because he thought they were once present. Local information

suggests that some elements of the flagstone floor may have still been visible during the 1960s and 1970s, so perhaps Clough did actually see it and used a schematic form because of the scale of his drawing; he certainly did not show flagstone floors at all of the mills that he surveyed. Lamb's earliest photographs of the mill, taken in 1987, show the floors well covered with sheep manure and a lot of rubble (Richard Lamb, *pers. comm.*).

- 3.9 The majority of the surviving flagstones are of limestone. The floor was found to be remarkably level, given the period which has elapsed since the building was last used for smelting, and the fact that it has been affected by factors such as water ingress. When levelled in from the TBM in the east window of the south wall, the surface of the floor varied in height only between 94.84m OD and 95.02m OD (see figure 6).

#### *The Western Area*

- 3.10 Starting at the north-west corner, to the west of the western keeper stone of the western ore hearth (A), there is an area of worn and very worn flags which run parallel to the tuyère cross wall forming the rear of the furnace arch here. However, at their south-west corner, there is a small area of very worn flags which run parallel to the west wall of the furnace room [4/147, 4/148]. These are bounded to the south by a blank area marking the former west side of the furnace arch. The east side of this furnace arch is marked by a spread of footings with a mortared surface. Unfortunately, nothing of the structure of the ore hearth itself survived, although the keeper stones were exposed to a greater height than previously, the western one being 0.85m high and the eastern one being 0.40m high [4/140-4/144] (see plate 14).
- 3.11 The approximate dimensions of a free-standing ore hearth taken from Percy (1870, 278-289) are 1.20m wide, with the distance from back to front (including the sumpter pot) of around 2m, indicating sufficient space between the keeper stones for its installation. The presence of these stones, found in a small number of other mills in the Yorkshire Dales (for example, Lumb Clough, Buckden High and surprisingly Surrender) does seem to denote a somewhat old-fashioned design. The lack of surviving flags to the front (south-west) side of the hearth may indicate the former position of the sumpter pot, suggesting that the cast-iron workstone within the hearth would have had a diagonal groove for the molten lead. The secondary stone structure to the immediate east of the east keeper stone was exposed to its full height, and the low opening at the base of the wall within it was cleared of its blocking of feed sacks [4/145, 4/146] (see figure 15). The function of this secondary structure remains unknown, although a similar feature exists at Marrick Low Mill in Swaledale. A substantial number of flags were also missing to the south and south-east of the ore hearth, and those that remained appeared disturbed and/or possibly roughly re-laid.
- 3.12 Moving south, the south-west part of the furnace room's floor comprises a large expanse of worn or very worn flags running in north-south lines broadly parallel to the west wall [4/131, 4/138, 4/166, 4/169, 4/170], although a narrower area adjacent to the west wall run east-west instead. The very worn flags are concentrated in a band starting adjacent to the doorway at the south end of the west wall and then running east [4/133, 4/134]. The floor in this area contains two features of interest. The most prominent is a north-west/south-east aligned trench or channel (B), running from the area south of the ore hearth where the flags are missing towards a covered drain or culvert (see D below) [4/132, 4/135, 4/139, 4/167, 4/168] (see plate 16). This channel is on average 0.50m wide and has a

maximum visible length of 3.70m; it is filled with compacted soil and sheep manure, and so the depth is unknown. Its edges are very neatly constructed, and it is important to note that the alignments of the rows of flags to either side do not match up. This shows that the channel (B) was not cut through an existing flagged floor, but was rather included in it when this part of the floor was laid. To the west of the channel, the second feature is formed by a single flag (C) which has been neatly inserted at an angle to all of the surrounding flagstone floor.

### *The Central Area*

- 3.13 A covered culvert or drain (D) appears to run parallel to the south wall of the furnace room, across the full width of the building [4/136, 4/178, 4/179] (see plate 17). The centre of the culvert is set on average 1.40m to the north of the south wall, although the surface width varies according to the flags which have been used to cover it. The construction of the culvert suggests that new flags were brought in to the furnace room specifically for this purpose; the stones are noticeably less worn than those to either side, and there are several examples of stones with a rough surface and high fossil (crinoid) content which occur only on the line of the culvert. There is a slight break in the line of the culvert to the south-east of the former sheep dip, but it then resumes to run to the doorway at the south end of the east wall [4/158] (see plate 20). The alignment of the culvert between the two doorways is significant, as during heavy rain a significant amount of water drips off the building's eaves and then runs into the interior of the furnace room; indeed, during the recording work, water was noted running in through the east doorway, pooling on the line of the culvert and then draining into it through a joint between two stones.
- 3.14 The base of the central ore hearth (E) was exposed but unfortunately, like the west ore hearth, all traces of the hearth itself had been removed. The base of the hearth is rectangular in plan, measuring 2.00m north-south by at least 1.50m east-west [4/149, 4/150, 4/171, 4/172, 4/174] (see plate 18), although it has been partly truncated by the concrete sheep dip to the east [4/129, 4/130, 4/137, 4/162, 4/164] (see plate 19). The hearth is formed by compacted mortared stone rubble edged with bricks to the west and south sides; the bricks were handmade, red (i.e. not the firebricks seen elsewhere in the furnace room), with average dimensions of 230mm by 110mm. This indicates a different design of ore hearth to the western example, although there is still more than enough room for the structure, with the sumpter pot presumably set to the immediate south. It was thought that the advertised rebuilding of some hearths at Grinton in 1890 and 1892 was simply a means of luring investors to part with their money (Lamb 2017, 16), but it is possible that the central hearth was actually rebuilt. To the west and south-west of the central ore hearth, there is an area of flags running parallel to the tuyère cross wall. These flags are very neatly cut, having a smooth, almost polished, surface [4/151, 4/152]; if the hearth was rebuilt in the early 1890s, then these new flags may have been laid at the same time.

### *The Eastern Area*

- 3.15 Moving east, the area of flooring between the concrete sheep dip and the east wall of the furnace room is perhaps the most altered in the entire building [4/159-4/161, 4/163, 4/165] (see plate 19). To the south of the aforementioned culvert (D), the flags are laid in lines running north-south, broadly parallel to the furnace room's east wall. To the north of the culvert, there is a central section of flags on the same orientation, but the majority of those to the east and west run east-west, broadly parallel to the furnace room's south wall. Of these flags, a considerable

number are either worn or very worn, with the latter all to the north of the culvert line.

- 3.16 To the north of the culvert line (D), there are two features of note. One is a north-west/south-east joint or line (F) placed on a very similar orientation to the channel (B) described above to the south of the western ore hearth. Only the eastern edge is clearly defined, but this is again very neat as with feature B; the visible part measures 1.60m in length, and the flags along its line may represent later infilling of a channel or trench (see plate 20). At its north-west end, there is a single inserted flag (G) placed at an angle to all others surrounding it, similar to the example described on the western side of the furnace room.
- 3.17 To the north, there are two areas of flags displaying little wear, which run parallel to the angled rear wall of the arch formerly containing the slag hearth [4/173, 4/175] (see plate 21); following clearance, a step or plinth was exposed at the base of the west part of the wall. The plinth may once have run the entire width of the slag hearth bay, and might possibly represent later rebuilding or alteration here; no similar plinths were exposed anywhere else in the furnace room. The two areas of flags are separated by a space where the floor is missing, and it is noticeable that the whole surface of the eastern area is set slightly lower than that of the western area. What appears to be a small diameter iron pipe set into the floor leaves the east wall of the furnace room to run parallel to the southern side of the eastern area of flags.
- 3.18 The reduction in height of the floor level through the removal of the sheep manure exposed more of the south elevation of the slag hearth (H) than had previously been visible [4/153-4/156, 4/176, 4/177] (see plate 22); as a result, a previous drawing of the slag hearth made from measurements taken in 1992-93 (Lamb 2017, 4) was re-drawn (see figure 8). The top left-hand tie-bar associated with the slag hearth could be seen as it passed into the loose masonry behind; it was of circular, rather than of flat, cross section and more than 0.51m in length. The one inch (25 mm) diameter matched that of the other tie-bars emerging from the tuyère cross wall, although this does not prove that they actually passed right through. The removal of the sheep manure revealed three or four lower courses of bricks forming some sort of plinth to the east of the hearth; some of the bricks to the lowest course, assumed to be a foundation layer running under the whole structure, retained a coating of mortar. Several large stones filled the gap between the two brick columns of the slag hearth. It was also noticeable that there were two firebricks immediately on top of the east column set back into the line of the later stone wall over and, to the east end of the basal structure, two courses of firebricks were set half a brick back from the main face. In view of the unexpected brickwork exposed to the east of the hearth, totally unlike any known illustrations of slag hearths, it is suggested that a later rebuilding or alteration took place to the structure, the extent of which is currently unknown. Given what has been noted about the central ore hearth above, it is possible that any rebuilding of the slag hearth also took place in the early 1890s.

## 4 DISCUSSION AND CONCLUSIONS

- 4.1 The recording work undertaken during the clearance work at Grinton has raised several questions meriting further discussion, and these are outlined below.
- 4.2 Lamb has described the possible development of the smelt mill, and suggested that the early 18th century form was a simple rectangular building, represented by the present furnace room (Lamb 2017, 1-12). This may have had an internal

waterwheel and bellows in the eastern part and two furnaces to the west with north-south aligned arches over and a dividing wall, probably very similar in layout to the somewhat smaller Marrick High Mill in Swaledale. Of this early arrangement, there appeared to be absolutely no trace in the recorded flagstone floor, although this is hardly surprising in view of the alterations that may have been taken prior to 1774 and also the disturbance resulting from the insertion of the sheep dip into the centre of the furnace room during the 20th century.

4.3 The addition of the bellows room to the north side of the mill prior to 1774 meant that the three furnaces were repositioned along what had previously been the north wall of the building, with their associated furnace arches. It is possible that many of the flags surviving to the southern half of the furnace room, laid in rows aligned broadly north-south with narrower areas at either end running east-west, might relate to these pre-1774 alterations, although this cannot be proved. If this was the case, then it might suggest that the angled channel (B) and perhaps also the similarly-angled feature (F) to the east relate to this pre-1774 arrangement as well, as channel B was demonstrably not cut into the flags here at a later date; again this cannot currently be proved. Many of these flags are highly fractured, either worn or very worn according to the descriptive system devised for this report. It is suggested that this may be the result of deliberate damage, as the level of damage is beyond what might be expected through normal wear and tear (Richard Lamb, *pers. comm.*), although why the flags should be deliberately damaged in this way is unclear. The alterations of 1820-22 saw the three furnaces erected prior to 1774 moved somewhat towards the south, resulting in the angled alignment to the furnace room's north wall, which has a polygonal form rather like a flattened half hexagon. The pre-1774 furnace arch piers had been fitted into square-cut grooves on the east and west walls, which were reused for the angled arches built in 1820-22. The rebuilding of the arches would have removed or disturbed much of the earlier flagstone floor in the northern half of the room, and it is likely that the areas of angled flags to the east and west arches which are aligned on the tuyère cross wall were re-laid in 1822.

4.4 Lamb also recently advanced the hypothesis that the three hearths were supplied with water via lead pipes connected to the launder in the bellows room, and which passed through mural holes, of which three survive (Lamb 2017, 11). Although the precise purpose of this water supply is not known, it was surmised that it may have been for slag granulation or quenching. Slag granulation in this way would obviate the use of stamps or a roller crusher to break up the slags prior to gravity separation before further treatment, and indeed this procedure is described for a slag hearth, but not ore hearths, at Alston in Cumbria, using a flow of water (Martell & Gill 1990, 28). Percy (1870, 414) mentions that slag from the slag hearth ran into a water-filled slag pit made of brick at the Keldheads smelt mill in Wensleydale, whilst at the Old Gang smelt mill in Swaledale, a water trough with a feed arrangement discovered during the excavation of one of the ore hearths might have served a similar purpose (Cranstone 1992, 28-31); putting slags, even grey slags from the ore hearth, into cold water may have been more widely practised than the literature suggests. Evidently, any water being brought to the hearth(s) for this purpose would then have to be taken away, and it is conceivable that the linear angled channel (B) and perhaps also the other angled feature (F) to the east once held lead pipes which drained away surplus water into the presumed culvert (D) running along the south wall of the furnace room. If correct, this would have a number of implications for the phasing of the flagstone floor. For example, it would imply that channel B was installed at the time of the 1820-22 alterations; as has been already noted, it appears to be contemporary with the north-south rows of flags to either side, which would then imply that these too must also date to 1820-

22, rather than being pre-1774 as suggested above. In addition, the culvert D is clearly a later insertion into the flagstone floor here. If this was inserted in 1820-22, it would imply that at least some of the flags to the north and south were earlier than this; alternatively, might the original arrangement for removing surplus water provided in 1820-22 have been insufficient, so that it was later necessary to install the culvert?

- 4.5 The foundations of the western and central ore hearths show that they were placed more or less adjacent to the tuyère cross wall, resulting in the valves for adjusting the air flow being on the other (north) side of the wall; how convenient this arrangement was for the smelters is a matter of conjecture. The western ore hearth appears to have been of a rather old-fashioned form, and may represent the remains of a structure that was not radically altered after 1822, whereas the central ore hearth could have been rebuilt in the early 1890s and an associated area of flags to the immediate south and west replaced.
- 4.6 The exposure of the lower parts of the eastern slag hearth, previously unseen, has produced significant new information. The height of the lower tie-bar from the floor compares well with that shown by Percy (1870, 412-416), and the partial infilling across the front (incomplete on the right-hand, east, side) by the lower three courses of bricks may reflect the provision or location of reinforcement for the cast-iron bearers that supported the inner walls. The lowest course of brickwork, i.e. the foundations, may in fact run right the way across between pillars, although it was obscured by the remaining earth floor in this area. What the brick extension to the east of the slag hearth actually represents is unknown at present, but the remains here demonstrate yet another variation on a theme in slag hearth design and operation. Nationally, this subject has suffered from lack of research, caused principally by the almost total lack of surviving components. Although the later 'store room' walls and internal rubble infill built over the slag hearth at Grinton now disguise the extent to which it does survive, it retains the potential to be one of the best, if not the best, surviving examples of a slag hearth in the entire country.
- 4.7 The lack of any clearance work in the bellows room means that the presence or absence of flagstone flooring here remains unresolved. It is assumed that it either remains partly *in situ* at a lower level, or that it was subsequently robbed out after smelting ceased, since it is hard to imagine a room housing a waterwheel with its attendant splashing, the supports for a geared crank, and foundations for the bellows only being provided with an earthen floor.
- 4.8 It was most unfortunate that, soon after the archaeological recording and the wedding celebrations, the flagstone floor of the furnace room was again covered with a significant depth of sludge, stones and other debris as a consequence of severe flooding in Swaledale on the July 30th 2019.

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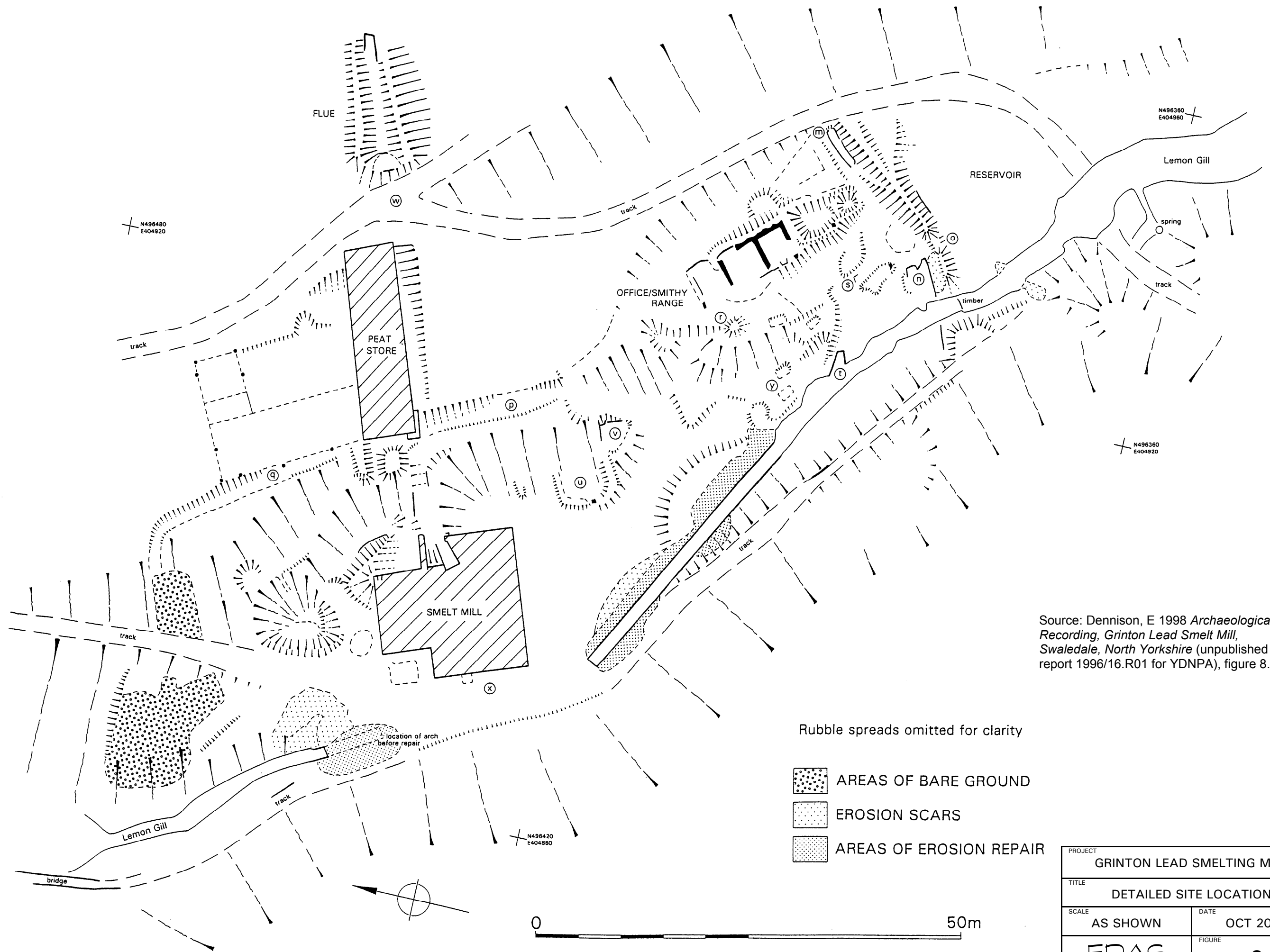
<http://www.dmm.org.uk> = Durham Mining Museum

<https://www.flickr.com/photos/97926191@N08/12743310633> = photograph of a Stobart and Partners brick from the Newton Cap brickworks, taken by Arthur Brickman on 1st January 2002




## **6 ACKNOWLEDGEMENTS**

- 6.1 The archaeological monitoring of the internal clearance works at the Grinton lead smelting mill was undertaken by Shaun Richardson (EDAS) and Richard Lamb, with funding provided by the YDNPA. The clearance work was arranged and organised by David Clarke and a number of volunteers. EDAS would like to thank Mr Miles Johnson, Senior Historic Environment Officer of the YDNPA, and David Clarke for their help with the project. Site photographs and drawings were produced by Shaun Richardson, and a draft report was significantly enhanced with expert comments by Richard Lamb. The final report was produced by Ed Dennison, who retains responsibility for any errors or inconsistencies.



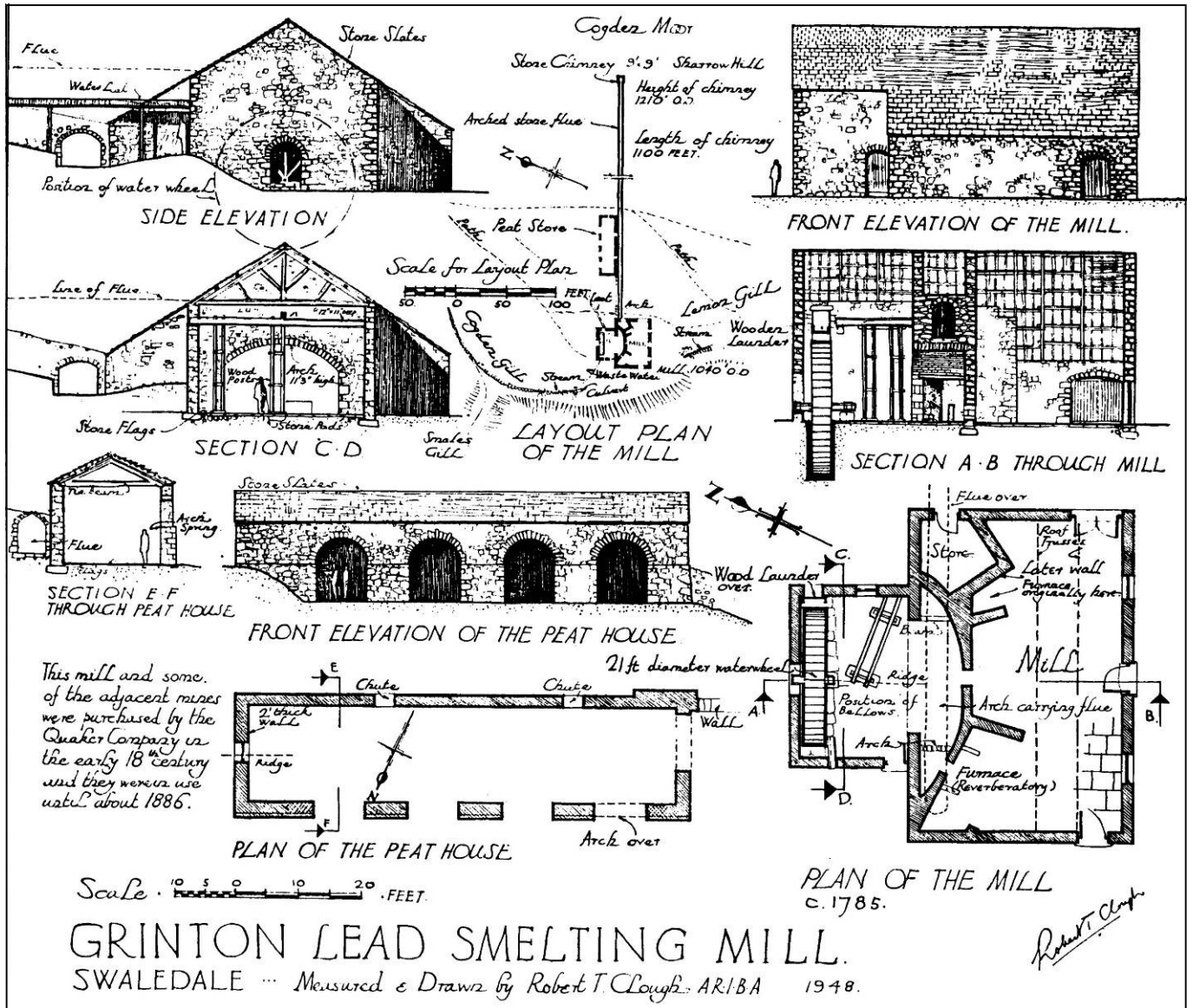


Source: Dennison, E 1998 *Archaeological Recording, Grinton Lead Smelt Mill, Swaledale, North Yorkshire* (unpublished EDAS report 1996/16.R01 for YDNPA), figure 8.

- Rubble spreads omitted for clarity
-  AREAS OF BARE GROUND
  -  EROSION SCARS
  -  AREAS OF EROSION REPAIR

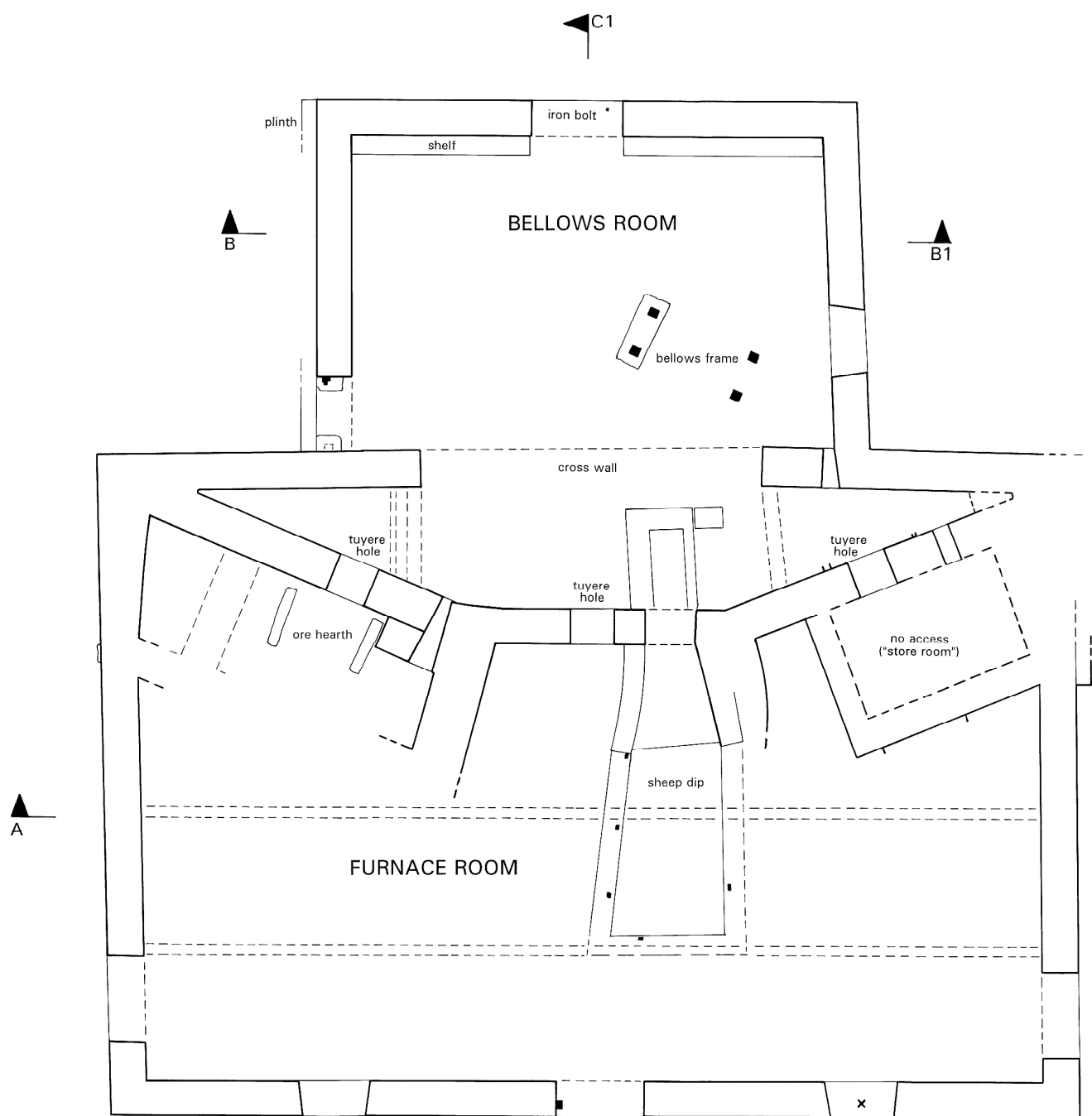
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TITLE		DETAILED SITE LOCATION	
SCALE	DATE	AS SHOWN	OCT 2019
EDAS	FIGURE		2





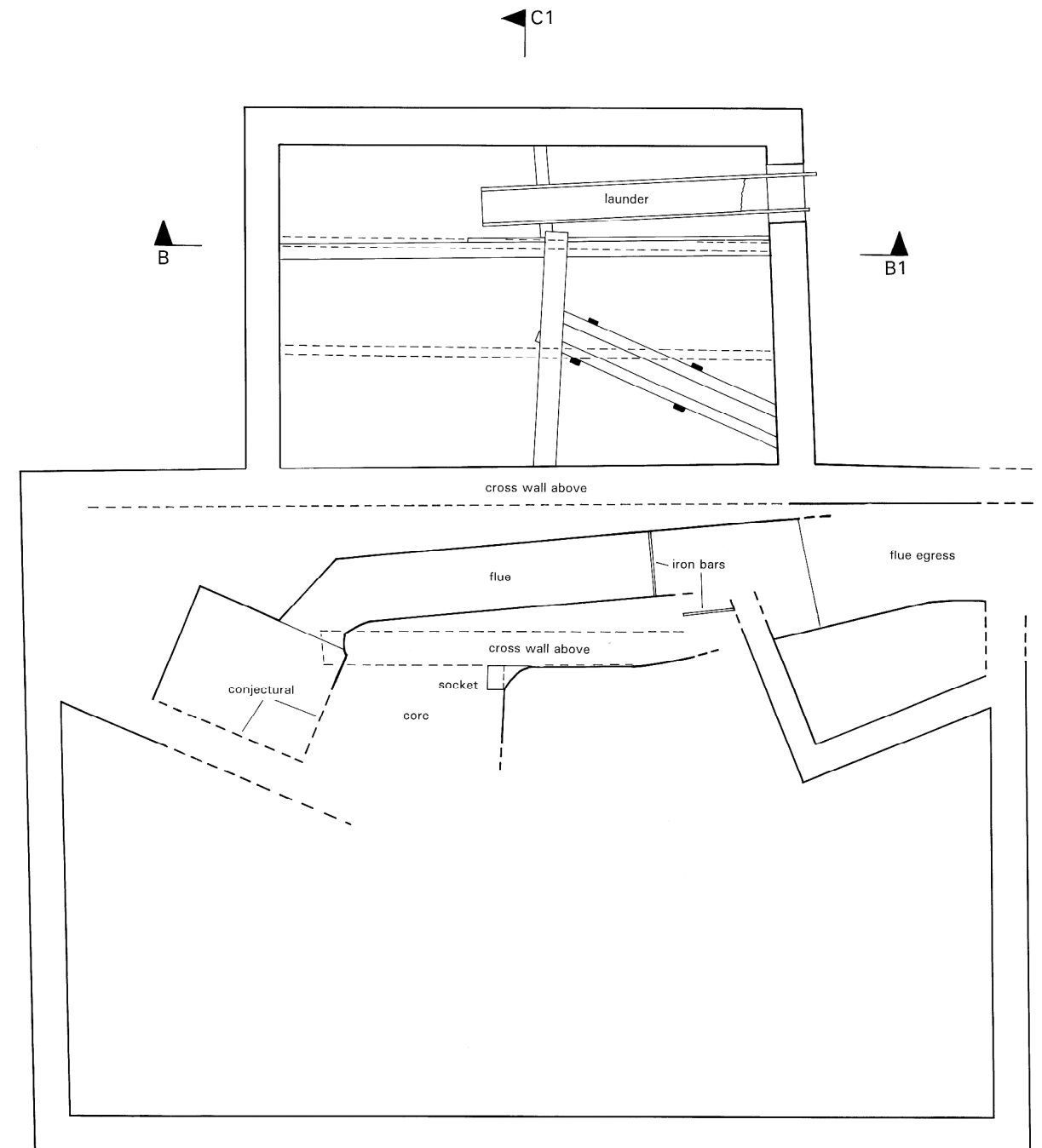
Source: Clough, R 1980 *The Lead Smelting Mills of the Yorkshire Dales and Northern Pennines* (2nd edition), p.111.

PROJECT		GRINTON LEAD SMELTING MILL	
TITLE		CLOUGH'S 1948 SURVEY	
SCALE	AS SHOWN	DATE	OCT 2019
EDAS		FIGURE	3



GROUND FLOOR

TBM 95.92m LD



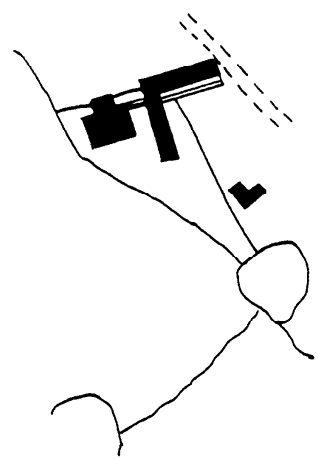
UPPER LEVEL

Cross section of timbers shown in black

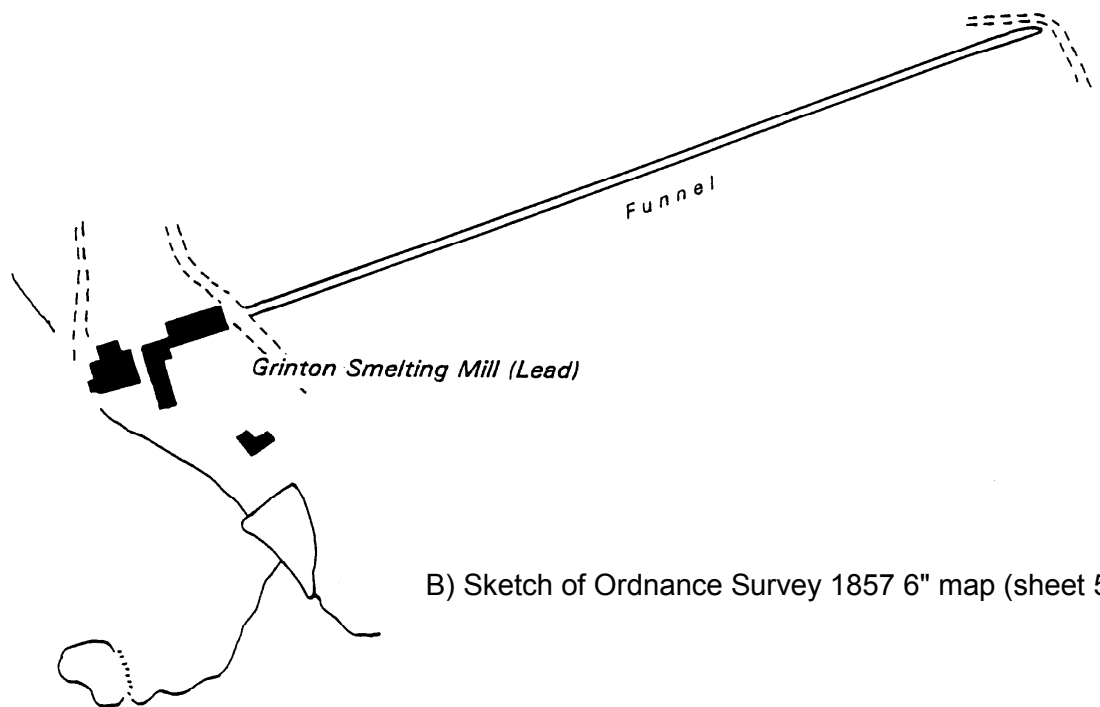


Source: Dennison, E 1998 *Archaeological Recording, Grinton Lead Smelt Mill, Swaledale, North Yorkshire* (unpublished EDAS report 1996/16.R01 for YDNPA), figure 3.

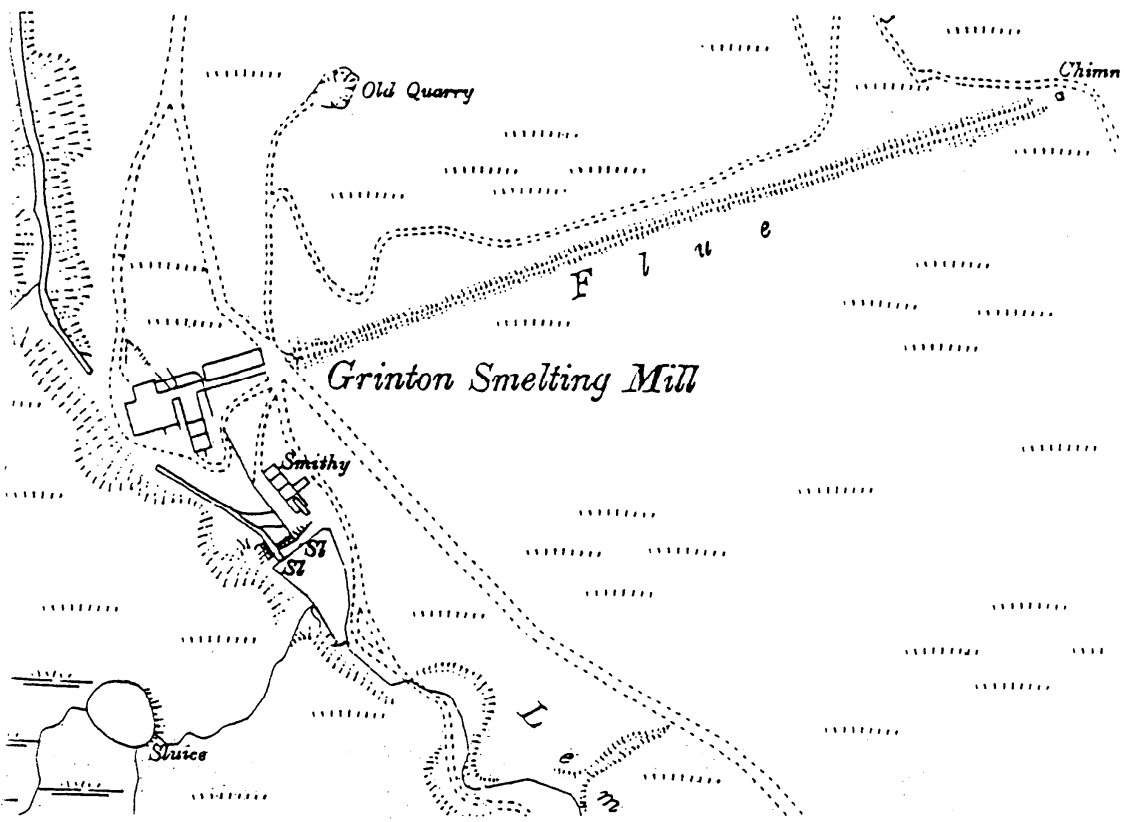
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TITLE 1996 EDAS SURVEY	
SCALE AS SHOWN	DATE OCT 2019
EDAS	FIGURE 4



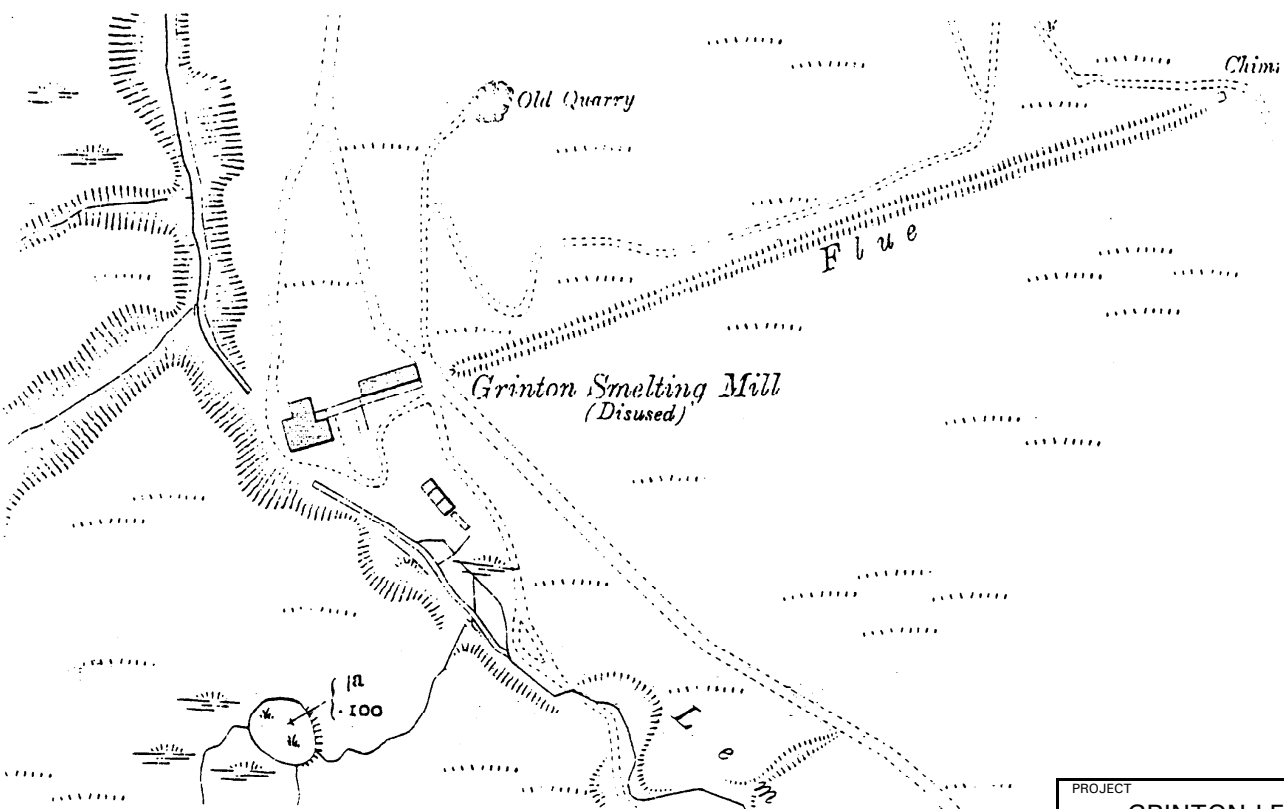
A) Sketch of c.1774 map.



B) Sketch of Ordnance Survey 1857 6" map (sheet 52).



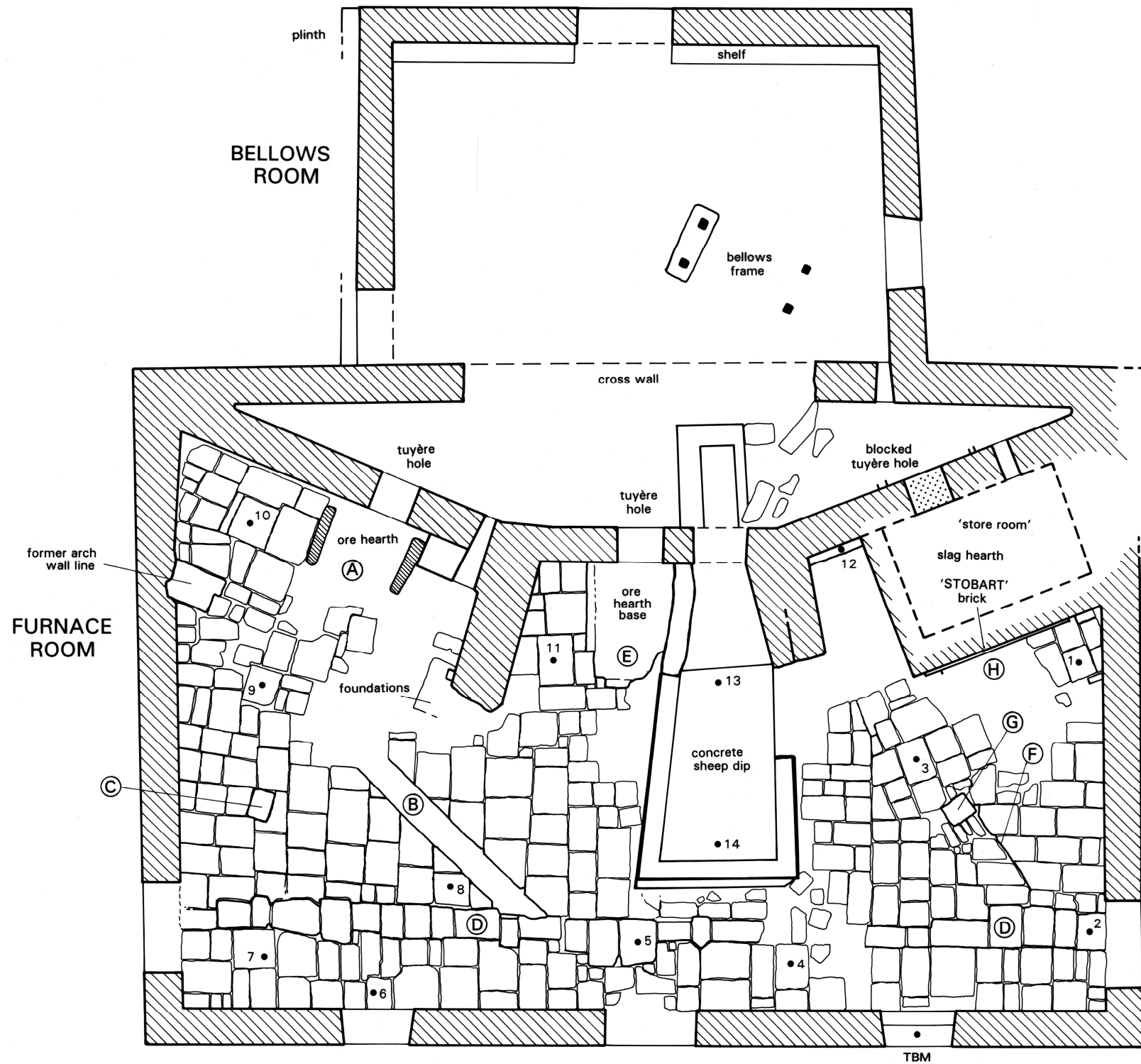
C) Ordnance Survey 1893 25" map (sheet 52/8).



D) Ordnance Survey 1913 25" map (sheet 52/8).

Source: Dennison, E 1998 *Archaeological Recording, Grinton Lead Smelt Mill, Swaledale, North Yorkshire* (unpublished EDAS report 1996/16.R01 for YDNPA), figure 2.

PROJECT		GRINTON LEAD SMELTING MILL	
TITLE		HISTORIC MAPS	
SCALE	AS SHOWN	DATE	OCT 2019
EDAS		FIGURE	5



- Features
- (A) Western ore hearth
  - (B) Trench or channel
  - (C) Inserted flag stone
  - (D) Covered culvert or drain
  - (E) Central ore hearth base
  - (F) Edge of trench or channel
  - (G) Inserted flag stone
  - (H) South elevation of slag hearth

- Levels (OD)
- TBM 95.92m
  - 1 = 94.84m
  - 2 = 94.98m
  - 3 = 94.95m
  - 4 = 94.98m
  - 5 = 94.98m
  - 6 = 95.02m
  - 7 = 94.94m
  - 8 = 94.99m
  - 9 = 94.99m
  - 10 = 94.99m
  - 11 = 95.00m
  - 12 = 94.96m
  - 13 = 94.96m
  - 14 = 95.12m

Ground plan



0  10m

PROJECT GRINTON LEAD SMELTING MILL	
TITLE RESULTS OF MONITORING	
SCALE AS SHOWN	DATE OCT 2019
EDAS	FIGURE 6





- Features
- (A) Western ore hearth
  - (B) Trench or channel
  - (C) Inserted flag stone
  - (D) Covered culvert or drain
  - (E) Central ore hearth base
  - (F) Edge of trench or channel
  - (G) Inserted flag stone
  - (H) South elevation of slag hearth

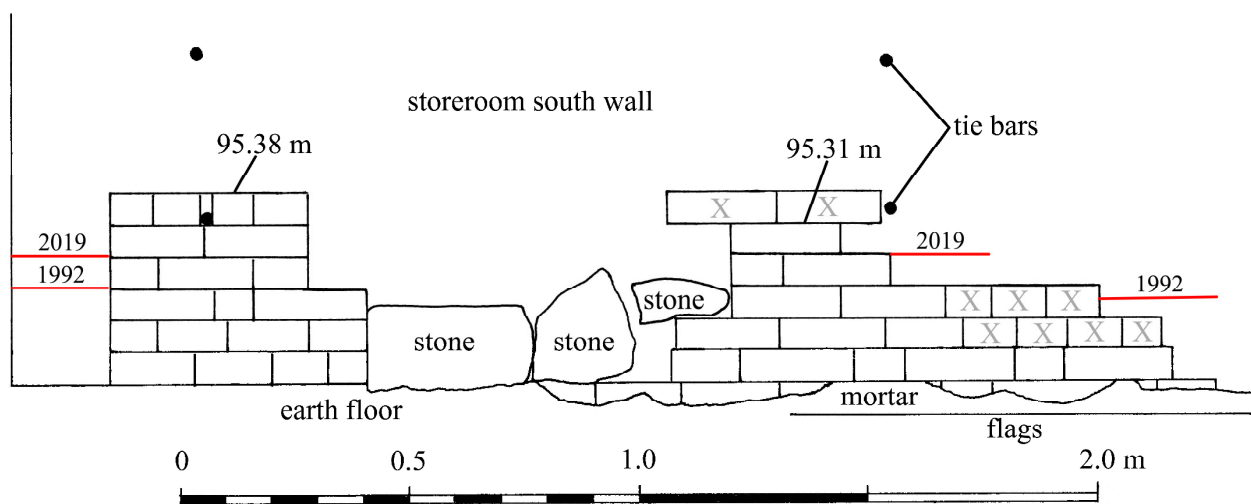


Ground plan



PROJECT GRINTON LEAD SMELTING MILL	
TITLE WEAR ON FLAGSTONE FLOOR	
SCALE AS SHOWN	DATE OCT 2019
EDAS	FIGURE 7

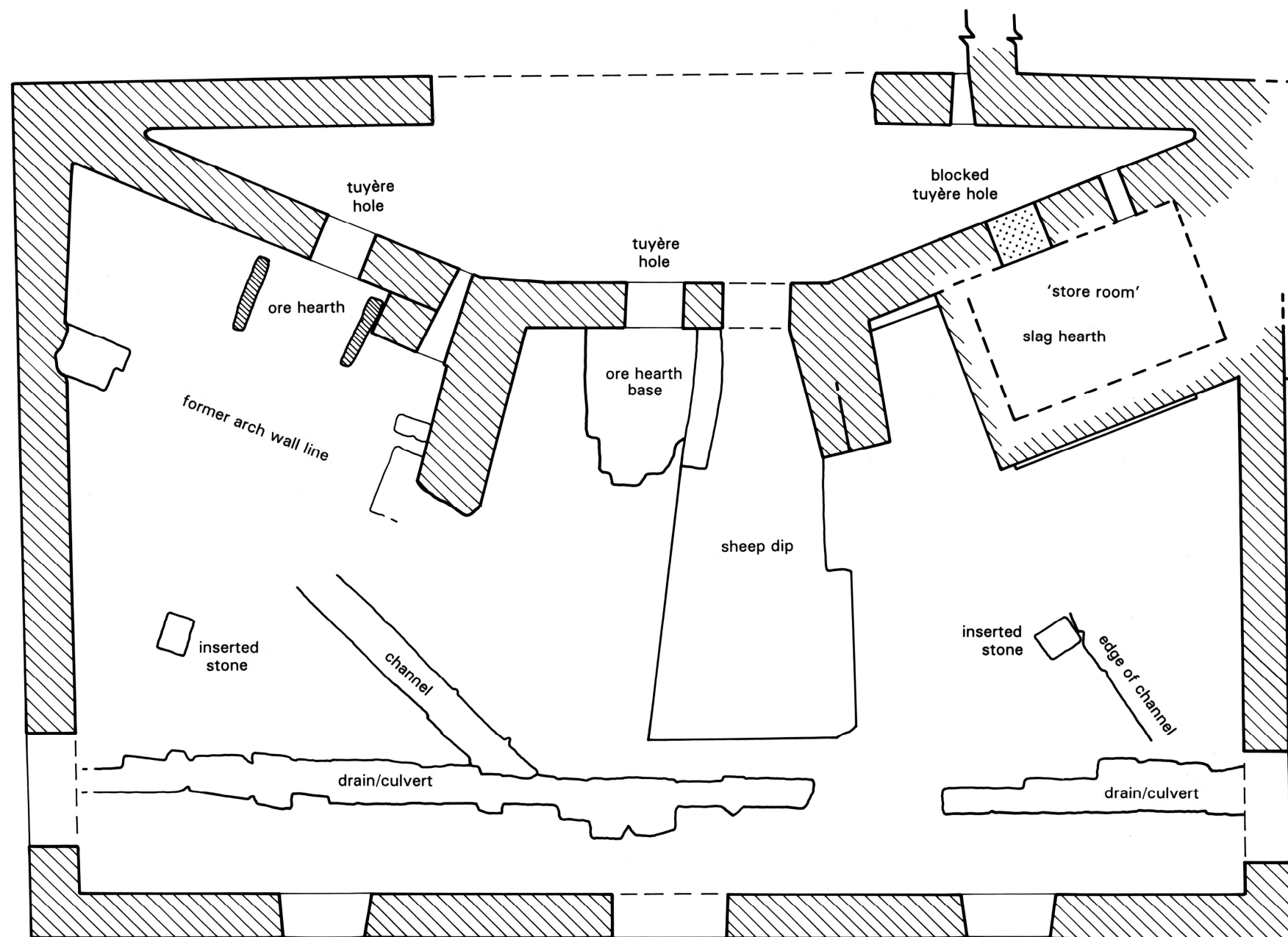




Drawing produced by Richard Lamb, reproduced with permission.

Shows the remains of the slag hearth, displaying the freshly-exposed firebricks, the positions of the four tie bars, the approximate heights of floor coverings at the dates shown (2019 prior to clearance), the set-back rows of bricks marked with a pale grey X, and the cleared floor levels.

PROJECT		GRINTON LEAD SMELTING MILL	
TITLE		REMAINS OF SLAG HEARTH	
SCALE	AS SHOWN	DATE	OCT 2019
EDAS		FIGURE	8



FURNACE ROOM

Ground plan



PROJECT		GRINTON LEAD SMELTING MILL	
TITLE		INTERPRETATION OF RESULTS	
SCALE	AS SHOWN	DATE	OCT 2019
EDAS		FIGURE	9





Plate 1: General view of smelt mill, looking NW (photo 1/198).



Plate 2: Furnace Room, prior to clearance, looking NW (photo 1/182).





Plate 3: Bellows Room, prior to clearance, looking SE (photo 1/194).



Plate 4: West and central parts of furnace room, during clearance, looking W (photo 1/200).





Plate 5: Furnace Room, after clearance, looking E (photo 3/360).



Plate 6: Furnace Room, during clearance, typical section through compacted sheep manure and soil, looking N (photo 1/215).





Plate 7: Bellows Room, after limited clearance, looking SE (photo 4/180).



Plate 8: Cast-iron plate, with curved profile to one side, recovered during excavations (photo 5/241).





Plate 9: Wrought-iron artefact, possible bifurcated stay, recovered during excavations (photo 5/239).



Plate 10: Wrought-iron artefact, possible two-handed tool or tongs recovered during excavations (photo 5/240).





Plate 11: Hand-moulded firebrick, stamped COWEN, recovered during excavations (photo 5/236).



Plate 12: Hand-moulded firebrick, stamped N CAP, recovered during excavations (photo 5/237).





Plate 13: General view of furnace room, after clearance and cleaning, looking W (photo 4/125).



Plate 14: Western ore hearth in furnace room, after clearance and cleaning, looking NW (photo 4/142).





Plate 15: Western ore hearth in furnace room, after clearance and cleaning, looking N (photo 4/146).



Plate 16: Flagstone floor in west side of furnace room, after clearance and cleaning, looking S (photo 4/168).





Plate 17: Flagstone floor in furnace room, after clearance and cleaning, showing west end of covered culvert (D), looking E (photo 4/136).



Plate 18: Furnace Room, base of central ore hearth, after clearance and cleaning, looking NE (photo 4/150).





Plate 19: East side of furnace room, after clearance and cleaning, showing sheep dip and differential wear to flagstone floor, looking S (photo 4/160).



Plate 20: Flagstone floor in east side of furnace room, after clearance and cleaning, showing east end of covered culvert (D) and angled channel (F), looking SE (photo 4/158).





Plate 21: North-east corner of furnace room, after clearance and cleaning, showing store room and slag hearth position, looking NE (photo 4/173).



Plate 22: Furnace Room, south side of store room, after clearance and cleaning, showing remains of slag hearth, looking N (photo 4/153).





Plate 23: Wedding preparations in the furnace room (photo supplied by David Clarke).



Plate 24: Wedding preparations in the furnace room (photo supplied by David Clarke).



Plate 25: Wedding preparations in the furnace room (photo supplied by David Clarke).

APPENDIX 1  
EDAS PHOTOGRAPHIC CATALOGUE

## GRINTON CLEARANCE PHOTOGRAPHIC CATALOGUE

Film 1: Colour digital photographs taken 25th February 2019

Film 2: Colour digital photographs taken 1st March 2019

Film 3: Colour digital photographs taken 25th April 2019

Film 4: Colour digital photographs taken 5th June 2019

Film 5: Colour digital photographs of recovered finds

<i>Film</i>	<i>Frame</i>	<i>Subject</i>	<i>Scale</i>
1	176	Furnace Room, western hearth (A) prior to clearance, looking NW	2 x 1m
1	178	Furnace Room, western hearth (A) prior to clearance, looking N	2 x 1m
1	180	Furnace Room, western and central hearths (A & E) prior to clearance, looking NW	2 x 1m
1	182	Furnace Room, sheep dip prior to clearance, looking NW	2 x 1m
1	183	Furnace Room, south side of store room and remains of slag hearth (H) prior to clearance, looking N	2 x 1m
1	184	Furnace Room, east side prior to clearance, looking NW	2 x 1m
1	185	Furnace Room, general view prior to clearance, looking W	2 x 1m
1	188	Bellows Room, south-west corner prior to clearance, looking W	2 x 1m
1	189	Bellows Room, south-west corner prior to clearance, looking SW	2 x 1m
1	190	Bellows Room, western tuyere hole prior to clearance, looking W	-
1	191	Bellows Room, blocked eastern tuyere hole prior to clearance, looking E	1m
1	192	Bellows Room, north-west corner prior to clearance, looking NW	2 x 1m
1	193	Bellows Room, west side prior to clearance, looking W	2 x 1m
1	194	Bellows Room, prior to clearance, looking SE	2 x 1m
1	195	Bellows Room, prior to clearance, looking NE	2 x 1m
1	196	Bellows Room, base of bellows frame prior to clearance, looking NE	1m
1	197	Bellows Room, base of bellow frame prior to clearance, looking S	1m
1	198	General view of smelt mill, looking NW	-
1	200	Furnace Room, west and central areas during clearance, looking W	2 x 1m
1	203	Furnace Room, central area during clearance, looking N	2 x 1m
1	204	Furnace Room, west and central areas during clearance, looking E	2 x 1m
1	205	Furnace Room, west and central areas during clearance, looking E	2 x 1m
1	208	Furnace Room, detail of floor in western area during clearance, looking N	1m
1	209	Furnace Room, detail of floor and channel (B) during clearance, looking E	2 x 1m
1	210	Furnace Room, west and central areas during clearance, looking NE	2 x 1m
1	213	Furnace Room, west and central areas during clearance, looking SE	2 x 1m
1	214	Furnace Room, detail of floor and channel (B) during clearance, looking W	1m
1	215	Furnace Room, during clearance, typical section through compacted sheep manure and soil, looking N	0.3m
1	216	Furnace Room, during clearance, typical section through compacted sheep manure and soil, looking N	0.3m
1	218	Furnace Room, central area during clearance, looking E	1m
1	219	Furnace Room, western area during clearance, looking S	1m
1	220	Furnace Room, central area during clearance, looking SE	1m
1	221	Furnace Room, west and central areas during clearance, looking SE	2 x 1m
1	222	Furnace Room, western hearth (A), partly excavated, looking N	1m
2	243	Furnace Room, covered culvert (D) during clearance, looking E	1m
2	244	Furnace Room, west and central areas during clearance, looking NE	1m
2	246	Furnace Room, west and central areas during clearance, looking W	1m
2	247	Furnace Room, base of central hearth (E) during clearance, looking N	1m
2	248	Furnace Room, east and central areas during clearance, looking NW	1m
2	249	Furnace Room, position of slag hearth (H) during clearance, looking N	1m
2	250	Furnace Room, general view during clearance, looking W	1m
3	347	Furnace Room, north-west corner after clearance, looking NW	1m
3	348	Furnace Room, western hearth (A) after clearance, looking NW	2 x 1m
3	349	Furnace Room, western hearth (A) after clearance, looking N	2 x 1m
3	351	Furnace Room, central hearth (E) after clearance, looking N	2 x 1m
3	352	Furnace Room, area to front of slag hearth (H) after clearance, looking N	2 x 1m
3	353	Furnace Room, area to front of slag hearth (H) after clearance, looking NE	2 x 1m
3	354	Furnace Room, remains of slag hearth (H) after clearance, looking N	1m



3	355	Furnace Room, general view after clearance, looking W	2 x 1m
3	356	Furnace Room, general view after clearance, looking W	2 x 1m
3	357	Furnace Room, general view of north wall after clearance, looking NW	1m
3	358	Furnace Room, general view of north wall after clearance, looking NE	1m
3	359	Furnace Room, general view of north wall after clearance, looking NE	1m
3	360	Furnace Room, general view after clearance, looking E	2 x 1m
3	361	Bellows Room, exposed slab beneath west uprights of bellows frame, looking E	1m
4	124	Furnace Room, general view after clearance and cleaning, looking W	3 x 1m
4	125	Furnace Room, general view after clearance and cleaning, looking W	3 x 1m
4	127	Furnace Room, west half after clearance and cleaning, looking SW	2 x 1m
4	128	Furnace Room, west half showing channel (B), after clearance and cleaning, looking SW	2 x 1m
4	129	Furnace Room, sheep dip after clearance and cleaning, looking S	1m
4	130	Furnace Room, sheep dip after clearance and cleaning, looking W	3 x 1m
4	131	Furnace Room, west half and channel (B), after clearance and cleaning, looking SW	2 x 1m
4	132	Furnace Room, west half showing covered culvert (D), after clearance and cleaning, looking E	3 x 1m
4	133	Furnace Room, general view after clearance and cleaning, looking E	3 x 1m
4	134	Furnace Room, general view after clearance and cleaning, looking E	3 x 1m
4	135	Furnace Room, west half and channel (B) after clearance and cleaning, looking E	3 x 1m
4	136	Furnace Room, west end of covered culvert (D) after clearance and cleaning, looking E	3 x 1m
4	137	Furnace Room, sheep dip after clearance and cleaning, looking SE	1m
4	138	Furnace Room, west half after clearance and cleaning, looking SW	2 x 1m
4	139	Furnace Room, west half and channel (B), after clearance and cleaning, looking SW	2 x 1m
4	140	Furnace Room, western hearth (A) after clearance and cleaning, looking N	2 x 1m
4	141	Furnace Room, western hearth (A) after clearance and cleaning, looking N	2 x 1m
4	142	Furnace Room, western hearth (A) after clearance and cleaning, looking NW	2 x 1m
4	143	Furnace Room, western hearth (A) after clearance and cleaning, looking NW	2 x 1m
4	144	Furnace Room, western hearth (A) after clearance and cleaning, looking NW	2 x 1m
4	145	Furnace Room, western hearth (A) after clearance and cleaning, looking N	2 x 1m
4	146	Furnace Room, western hearth (A) after clearance and cleaning, looking N	2 x 1m
4	147	Furnace Room, flagstones to north-west of western hearth (A) after clearance and cleaning, looking NW	1m
4	148	Furnace Room, flagstones to north-west of western hearth (A) after clearance and cleaning, looking NW	1m
4	149	Furnace Room, central hearth (E) after clearance and cleaning, looking N	2 x 1m
4	150	Furnace Room, central hearth (E) after clearance and cleaning, looking NE	2 x 1m
4	151	Furnace Room, flagstones to west of central hearth (E) after clearance and cleaning, looking W	2 x 1m
4	152	Furnace Room, flagstones to west of central hearth (E) after clearance and cleaning, looking NE	2 x 1m
4	153	Furnace Room, south side of store room after clearance and cleaning, showing remains of slag hearth (H), looking N	2 x 1m
4	154	Furnace Room, south side of store room after clearance and cleaning, showing remains of slag hearth (H), looking N	1m
4	155	Furnace Room, south side of store room after clearance and cleaning, showing remains of slag hearth (H), looking NE	2 x 1m
4	156	Furnace Room, south side of store room after clearance and cleaning, showing remains of slag hearth (H), looking N	2 x 1m
4	158	Furnace Room, east side after clearance and cleaning, showing east end of covered culvert (D) and aligned channel (F), after clearance and cleaning, looking SE	1m
4	159	Furnace Room, east side showing aligned channel (F) after clearance and cleaning, looking SE	2 x 1m
4	160	Furnace Room, east side after clearance and cleaning, looking S	2 x 1m
4	161	Furnace Room, east side showing differential wear to flagstones, after clearance and cleaning, looking S	2 x 1m
4	162	Furnace Room, sheep dip after clearance and cleaning, looking S	1m
4	163	Furnace Room, east side after clearance and cleaning, looking S	1m
4	164	Furnace Room, sheep dip after clearance and cleaning, looking S	1m
4	165	Furnace Room, east side after clearance and cleaning, looking S	2 x 1m
4	166	Furnace Room, west side after clearance and cleaning, looking S	1m
4	167	Furnace Room, west side after clearance and cleaning showing channel (B), looking S	1m
4	168	Furnace Room, west side after clearance and cleaning showing channel (B), looking S	1m

4	169	Furnace Room, west side after clearance and cleaning, looking S	1m
4	170	Furnace Room, west side after clearance and cleaning, looking S	1m
4	171	Furnace Room, north wall after clearance and cleaning, looking N	1m
4	172	Furnace Room, north wall and central hearth (E), after clearance and cleaning, looking N	1m
4	173	Furnace Room, north-east corner after clearance and cleaning, showing store room and slag hearth position (H), looking NE	1m
4	174	Furnace Room, north wall and central hearth (E) after clearance and cleaning, looking NW	1m
4	175	Furnace Room, north wall and slag hearth (H) after clearance and cleaning, looking NE	1m
4	176	Furnace Room, north wall after clearance and cleaning, looking NW	2 x 1m
4	177	Furnace Room, north wall after clearance and cleaning, looking NW	2 x 1m
4	178	Furnace Room, south wall after clearance and cleaning, looking SW	-
4	179	Furnace Room, south wall after clearance and cleaning, looking SW	-
4	180	Bellows Room, south wall after limited clearance and cleaning, looking SE	1m
4	181	Bellows Room, east side after clearance and cleaning, looking E	1m
4	182	Bellows Room, east side after clearance and cleaning, looking E	1m
4	183	Bellows Room, west side after clearance and cleaning, looking NW	1m
5	236	Hand-moulded brick, stamped COWEN, recovered during excavations	0.30m
5	237	Hand-moulded brick, stamped N CAP, recovered during excavations	0.30m
5	238	Hand-moulded brick, stamped L & M, recovered during excavations	0.30m
5	239	Wrought-iron artefact, possible bifurcated stay, recovered during excavations	0.30m
5	240	Wrought-iron artefact, possible two-handed tool or tongs, recovered during excavations	0.30m
5	241	Cast-iron plate with curved profile to one site, recovered during excavations	0.30m

APPENDIX 2  
EDAS WRITTEN SCHEME OF INVESTIGATION

INTERNAL CLEARANCE WORKS,  
GRINTON LEAD SMELTING MILL,  
CODGEN GILL, SWALEDALE, NORTH YORKSHIRE

WRITTEN SCHEME OF INVESTIGATION  
FOR A PROGRAMME OF  
ARCHAEOLOGICAL RECORDING

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# **INTERNAL CLEARANCE WORKS, GRINTON LEAD SMELTING MILL, CODGEN GILL, SWALEDALE, NORTH YORKSHIRE**

## **WRITTEN SCHEME OF INVESTIGATION FOR A PROGRAMME OF ARCHAEOLOGICAL RECORDING**

### **1 INTRODUCTION**

- 1.1 This Written Scheme of Investigation (WSI) details the work required to undertake a programme of architectural recording, to be carried out during various internal clearance works at the Grinton lead smelting mill, Cogden Gill, Swaledale, North Yorkshire (NGR SE 04877 96425 centred). This clearance work is being done to facilitate a wedding inside the mill on 27th July 2019.
- 1.2 This written scheme has been produced by Ed Dennison Archaeological Services Ltd (EDAS), at the request of the Senior Historic Environment Officer at the Yorkshire Dales National Park Authority (YDNPA), Mr Miles Johnson.

### **2 SITE LOCATION AND DESIGNATIONS**

- 2.1 The Grinton smelt mill complex is located c.2km to the south of Grinton village, on the east side of the Cogden Gill at the junction of Smales Gill and Lemon Gill (see figure 1). The smelt mill is aligned north-east/south-west with a detached peat store at approximately 90 degrees to this.
- 2.2 The smelt mill is both a Grade II Listed Building (National Heritage List for England (NHLE) 1318580), first listed on 13th February 1973, and a Scheduled Monument (NHLE 1016203), first scheduled on 15th May 1974; the Scheduled Monument area includes the mill, the flue, the fuel (peat) store and associated earthworks (see figure 1). The dual listing means that the Scheduled Monument legislation takes precedence.
- 2.3 The smelt mill is also listed on the YDNPA Historic Environment Record (site MYD4538) and Historic England's National Record of the Historic Environment (NRHE - Pastscape) (monument 48831; NMR SE 09 NW 39).

### **3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

- 3.1 The historical and archaeological background to the smelt mill complex has already been researched and discussed in some detail (Tyson, Spensley & White 1995), and so the following provides a brief summary.
- 3.2 The Grinton mill is only one of a number of lead smelting mills which were built in this part of Swaledale, the others being Grovebeck Mill, New Mill, and Scotts Mill (Smith 1997). None of these survive to any great degree and the Grinton mill represents the best preserved example of all those within the Yorkshire Dales National Park.
- 3.3 No specific date for the building of the Grinton mill is known, but it was probably constructed by Reginald Marriott in the early 18th century, possibly between 1705-10, after he purchased the rights to the surface waste in the Manor of Grinton. Marriott had previously sent most of his lead ore to a smelt mill at Marrick and the fact that he had obtained the rights of turbarry (peat cutting) in the area, as well as owning some coal mines and stone quarries, meant that he was in a good position to build and operate a new mill at relatively low cost. The location for this new mill

took advantage of the plentiful water supply provided by a spring and the Codgen Gill, and was close to the developing mines on Grinton How. For this reason, the mill is also known as the How or Low Mill.

- 3.4 The first documented reference to the mill occurs in 1722-23, and in 1733 the mill and its utensils were included in a proposed sale to the London Lead Company. However, this sale never went through and in 1756 the mill was sold by Hugh Marriott's wife to Caleb Readshaw, a Richmond merchant with interests in other mines in the Dales (Tyson & Gill 1992, 152); at this time the mill was described as "the smelting mill with a little house or chamber and backside thereunto". The first account of production at the mill occurs in the 1750s, with 194 fadders (213 tons) of lead being smelted between August 1758 and September 1759. A map of the Manor of Grinton made in 1768 depicts the mill as a single building with a chimney at the south end, and there is a separate peat store and two reservoirs. A slightly later map of 1774 shows a T-shaped building with water courses, although no chimney or flue beyond the peat store is indicated. In 1776 the tools and utensils at the mill were valued at £60 3s 7d, and the accounts suggest that Readshaw leased the mill rather than working it himself.
- 3.5 In 1791 the mill was sold by Caleb Readshaw Morley, the grandson of the Caleb Readshaw mentioned above, to James Fenton and Edward Wilkinson who became the new Manorial Lords. In 1803 the mill was sold again, to Christopher and Mathew Whitelock of Cogden Hall who were shareholders in the Grinton lead mines at this time. Between 1820-22 ore from the Grinton mill was being sent to some of the other nearby smelt mills, probably Scott's Mill at Grovebeck, and this has led to the suggestion that the Grinton mill was being rebuilt at this time. Further evidence for this is provided by an 1830 report by the Crown's Agent, John Bower, which mentions that Robinson, Whitelock and Company had recently erected a new mill on the waste at Grinton.
- 3.6 The Ordnance Survey 1st edition (1856) 6" map (sheet 52) shows the complex as comprising a T-shaped mill, with small annexes on the west and south sides in the south west corner, a rectangular peat store with a range of structures attached to its west end and extending to the south, and a flue (named as a 'funnel') running to the top of Sharrow Hill; no chimney is depicted or named. A second small L-shaped range of buildings is shown between the peat store and the reservoir, and a second reservoir is suggested by a 'sluice' on the hillside to the west.
- 3.7 In 1876 the Crown sold the Grinton mineral rights to the Charlesworth family of Chapelthorpe Hall in Wakefield, who had purchased the manor in 1855. A list of equipment at the mill is given as: "250 loads of peat. 2 ore hearths, slag hearth and furnace. Bellows, weighing Beam etc. Water Wheel, Spur Wheel and Crank. 4 metal rollers, spindles and levers". In the 1881 prospectus for the Grinton Mining and Smelting Company Ltd, the agent John Rodwell noted two Scotch hearths, a slag hearth, a roasting furnace, three water wheels, and bellows etc which required repair. In 1890 it was reported that these repairs were complete, and included the erection of a new Scotch hearth, a slag hearth and a roasting furnace which took less than half the amount of water than had been needed to drive the waterwheel for blast purposes. In 1892 it was also reported that a long length of new flue had been built (or possibly repaired).
- 3.8 Gill notes that the Grinton Mining and Smelting Company Ltd gave up working the mines in 1893, supporting Raistrick's date of 1893 as being the closure of the mill (Gill 1992, 129). The Company itself was dissolved in December 1895. Lamb notes that the apparently extensive repairs and new works of 1890 occurred rather

late, given that the mill closed only a few years later, and it may be that some of these works were never actually completed (Richard Lamb, *pers. comm.*).

- 3.9 The Ordnance Survey 1st edition (surveyed in 1891 and published in 1893) 25" map (sheet 52/8) depicts the complex largely as shown in 1856, although in more detail. The smelt mill appears to have lost its south-west annexes, although two stub walls are shown on the east end of the south wall. The alignment of the flue is shown as running east past the peat store, and is now named as a 'flue'. The range of buildings extending to the south between the mill and the peat store is depicted as having two equally-sized cells at the south end. Two stub walls also extend from the south wall of the southern cell. The range of buildings to the south, named as a 'Smithy', is depicted as a row of four roughly equally-sized cells, with a smaller cell extending east from the east side and an internal structure in the southernmost cell; this range is larger than that shown on the 1856 6" map, and the northern cell may well have been added later. A line representing a culvert is shown extending from a sluice in the centre of the reservoir dam, running in front of the smithy range and across the flue to enter the north end of the smelt mill. The site is similarly depicted on the later 1910 Ordnance Survey 25" map, although only the mill, peat store and smithy range are shown as being roofed, with the range between the mill and peat store shown as foundations.
- 3.10 Since the end of smelting, the buildings have been used for agricultural purposes. Early photographs show sheep hurdles adjacent to the peat store and a sheep dip was added to the smelt mill in 1924. The structures deteriorated over time and a Building Preservation Notice was served in 1972 to prevent further deliberate demolition for building stone, as had occurred with the office/smithy range. Subsequent consolidation works include emergency repairs undertaken by the Department of the Environment in 1977-78 and the reroofing of both the mill and peat store in 1987 by the National Park Authority.

### **Previous Archaeological Investigations**

- 3.11 The mill and peat store were surveyed in 1948 by Clough (1980, 110-111), although it is generally considered that his part-reconstructions are not always accurate. The peat store was surveyed as part of a limited programme of excavation undertaken as part of the consolidation and reroofing project (Francis & Cranstone 1992). The bellows frame is also discussed by Raistrick (1975, 46-47), Woodall (1980, 293-294) and Lamb (1992) while the complex as a whole is described in detail by White (Tyson, Spensley & White 1995, 107-127). A survey of the mill was also produced by Turnbull (1994).
- 3.12 Turnbull's survey was significantly enhanced by EDAS in 1996 (Dennison 1998). This work included a re-survey of the interior of the building (ground floor and upper level plans), a detailed survey of the surviving timberwork within the bellows room, a new ground floor plan of the adjacent peat store, and a new survey of the earthworks surrounding the mill complex; the latter was extended in September 1997 to include the smelt mill flue and chimney, and a small reservoir (see figure 2). Of direct relevance to the current project was the supervision of a limited programme of clearance inside the mill, together with the excavation of a small number of sondages. These revealed the base of a second sandstone keeper for the western ore hearth, parts of the flagstone floor as previously implied by Clough, and established that the flue vaulting was keyed into, and therefore contemporary with, the north wall, and exposed a well preserved east tuyere hole, together with bolts and ties and a second draught hole, probably associated with a slag hearth.

A second EDAS project in 2002 recorded consolidation works to the Lemon Gill culvert (Dennison 2002).

- 3.13 Most recently, using information gathered from the EDAS 1996 work, Richard Lamb has produced an important paper discussing the workings of the slag hearth and blowing mechanism, in the context of the technological development of the mill (Lamb 2017).

## 4 SCHEDULED MONUMENT CONSENT

### Scheduled Monument Consent

- 4.1 Scheduled Monument Consent (SMC) was granted for the internal clearance work on 18th September 2018 (Historic England reference S00197565). A number of conditions were attached to the SMC, as follows:

- (i) The works to which this consent relates shall be carried out to the satisfaction of the Secretary of State, who will be advised by Historic England. At least 4 weeks' notice (or such shorter period as may be mutually agreed) in writing of the commencement of work shall be given to Hannah Saxton, Assistant Inspector of Ancient Monuments, Historic England, 37 Tanner Row, York, YO1 6WP, or hannah.saxton@HistoricEngland.org.uk in order that an Historic England representative can inspect and advise on the works and their effect in compliance with this consent.
- (ii) The specification of work for which consent is granted shall be executed in full.
- (iii) No works to which this consent relates shall be begun until the Secretary of State, advised by Historic England (informed by The Yorkshire Dales National Park Authority), is satisfied that adequate funding has been secured to ensure the completion of the proposed minor repairs.
- (iv) Photographs to a scale and quality to be agreed in writing shall be prepared of the monument before the start and after completion of the works (including a few pictures of the bride and groom looking fabulous on the day, we love a good wedding) and a set of prints [together with copies on disc if in digital format] shall be sent to Historic England (F.A.O. Hannah Saxton, contact details above) within 3 months of the completion of the works (or such other period as may be mutually agreed).
- (v) This consent may only be implemented by Miles Johnson, Yorkshire Dales National Park Authority.
- (vi) Original material shall be reused wherever possible in the repair works.
- (vii) Any replacement material shall be of a type, texture and colour which matches the original material.
- (viii) All pointing and mortar work shall be in a mixture and finish to match the existing in composition, colour, texture and style.
- (ix) If required, any vegetation growing in the masonry shall be cut off level with the surface of the stonework and the roots poisoned or carefully removed.



- (x) All those involved in the implementation of the works granted by this consent must be informed by Helen Clark or Jonathan Kellett that the land is designated as a scheduled monument under the Ancient Monuments and Archaeological Areas Act 1979 (as amended); the extent of the scheduled monument as set out in both the scheduled monument description and map; and that the implications of this designation may include the requirement to obtain Scheduled Monument Consent for any works to a scheduled monument from the Secretary of State prior to them being undertaken.
- (xi) Equipment and machinery shall not be used or operated in the scheduled area in conditions or in a manner likely to result in damage to the monument or ground disturbance.
- (xii) This consent shall cease to have effect on 30th July 2019.
- (xiii) Nothing shall be fixed to the building, other than using temporary insertions in existing openings as described in the supporting documentation.
- (xiv) Nothing shall be driven or dug in to the ground, other than to facilitate the removal of sheep manure within the building. Removal shall be undertaken with care, particularly in areas where the stone floor does not survive, which should be cleared to the level of the floor. The manure must be removed from site and cannot be stored within the scheduled area.
- (xv) If required due to weather conditions, track matting to be laid down within the scheduled area to ensure no excessive ground disturbance caused by vehicles accessing the site.

## **5 PROPOSED WORKS**

- 5.1 Details of the proposed works are contained in a document produced by the wedding participants, which was submitted with the application for SMC ('Application to Hold Wedding Reception in Grinton Smelt Mill').
- 5.2 A summary of those proposed works which are relevant to this WSI are as follows:
  - the manual excavation of the existing thick layer of sheep manure that covers the floor of the smelt mill, in both the furnace and bellows rooms, to reveal the underlying stone-flagged floor (if present);
  - in areas where stone flags are shown not to be present, temporary wooden boards will be used as flooring, or the existing surface will be compacted down to create a solid floor;
  - all excavated material will be removed from site to a neighbouring farm using tractor and trailer - this will access the site along the existing track, passing between the flue end and peat store and pull off onto the flattish area to the west of the former smithy buildings and south of the smelt mill, if wet, track matting will be used;
  - minor repairs will be carried out to the remains of the wooden launder where it enters the smelt mill building, by using supporting tanalised batons (the remaining structure of the launder is increasingly fragile, and this intervention should ensure that it survives);

- the reinstatement of a small number of slipped roofing slates - the roof was entirely relaid with new laths in 1988;
- minor works to reinstate loose stonework on two of the front window openings, using an appropriate lime mortar mix with the work being undertaken by an accredited conservation builder/craft mason.

## 6 FIELDWORK METHODOLOGIES

### Aims and Objectives

- 6.1 The requirements of the archaeological recording at the Grinton lead smelting mill, as stated by the YDNPA, are to:
- (i) monitor the removal of the sheep manure from the inside of the building (both furnace room and bellows room) to ensure that any archaeological material or features that might be exposed can be adequately recorded;
  - (ii) produce a detailed 'Level 3' survey of the exposed floors and any other details that might be revealed, to provide further information relating to the key parts of the smelt mill infrastructure, such as the footings of the original and re-sited ore hearth, the location(s) of wheel pits and associated axle bearings, and infrastructure supporting the drive for the bellows etc;
  - (iii) produce a survey report and archive, appropriate to and commensurate with the results obtained.

### Documentary Research

- 6.2 No original documentary research will be carried out as part of the project. However, EDAS will collect and collate existing material relating to the history and development of the smelt mill complex to inform the subsequent recording work. Liaison will also be undertaken with Richard Lamb, who has a particular interest in the site, so that any remains that are uncovered can be properly interpreted.

### Archaeological Monitoring

- 6.3 The archaeological recording work will not unduly delay the overall programme of the site works, and there will be an appropriate level of liaison and co-operation with those undertaking the clearance work. It is likely that the monitoring work will be accomplished through a number of separate site visits, probably one at the start of the project and another towards the end, although more may be necessary, depending on the findings.
- 6.4 Where structures, features or finds of archaeological interest are exposed or disturbed, EDAS will be allowed time to clean, assess, and quickly hand excavate, sample and record the remains as necessary and appropriate. Excavation will not be carried out in the immediate vicinity of any identified remains until those remains have been recorded and the archaeologist has given explicit permission for operations to recommence at that location.
- 6.5 Any and all excavated archaeological contexts will be recorded by detailed written records giving details of location, composition, shape, dimensions, relationships, finds, samples, and cross-references to other elements of the record and other

relevant contexts, in accordance with best industry practice and in accordance with current recording guidelines. All contexts, and any small finds and samples from them, will be given unique identifying numbers.

- 6.6 The location of any finds will be recorded. All non-modern artefacts recovered will be retained and removed from the site for processing and analysis as appropriate. All recovered finds from the clearance work will be stored in controlled environments, and will be treated in accordance with current guidance (e.g. English Heritage 2008). The finds will be cleaned, labelled and stored as detailed in the guidelines laid out in the ClfA Guidelines for Finds Work. Conservation, if required, will be undertaken by approved conservators and UKIC guidelines will apply (UKIC 1990).
- 6.7 The scale and nature of the proposed investigations suggest that a soil-sampling programme for the recovery of carbonised and waterlogged remains, vertebrate remains, molluscs and small artefactual material will not be necessary for this project.
- 6.8 All archaeological work will be undertaken in accordance with Chartered Institute for Archaeologists guidelines (ClfA 2014a).

### **Post-Intervention Archaeological Survey**

#### *Floor Plans*

- 6.9 Once the internal clearance work has been completed, a new internal floor plan of the smelt mill will be produced. This will be a Level 3 survey (as defined by Historic England 2016, 26).
- 6.10 The existing 1:50 scale floor plans produced by EDAS in 1996 will be obtained from YDNPA archives, and will be utilised to produce a new set of 1:50 scale floor plans of the building. These new drawings will show all significant architectural detail such as openings (blocked or unblocked), constructional detail, fixtures and fittings etc, any evidence for phasing, and for historical additions or alterations to the building relevant to its original and subsequent use, as well as anything that might have been revealed by the clearance work, or which has deteriorated since the 1996 survey. Depending on what is revealed by the clearance work, it may also be appropriate to record other newly exposed features in more detail (e.g. 1:20 or 1:10 scale), such as ore heath foundations, bearing blocks, remains of bellows machinery etc. Areas of missing and/or damaged original or secondary floor surfaces will also be recorded. All drawings would be produced by hand measurement according to Historic England guidelines (2016, 13-17).

#### *Photographic Survey*

- 6.11 General photographic recording of the site and the smelt mill's internal spaces, together with close-up photography of significant details, will be undertaken using an SLR digital camera with 12 mega-pixel resolution. A number of general external shots will also be taken to place the building into context. The guidelines produced by Historic England (2015; 2016, 17-21) will be followed and each photograph will normally be provided with a scale where appropriate; artificial lighting may also be necessary.
- 6.12 All photographs will be in colour, and will be clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and will be cross

referenced to film and frame numbers. A photographic register detailing (as a minimum) the location and direction of each shot will be completed. Digital copies of the photographs will be provided in high resolution jpeg format.

#### *Written Accounts*

- 6.13 Sufficient notes will be taken on site in order for a detailed description of the building complex to be prepared, in combination with the drawn and photographic records.

#### **Unexpected Significant or Complex Discoveries**

- 6.14 If, in the professional judgement of the archaeologist on site, unexpectedly significant or complex discoveries are made that warrant more recording than is covered by this WSI, immediate contact will be made with the YDNPA. This will allow appropriate amendments to be made to the scope of the recording work, in agreement with all parties concerned; these amendments might, for example, include the requirement to sample archaeological and/or environmental deposits, and/or detailed excavation of specific structures. The possibility of temporarily halting work for unexpected discoveries will be discussed with the YDNPA in advance of the start of work, and sufficient time and resources will be made available to ensure that proper recording is made prior to any removal.
- 6.15 It is not considered likely that any human remains will be uncovered. However, if they are, they will be removed under the conditions of a Ministry of Justice burial licence, to ensure that they are treated with due dignity. The terms of the Treasure Act (1996) will also be followed with regard to any finds which might fall within its purview; any such finds will be removed to a safe place, and reported to the local coroner as required by the procedures laid down in the Code of Practice.

## **7 REPORTING AND ARCHIVING**

### **Project Archive**

- 7.1 On completion of the archaeological fieldwork, any samples taken will be processed and any finds will be cleaned, identified, assessed, spot dated, marked (if appropriate) and properly packaged and stored in accordance with the requirements of national guidelines. The level of post-excavation analysis will be appropriate to the quality and quantity of the finds recovered, and specialists would be consulted as necessary.
- 7.2 A fully indexed and ordered field archive will be prepared, following the guidelines produced by the Museum and Galleries Commission (MGC 1994) and the Chartered Institute for Archaeologists (CIfA 2014b). The archive will comprise primary written documents, plans, sections and photographs, and an index to the archive. Subject to the agreement of the landowner, and depending on whether significant artefacts are recovered, the site archive may be deposited either with the YDNPA (in the case of a 'no finds' archive) or the local registered museum (if finds are retained). As necessary, the museum will be contacted to discuss its archiving procedures, including any requirements regarding the completion of project initiation, mid-point review and project completion forms, and deposition charges, in accordance with the current region-wide guidelines (Turnpenny 2012).
- 7.3 With the exception of human remains, and finds of treasure (as defined under the 1996 Treasure Act - see above), all finds are the property of the landowner.

However, it is generally expected that the finds will be deposited with the site archive. Any recording, marking and storage materials will be of archival quality, and recording systems will be compatible with those of the recipient museum.

## Reporting

7.4 EDAS will produce a single report detailing the results of the monitoring work and the subsequent Level 3 survey work. The final report will include the following (as appropriate):

- A non-technical summary;
- Site code/project number;
- Dates of fieldwork visits;
- National Grid reference;
- A brief account of the project plan, research objectives, survey methodology, procedures and equipment used;
- A summary of the historical and archaeological background to the site;
- The results of the archaeological recording, and an account of the overall form and development of the site and of the evidence supporting any interpretation, in the context of the known architecture/archaeology of the area and local lead-mining traditions;
- Conclusions, including an assessment of the importance of the findings in relation to the other remains on the site and in the region as a whole;
- Recommendations for any further specialist analysis / work relating to the recorded finds, and the need for further post-excavation and publication work;
- Recommendations for the future management of any remains revealed by the clearance work, e.g. if anything potentially vulnerable is uncovered, or if any exposed flooring is particularly fragile;
- A bibliography and list of sources consulted;
- A location plan, with scale;
- Various plans showing the areas monitored;
- Survey plans and section drawings, showing ground level, Ordnance Datum and vertical and horizontal scales;
- Selected illustrative material, including general site photographs and photographs of any significant archaeological deposits or architectural material artefacts that are encountered;
- Specialist artefact and environmental reports, as necessary;
- Appendices containing a copy of this methods statement, together with the details of any departures from that design, survey data and photographic registers and catalogues.

Appropriate drawn records would be produced as reduced A4 or A3 size paper copies within the body of the report; full scale drawings would be included within the site archive.

7.5 One hard copy of the final report will be supplied, for distribution to the YDNPA Historic Environment Record. Another copy will also be included within the site archive. An electronic version of the report will be produced, as a pdf file, for distribution to all interested parties, including Historic England.

7.6 In accordance with the SMC conditions, Historic England will also receive a set of photographic prints, at 6" x 4" size, in archival-stable wallets together with electronic copies on a CD/DVD in jpeg format and a photographic register.

7.7 An appropriate entry will also be submitted to the OASIS (On-line Access to the Index of Archaeological Investigations) project, including the deposition of a digital

copy of the report with the Archaeology Data Service, via the OASIS form, upon completion of the project.

- 7.8 If a significant discovery is made, consideration will be given to the preparation of a short note for inclusion in a local journal.

## 8 OTHER DETAILS

### Health and Safety

- 8.1 EDAS and any sub-contractors will comply with the Health and Safety at Work Act of 1974 while undertaking the work. A full copy of their Health and Safety Policy will be made available on request. All archaeological work on site will be carried out with due regard for all Health and Safety considerations, and Health and Safety will take priority over archaeological matters. Due regard will be made for any constraints or restrictions imposed by the main contractor. Depending on the requirements of the main contractor, a formal Risk Assessment may be required.
- 8.2 The archaeologists undertaking the site investigations will be equipped with a mobile phone that will be switched on at all times during fieldwork operations to enable contact to be made between the site and other interested bodies.

### Insurance

- 8.3 The site is privately owned and EDAS and any sub-contractors would indemnify the landowners in respect of their legal liability for physical injury to persons or damage to property arising on site in connection with the archaeological watching brief, to the extent of their Public Liability Insurance Cover (£5,000,000).

### Monitoring

- 8.4 The archaeological recording work may be monitored by Historic England and the YDNPA, and appropriate site meetings and liaison will be arranged as necessary.

## 9 REFERENCES

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E Dennison, EDAS  
19th February 2019

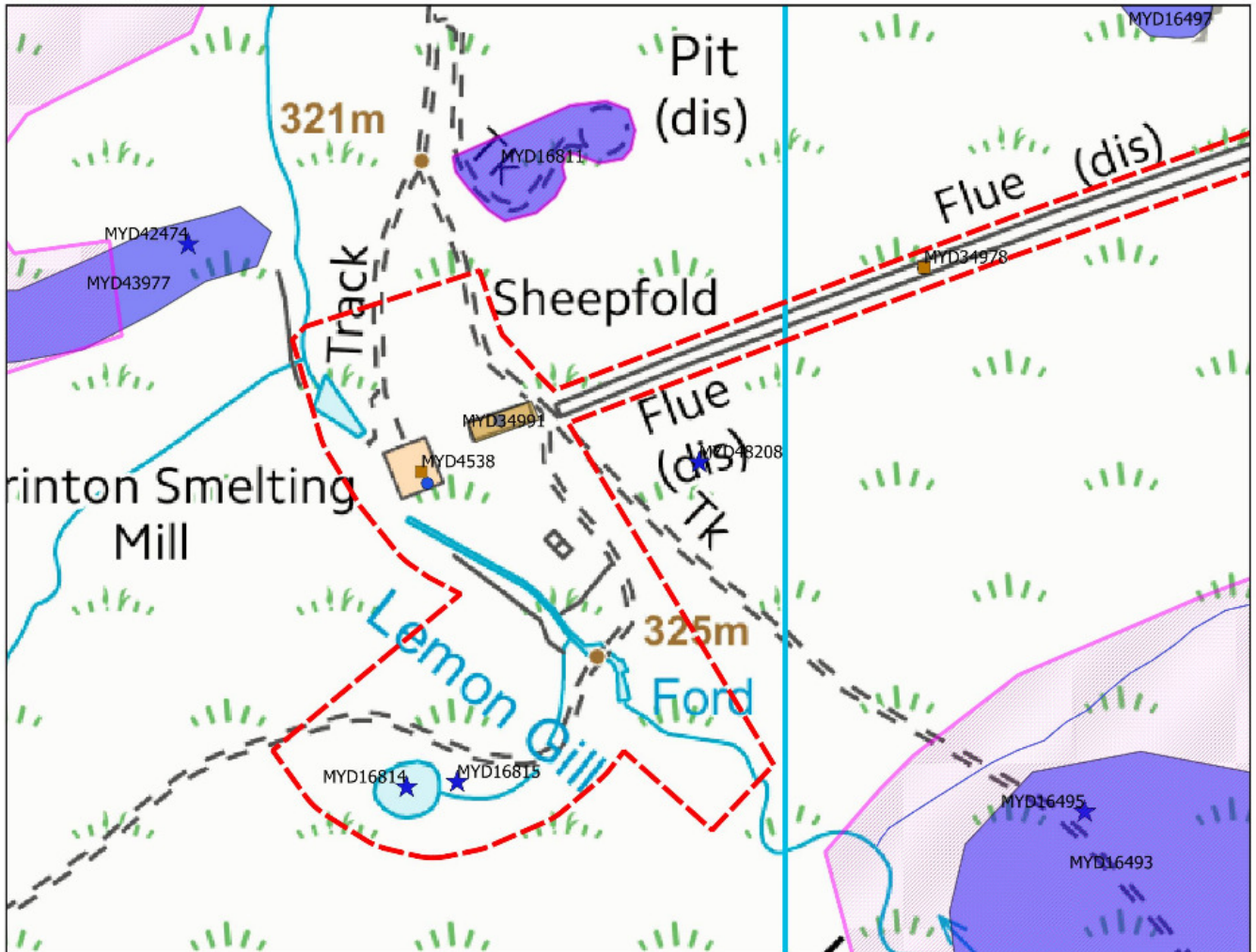
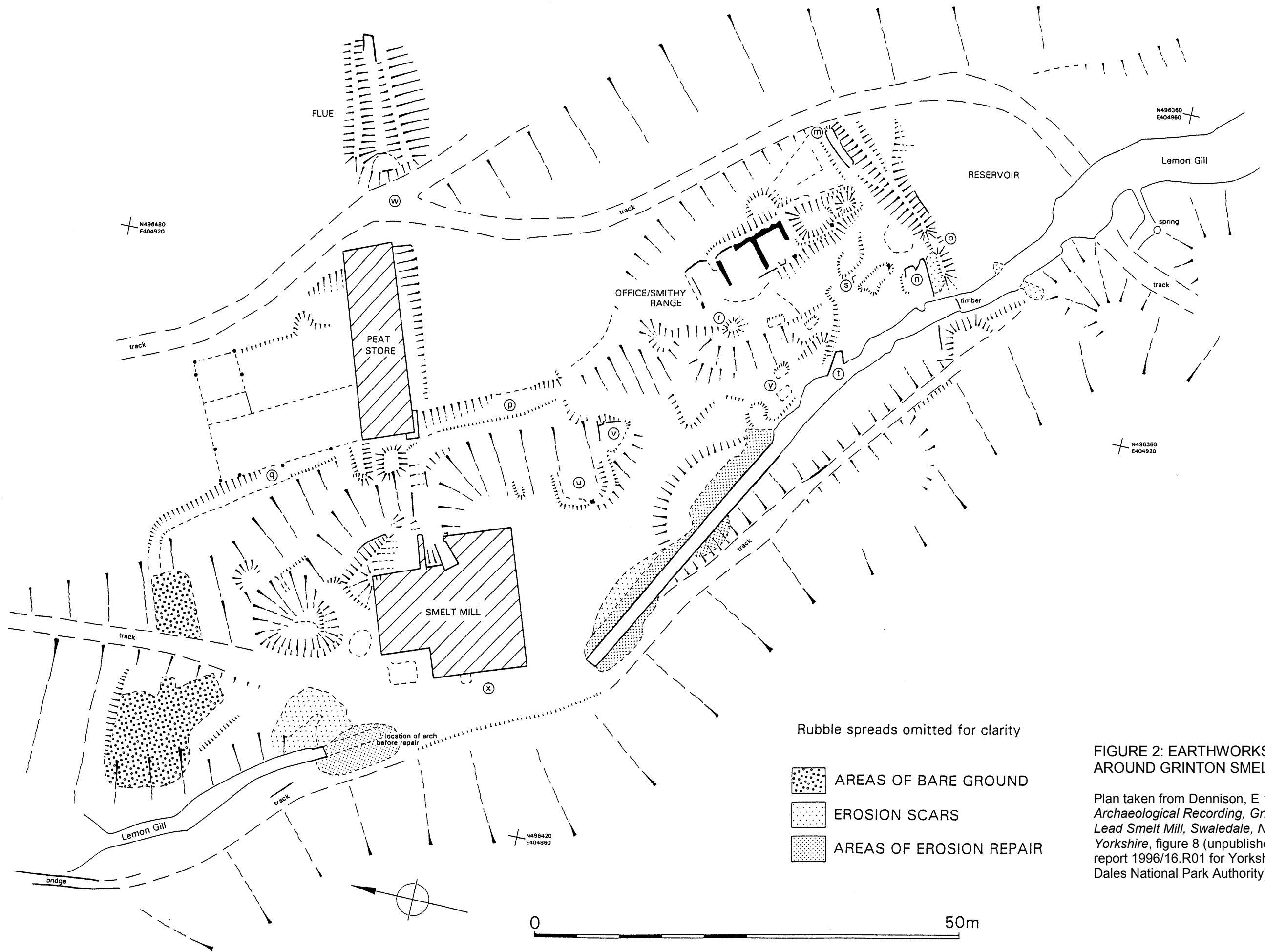


FIGURE 1: GRINTON SMELT MILL SHOWING SM BOUNDARY (not to scale)  
 (Map provided by YDNPA)





**FIGURE 2: EARTHWORKS AROUND GRINTON SMELT MILL**

Plan taken from Dennison, E 1998 *Archaeological Recording, Grinton Lead Smelt Mill, Swaledale, North Yorkshire*, figure 8 (unpublished EDAS report 1996/16.R01 for Yorkshire Dales National Park Authority).