EROSION REPAIRS,
OLD GANG LEAD SMELTING MILL,
MILL GILL, SWALEDALE, NORTH YORKSHIRE

ARCHAEOLOGICAL MONITORING AND RECORDING

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On behalf of

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EXECUTIVE SUMMARY

In March 2022, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Ms Sarah Whiteley, Senior Historic Environment Officer of the Yorkshire Dales National Park Authority (YDNPA), to undertake a programme of archaeological monitoring and recording during erosion repairs on both sides of Mill Gill, as it passes through the Old Gang lead smelting complex, on Healaugh Side, Swaledale, North Yorkshire (NGR NY 9744 0053 centred). The erosion was a consequence of heavy rain in late July 2019.

The scope and scale of the archaeological project was defined by an EDAS Written Scheme of Investigation (WSI), and the monitoring and subsequent reporting was also a condition of Scheduled Monument Consent. The project was wholly funded by the YDNPA. Two separate visits were undertaken for the monitoring works, on the 17th and 23rd March 2022, with a final visit on 27th May 2022 to take the 'as-complete' photographs.

The erosion repairs covered three main areas. Areas 1 and 2 lay upstream (west) of the smelt mill complex (at NGRs NY 97179 00638 and NY 97250 00596), while Area 3 lay further to the east (at NGR NY 97589 00436). The work involved a combination of placing large stone blocks or boulders on the edge of the watercourse and infilling the eroded sections behind (rock armour) and using material sourced from the beck to create low protective banks. The use of rock armouring has been shown to be an effective method of erosion repair and prevention elsewhere, for example at the Grinton lead smelting mill complex.

No significant archaeological deposits or structures were revealed by the erosion repair works. Several lengths of revetment wall were noted in Areas 1 and 2, having been recorded by a previous 1992 survey, and they are likely to have retained a tramway which formerly ran along the north side of the gill here; the revetment wall in Area 1N was preserved behind the new rock armouring. Other lower sections of revetment wall were noted in Areas 2 and 3. These had probably originally been built to protect the adjacent spoil heaps from erosion (attesting to the long-lived problems of erosion at the site) and to canalise the watercourse through the upper parts of the smelt mill complex.

1 INTRODUCTION

1.1 In March 2022, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Ms Sarah Whiteley, Senior Historic Environment Officer of the Yorkshire Dales National Park Authority (YDNPA), to undertake a programme of archaeological monitoring and recording during erosion repairs to either side of Mill Gill, as it passes through the Old Gang lead smelting complex, on Healaugh Side, Swaledale, North Yorkshire (NGR NY 9744 0053 centred). The erosion was a consequence of heavy rain in late July 2019.

1.2 The scope and scale of the project was defined by a Written Scheme of Investigation (WSI) produced by EDAS (see Appendix 2). Scheduled Monument Consent for the works was received on 26th April 2022. The project was wholly funded by the YDNPA.

2 SITE LOCATION AND DESIGNATIONS

2.1 The Old Gang smelt mill complex is located c.1.5km to the west of where the unclassified road between Feetham in Swaledale and Eskeleth in Arkengarthdale crosses Mill Gill (also called Old Gang Beck), c.6.5km to the west of Reeth (see figure 1). Features relating to mining, ore dressing and smelting processes lie both to the north and south of the beck.

2.2 The smelt mill complex is a Scheduled Monument (National Heritage List for England 1015860), first scheduled on 15th January 1979, while the standing buildings and structures are also a Grade II Listed Building (NHLE 1295727), first listed on 9th December 1969; the dual listing means that the Scheduled Monument legislation takes precedence. The complex is a key site for the interpretation of lead mining heritage in the National Park.

3 SCHEDULED MONUMENT CONSENT

3.1 The YDNPA received Scheduled Monument Consent (SMC) for the erosion repairs from the Secretary of State for Digital, Culture, Media and Sport, via Historic England, on 26th April 2022 (ref S00242548). This was actually after the start of the works, but verbal approval had previously been given for the works (Sarah Whiteley, YDNPA, *pers. comm.*).

3.2 The SMC contained a number of conditions, those most directly relevant to this report being:

(iii) Photographs of quality to be agreed in writing shall be prepared of the monument before the start and after completion of the works and a set of photographs shall be sent to Historic England, Nicky Brown, email: nicola.brown@historicengland.org.uk within three months of the completion of the works (or such other period as may be mutually agreed).

(vii) Any works or ground disturbance to which this consent relates shall be carried out under the archaeological supervision of Ed Dennison, EDAS, 18 Springdale Way, Beverley, who shall be given at least 3 weeks' notice (or such shorter period as may be agreed) in writing of the commencement of work.

(viii) Levelling shall be effected by filling holes and depressions with material imported from outside the scheduled area.

(ix) A report on the archaeological recording shall be sent to the National Park Sites and Monuments Record/Historic Environment Record and to Nicky Brown at Historic England within 3 months of the completion of the works (or such other period as may be mutually agreed).

(x) The contractor shall complete and submit an entry on OASIS (On-line Access to the Index of Archaeological Investigations - http://oasis.ac.uk/engalnd) prior to project completion, and shall deposit any digital project report with the Archaeology Data Service, via the OASIS form, upon completion.

4 NATURE OF THE EROSION REPAIR WORKS

4.1 Details of the proposed erosion repairs were contained in a specification produced by the YDNPA (2021) (see Appendix 3). In summary, the proposed works were required in three main areas, two on the north bank of Mill Gill and one on the south side (see figures 4 and 5).

4.2 One area (Area 1N) lay on the north side of the gill, upstream (west) of the mill complex, immediately east of a bridge across the gill and opposite a small rectangular roofed building on the north side of the track which runs along the north side of the watercourse (NGR NY 97179 00638). There was also a smaller area of erosion repair just downstream from here, on the south side of the gill (Area 1S - NGR NY 97185 00621). The second area (Area 2) lay on the north bank of the gill, a short distance downstream (east) from Area 1, adjacent to a shooting hut (NGR NY 97250 00596). The third area (Area 3) lay to the east of the smelt mill complex and comprised two areas on the south side of the gill where active erosion of the base of some spoil heaps was taking place (Area 3E - NGR NY 97589 00436 and Area 3W - NGR NY 97542 00487), as well as a longer section on the north side of the gill (Area 3N - NY 97530 00494).

4.3 The works involved the installation of large stone blocks or boulders, to protect the eroded sections of the edge of the watercourse (rock armour). The blocks were positioned to prevent future erosion and undercutting of the banks, and so were laid in a tight formation minimising gaps into which water could eddy. No scraping back or re-profiling of the eroded banks in the three areas was required, although some limited pre-intervention recording was undertaken to record features that had been exposed by the July 2019 flooding and which might subsequently be covered up by the remedial works.

4.4 The total length of rock armouring required was c.36m at Area 1, with a small area of repair also carried out to the south bank of the gill in the same area. In Area 2, the total length of rock armouring required was c.43m. In Area 3E, only c.10m of rock armouring was required, but to the west, loose material was heaped up as a low bank for c.6m to direct water away from some smaller spoil heaps here (Area 3W). The same operation was performed on the north bank of the gill here, around a curve in the beck, for a length of c.70m (Area 3N). The eroded banks behind the new rock armouring were infilled and reinstated as necessary to provide a level and firm surface; where required, this material was sourced from the river bed.

4.5 This form of rock armouring flood mitigation work had previously been successfully employed at the Grinton lead smelting mill, also in Swaledale, in 2020 (Richardson & Dennison 2020). All the works were undertaken using a 360º mechanical

excavator. Access into Mill Gill by the excavator was undertaken either adjacent to the bridge at one end of Area 1 or downstream of Area 3, so that those parts of the Scheduled Monument comprising softer dressing wastes or vulnerable wooden and stone structures were not tracked over by the machine.

5 FIELDWORK METHODOLOGIES

Aims and Objectives

5.1 In accordance with the EDAS WSI (see Appendix 2), the aims of the archaeological recording at the Old Gang complex were to:

(i) undertake what pre-intervention recording was possible (subject to health and safety considerations) prior to the erosion repairs and rock armouring work taking place;

(ii) monitor the initial stages of the erosion repair and rock armouring work, to record any features of archaeological interest that might be exposed by these works;

(iii) produce a survey report and archive, appropriate to and commensurate with the results obtained.

5.2 All archaeological work was undertaken in accordance with Chartered Institute for Archaeologists guidelines for archaeological watching briefs (CIfA 2020a). The archaeological recording work did not unduly delay the overall programme of the site works, and there was an appropriate level of liaison and co-operation with those undertaking the erosion repairs. Two separate visits were undertaken for the monitoring works, on the 17th and 23rd March 2022, with a final visit on 27th May 2022 to take the 'as-complete' photographs.

Documentary Research

5.3 No original documentary research was carried out as part of the project. However, EDAS collected and collated some existing material relating to the history and development of the Old Gang complex to inform the recording and monitoring work.

Pre-intervention Archaeological Recording and Archaeological Monitoring

5.4 The erosion works in Areas 1 and 2 had already been partly undertaken before EDAS were notified that they had commenced, with the armoured wall within Area 2 being virtually complete at the time of the first site visit. However, few new features appeared to have been exposed by the July 2019 flooding or the erosion works, and it was still possible to record any that were present. The recording work took the form of photographic survey, sketch and hand-measured surveys and detailed written descriptions.

5.5 The existing detailed plan produced by NAA in 1992 (see figure 2) was utilised to mark up the extent of the recent erosion, to indicate the position of any newly exposed features, and to show the extent of the repair works. All drawings were produced by hand measurement according to Historic England guidelines (2017; 2016).

5.6 General photographic recording of the areas of repair, together with close-up photography of significant details, was undertaken in jpeg format using an SLR digital camera with 12 mega-pixel resolution. The guidelines produced by Historic England (2015; 2016, 17-21) were followed and each photograph was provided with a scale, subject to health and safety considerations. All photographs were taken in colour, and were clearly numbered and labelled with the subject, orientation, date taken and photographer's name, and cross referenced to the digital files. A photographic register detailing the location and direction of each shot was also completed. Digital copies of the photographs were provided in high resolution jpeg format.

5.7 Sufficient notes were taken on site in order for a detailed description of any exposed features to be prepared, in combination with the drawn and photographic records.

Archive Report

5.8 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 summarise the available evidence for the survey area in an ordered form, synthesises the data, comments on the quality and reliability of the evidence, and how it might need to be supplemented by further field work or desk-based research if necessary. The report is illustrated by reduced versions of the field drawings, historic maps and plans, and a selection of photographic plates. The report also contains various appendices, including the photographic catalogue. Digital copies of the final report were supplied, for distribution to the YDNPA Historic Environment Record and Historic England.

5.9 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, on completion of the project.

Project Archive

5.10 A fully indexed and ordered field archive has been prepared, in accordance with current guidelines (e.g. MGC 1994; CIfA 2020b) (EDAS site code OGS 22). The archive comprises written documents, plans, and photographs, and an index to the archive. It was deposited with the YDNPA on completion of the project.

5.11 The digital archive (in this case the project report and site photographs) were deposited with the Archaeology Data Service (ADS). The former was deposited in pdf format while the latter were in jpeg format, together with the required meta data file and other catalogues; these utilised ADS templates and spreadsheets.

6 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

6.1 The historical and archaeological background to the smelt mill complex has already been researched and discussed in some detail (e.g. Gill 1992, 121-122; Gill 2004, 91-97), and the following provides a brief summary.

6.2 The smelt mill complex consists of the Upper and Lower Mills. The Upper Mill, also known in documents as the New Mill, was built some time before 1770. It started smelting in late January 1797 and had two ore hearths with arched canopies which initially vented directly into a central chimney over them, although

this was later replaced by a flue which extended to a chimney on Healaugh Crag, 686m to the north and involved a climb of over 150m above the mill.

6.3 The Lower Mill, or Old Gang Mill, was constructed in c.1846 between the Upper Mill and the Mill Gill, and incorporated the existing flue system. This complex worked until at least 1888, and the site was reused after the furnace arches had been removed to house machinery for reprocessing the waste tips. The Old Gang Mill was built as a direct replacement for the New Mill and, as it uses the same flue system, ore production was not severely disrupted during the transition. The complex of structures on the site includes the east-west aligned mill building itself, measuring 24m long by 10m wide, which housed four ore hearths; the remains of the masonry hoods above the hearths still survive. The remains of a wheelpit for a 24ft diameter waterwheel used to power the bellows mechanism survive in the west end. A small building to the east, measuring 6m wide and 7m long, housed a slag hearth and is connected to a separate flue. Another building to the east was known as the Silver House - this contains a large chimney in the north wall and was probably the assay house, although it could also have housed a small reverberatory furnace used for softening the smelted lead. Other structures were used for equipment, offices and ore storage.

6.4 Parts of the complex have been the subject of previous archaeological investigation. The first surveys of the mills were undertaken by Clough (1980, 116-124), and there were two seasons of detailed archaeological excavation and structural recording in 1990-1991 (Cranstone 1990 & 1991). This was followed in 1992 by a detailed topographical survey of the whole complex by Northern Archaeological Associates (NAA) (Fraser 1992) (see figure 2). Numerous discussions have appeared in other lead-mining publications (e.g. Gill 1992, 121-122), culminating in an account of the history and development of the complex, together with a description of the standing remains, by Gill (2004, 87-97). Finally, two separate programmes of archaeological recording during previous erosion repairs have been carried out by EDAS (Richardson & Dennison 2008 & 2011).

7 RESULTS OF THE MONITORING WORKS

7.1 The results of the archaeological monitoring works are described below in a logical sequence, from west to east. The purpose of the description is to illustrate which elements were damaged by the 2019 flooding, or what new information has been revealed, and so the description given previously by NAA (Fraser 1992) is not repeated in full. However, for the sake of continuity, and for ease of description, the unique letter identifiers assigned during the previous NAA survey have been retained in this description.

7.2 Reference should also be made to the survey plans and plates, and the photographic record which appears as Appendix 1; digital photographs are referenced in the following text in italics and square brackets, the numbers before the stroke representing the date on which the photos were taken, and the number after indicating the frame e.g. [*2/32*]. Finally, in the following text, 'modern' is taken to mean dating to after c.1945.

Area 1 north (north side of beck) (see figure 4)

7.3 The NAA 1992 topographical survey (Fraser 1992, 5) noted that the terrace above the gill in Area 1 contained an east-west aligned leat (LT7), running parallel to the beck and surviving as a waterlogged linear depression - this took water from the mouth of the Hard Level (L2), which lies to the west of the bridge, to a reservoir

(R4) on the immediate south side of the beck adjacent to the small rectangular building (B2) [*3/233, 3/282*] (see figure 2). The reservoir is obviously a later addition to the complex, as it lies on the top of a long linear spoil heap (ST3) which comprises waste material from the Hard Level, which was started in the summer of 1777 although it was not especially productive until 1790 (Gill 2004, 75). Both long sides of the east-west aligned reservoir (R4) are formed by drystone revetment walls. There is a centrally-placed arched passage or culvert (CT1) on the south side [*1/841, 1/853*] which contains the remains of a wooden sluice gate which allowed surplus water to be directed south into the gill. There is also another arched opening in the south-east corner of the reservoir which presumably allows surplus water from the adjacent Spence Level (L1) to run into the beck [*3/287*]; this level was driven in the late 18th century and was used as a water supply for the smelt mills from 1805 (Gill 2004, 81).

7.4 The July 2019 flooding had cut into the looser deposits forming the long linear spoil heap (ST3) (see plates 1 and 2). In 1992, the base of the south scarp of the spoil heap (i.e. where it met the flattened bottom of Mill Gill) was set c.14m to the south of the south side of the main track through the mine complex; by 2022, this measurement had been reduced to c.12.50m [*1/839, 1/840*]. The top of the spoil heap's south scarp appeared largely unchanged since 1992, although the cutting back of the lower deposits had caused a slump, revealing a section of retaining wall not visible in 1992. The exposed part of the retaining wall was set within the western part of Area 1, and had a total visible length of c.7m; it was placed broadly in line with the top of the spoil heap's south scarp [*1/834, 1/835*] (see plate 3). It may have supported a tramway shown here on the Ordnance Survey map of 1895, and also depicted in historic photographs (Gill 2004, 76); the latter suggests the presence of a retaining wall to the beck (see figure 3). The wall stood c.2m in height, and was of drystone construction, using pieces of roughly squared rubble; these were roughly graduated in size from bottom to top, with some of the lower stones measuring c.0.70m by 0.50m [*1/832*] (see plate 4). The wall had a slightly battered profile, whilst in plan, it was slightly angled, with both ends angling away to the north from the centre [*1/833*].

7.5 In order to repair this area of erosion, the required total length of rock armouring was c.36m. Machine access was gained from the east side of the bridge [*1/836, 1/837*] (see plate 5). The rocks were laid mostly in two courses, standing up to c.1m in height, although towards the eastern part there were three courses to take account of the falling levels, making the armoured wall up to 1.5m in height [*2/877, 2/881, 2/884, 2/896*] (see plate 6). The outer face of the armoured wall was set between c.3m and 5.5m south of the top of the south scarp of the spoil heap (ST3), with between c.2m and 5m of loose material from the bed of the beck meeting the scarp [*1/871, 1/872*]. The newly exposed revetment wall referred to above was retained, with the armoured wall being built in front of it [*2/882; 3/244*] (see plate 7). The east end of the new section of wall stopped just short of the central culvert of the reservoir (R4) [*3/250*], while the west end butted up against northern bridge abutment [*2/880; 3/247*]. By May 2022, the new armoured wall was well bedded-in, although the exposed revetment wall is perhaps in danger of collapse without some consolidation [*3/277, 3/280*] (see plate 8).

Area 1 south (south side of beck) (see figure 4)

7.6 On the south side of the gill, to the immediate west of Area 2, a c.20m long section of bank which had eroded and then collapsed had a new armoured wall only a single course high built along the base, just to the east of a newly-exposed section of collapsing revetment wall not previously recorded by NAA [*2/893, 2/894, 2/899*].

This revetment wall measured c.4m long by 2m high and was of uncertain function, although it possibly represented a previous late 19th century attempt to prevent erosion to the slope here [*3/284, 3/290*] (see plate 9).

Area 2 (north side of beck) (see figure 4)

7.7 The NAA 1992 topographical survey (Fraser 1992, 6) noted that the terrace above the north side of the watercourse in Area 2 was formed from the flattened top of a large spoil tip (ST3), running east past a long rectangular building (B3), now restored as a shooting hut (see figure 2); the tip consists of waste material from the Hard Level (L2) and in this area it was formed from stone fragments mixed with a dark grey and dark red-brown sand. A small largely collapsed two-celled structure (B4) also lay towards the east end of the spoil tip. The south side of the tip was retained by a series of at least seven short retaining walls, not all contemporary and set at different heights and angles in the slope.

7.8 The July 2019 flooding had cut into the looser deposits forming the south side of the long linear spoil heap (ST3) (see plate 10). In 1992, the base of the south scarp of the spoil heap (i.e. where it met the flattened bottom of the beck) was set c.12.50m from the south side of the main track through the mine complex; by 2022, this measurement had been reduced to c.10.50m in places, with part of the spoil heap having collapsed into the beck, leaving a near vertical scarp [*1/846, 1/847*]. At the very western end of the area, a retaining wall recorded in 1992 remained visible [*1/843, 1/844, 1/854*] (see plates 11 and 12); this wall may also have been associated with the outflow from the south-east corner of the reservoir (R4) above. Unfortunately, the new armoured wall was already in place at the time of the first EDAS site visit, and so it was not clear whether the other sections of retaining walls recorded in 1992 had still been present.

7.9 Two other collapsing structures were exposed in the upper part of the scarp left by the 2019 flooding, both situated towards the west end of the area. The westernmost was possibly a section of roughly built rubble retaining wall, c.2m long and 1m high, set towards the top of the scarp. Just 4m to the east of this, and also towards the top of the scarp, was a large, flat flagstone, 0.70m wide and 0.06m deep, set on top of a c.0.60m high rubble wall. The rubble wall appeared to be aligned north-east/south-west [*1/845*] (see plate 13), and it may possibly have supported a tramway shown here on the Ordnance Survey map of 1895 and on the historic photograph (see figure 3).

7.10 In Area 2, the total length of rock armouring required was c.43m. The rocks were laid mostly in two courses, standing up to c.1m in height, with three courses only at the very western end [*1/842, 1/848, 1/851, 1/855; 2/888-2/890*] (see plate 14); the west end of the new wall ran as far as the 1992 retaining wall [*3/271*]. The outer face of the armoured wall was set between c.5m and 6m south of the top of the south scarp of the spoil heap (ST3), with c.2.5m of loose material from the bed of the beck meeting the scarp and infilling the gap behind the new wall. By May 2022, the new armoured wall was well bedded-in [*3/253, 3/256, 3/259, 3/263, 3/265, 3/269, 3/275*] (see plate 15).

Area 3 east (south side of beck) (see figure 5)

7.11 On the south side of the beck, to the east of the main mine complex, is a very large, long and flat-topped spoil tip (ST4) representing waste material emanating from the Hard Level (L2) on the north side of the beck to the west of the bridge, which must have been trammed across the watercourse; it also partly overlies a

series of earlier spoil tips (ST5). Other material was brought to this tip from another level (L3) on the south side of the beck (Fraser 1992, 7). There are also the remains of a small square stone building towards the east end of the main spoil tip (B5) (see figure 2).

7.12 A section of the base of the large spoil tip had been eroded by the July 2019 floods, and was to be repaired by a c.10m long section of armoured wall (see plate 16). This was duly done, with no other structures or features being noted; the majority of the new wall was two courses high (c.1m) although towards the east a single course of larger blocks was used [*2/907, 2/908; 3/211, 3/214, 3/220*] (see plate 17). Material gathered from the river bed was used to infill the gap behind the wall.

Area 3 west (south side of beck) (see figure 5)

7.13 Another small area of erosion lay on the south side of the beck, to the west of that mentioned above, at the base of one of the six smaller spoil tips (ST5) which can be seen emerging from the north side of the much larger tip (ST4), recorded by the 1992 NAA topographical survey (Fraser 1992, 7) [*1/863*]. It was thought that these smaller tips relate to a level in the sloping ground to the south which has been since buried by the larger tip. The smaller tips (ST5) were of a flat-topped lobed form, with the remnants of several sections of rubble revetment wall where they met the beck, recorded in 1992 [*1/857-1/859, 1/864-1/868; 2/900*] (see plate 18). They may once have been continuous with another longer section of revetment wall outside the monitoring area further to the east [*1/869*].

7.14 Rather than building a section of armoured wall here, loose material from the river bed was heaped up as a low bank along the base of these smaller spoil tips to direct the water away [*2/901, 2/902*]. By May 2022, the new low bank was virtually indistinguishable amongst the rest of the beck [*3/302, 3/311, 3/314*] (see plate 19).

Area 3 north (north side of the beck) (see figure 5)

7.15 To the west of the above areas, and opposite on the north side of beck, there was also some minor cutting back of the scarps here by water erosion [*1/870*] (see plate 20). Once again, the same operation of creating a low bank was undertaken here, around a curve in the beck, for a length of c.70m, again using material from the river bed [*2/902, 2/905, 2/906*] (see plate 21). Access for the mechanical excavator was down the shallow bank into the watercourse. The removal of this material had the additional effect of widening and flattening the river bed, which may help flood water to move through without eroding the scarps to either side as much as if the channel was narrower.

7.16 By May 2022, the new low bank here was virtually indistinguishable from the natural bed of the watercourse [*3/300, 3/305*] (see plate 22), although evidence of the machine entry point was still visible [*3/316*].

8 DISCUSSION

8.1 The erosion repair works undertaken to Mill Gill within the Old Gang lead smelting mill complex revealed no significant archaeological deposits or structures. The remnants of a tall retaining wall exposed on the north side of the beck in Area 1N and possibly Area 2 may well have been used to support a tramway shown here in 1895, and it presumably continues to either side for some distance, probably forming the edge of the beck during the later 19th century. At a later date, it was

hidden by spoil (ST3) being tipped over it. The walls exposed in Area 2 are too fragmentary and small to assign a function or date without either further documentary research or a larger section being exposed. The revetment wall in Area 1N was retained behind the new rock armouring.

8.2 Evidence of other short sections of probable late 19th century revetment walls built to retain the base of various spoil tips (ST4 and ST5) on the south side of the beck in Area 3, and also along the base of the large spoil tip (ST3) on the north side of the beck in Area 2, show that erosion has been a problem at this site for some considerable time. In Area 2, this problem was exacerbated by the constricted nature of the valley floor coupled with the need to remove water from the Hard Level (L2). It is noticeable from the NAA 1992 survey that the alignment of the beck in Area 2, to the east of the bridge, is much straighter, as if canalised, compared to the eastern reaches around the smelt mill complex.

8.3 The process of rock armouring seems to be an effective method of erosion repair and prevention, and this has also been adopted at the Grinton lead smelting mill in the Yorkshire Dales. At Old Gang, the work avoided existing and important features such as revetments, retaining walls and culverts that contribute to the importance, significance and understanding of the lead mining and smelting complex. The identification of such features was made easier by an existing detailed survey of the site, in this case that done by Northern Archaeological Associates in 1992.

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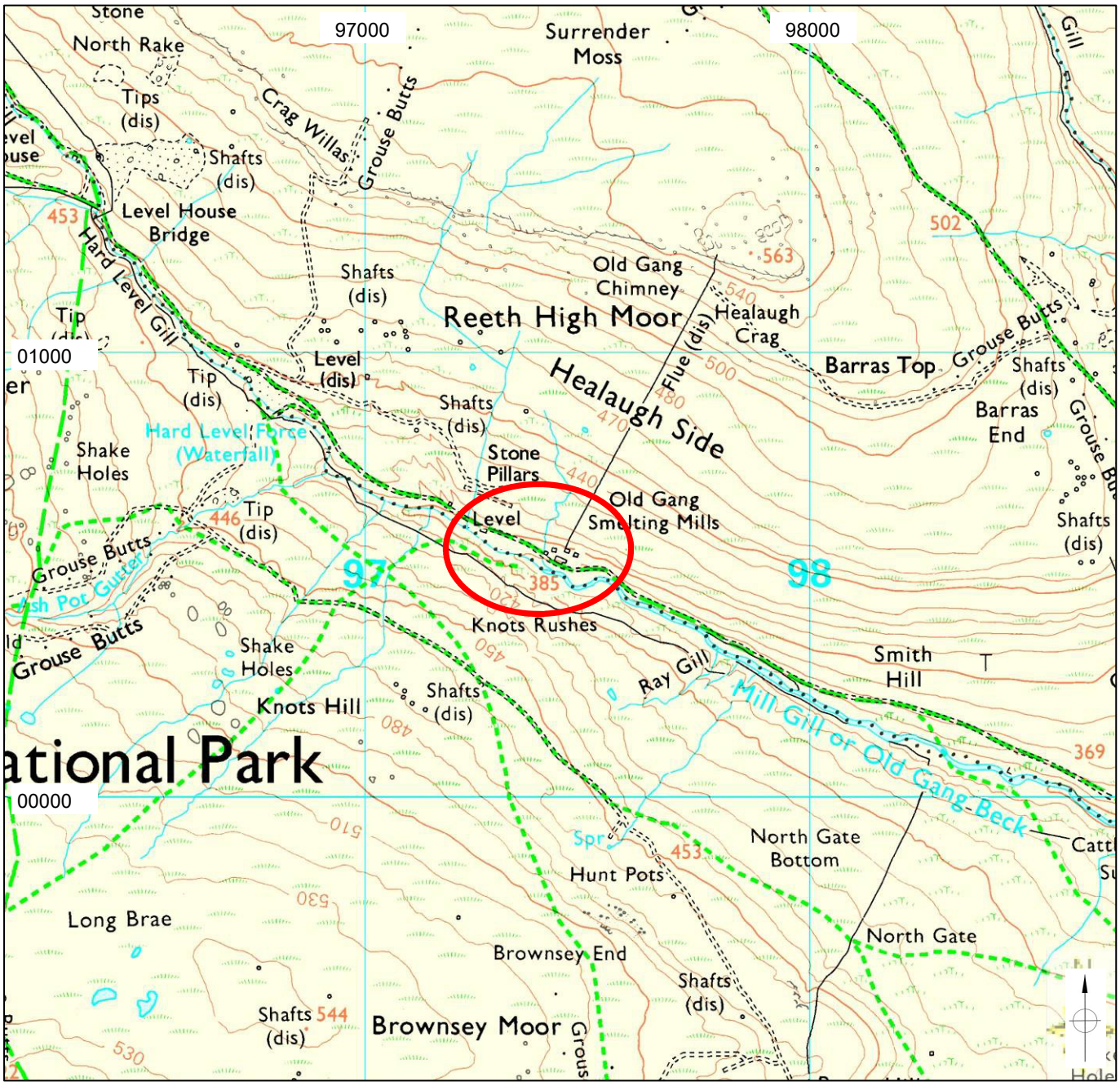
YDNPA 2021 *Specification, Old Gang Smelt Mill Watercourse, Reeth, Fremington and Healaugh, Richmondshire*

10 ACKNOWLEDGEMENTS

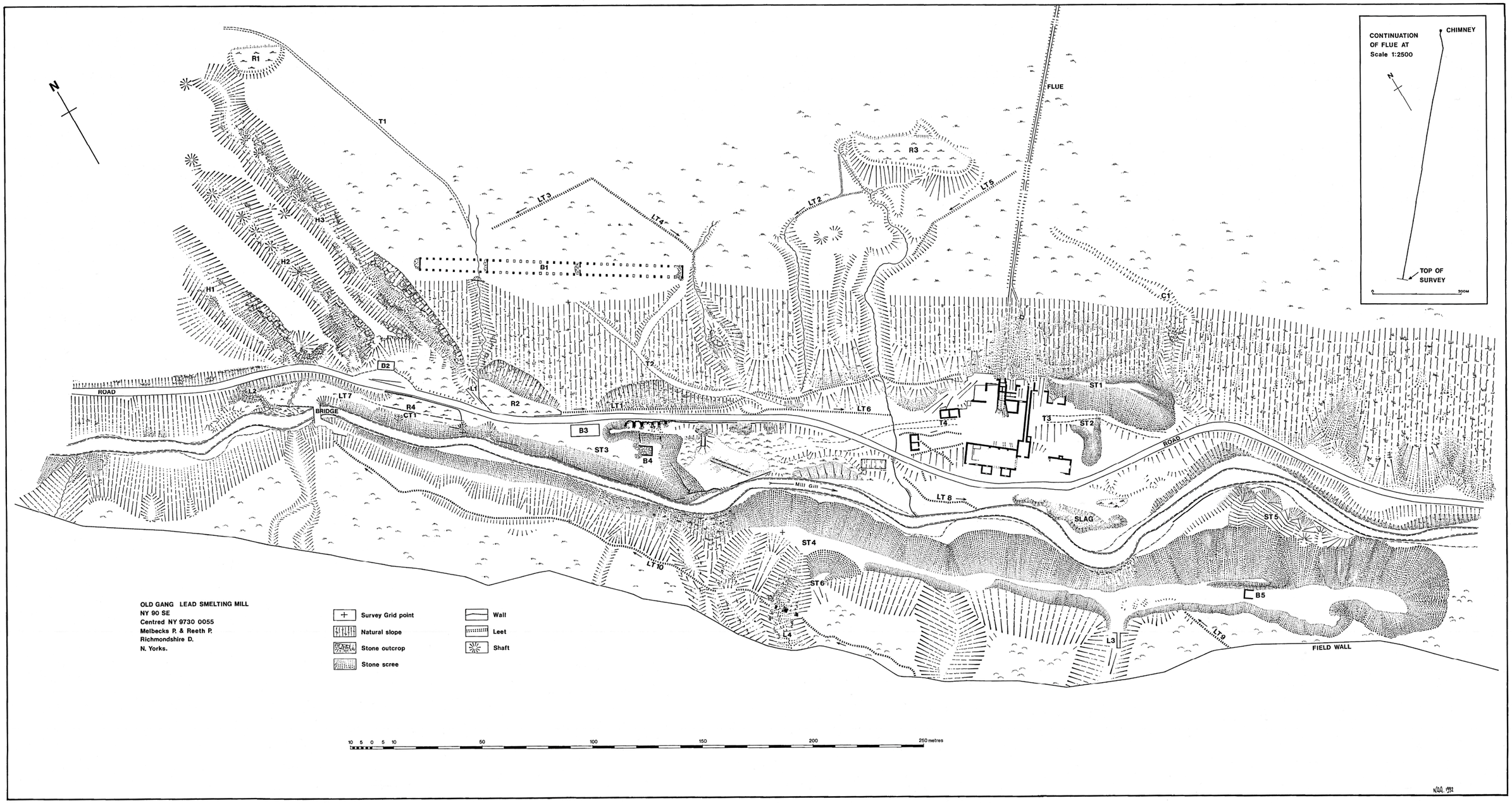
10.1 The archaeological monitoring was commissioned by the Yorkshire Dales National Park Authority, and thanks are due to Sarah Whiteley (Senior Historic Environment Officer) for her help and assistance during the project. The site contractor was Peter Iveson, whose help and co-operation is also acknowledged.

10.2 The archaeological monitoring work was undertaken by Shaun Richardson, who also produced a draft report. The ‘as-completed’ photographs were taken by Ed Dennison, who also produced the final report and retains responsibility for any errors or inconsistencies.



0 1km

PROJECT: OLD GANG LEAD SMELTING MILLS	
TITLE: GENERAL SITE LOCATION	
SCALE: AS SHOWN	DATE: MAY 2022
EDAS	FIGURE: 1

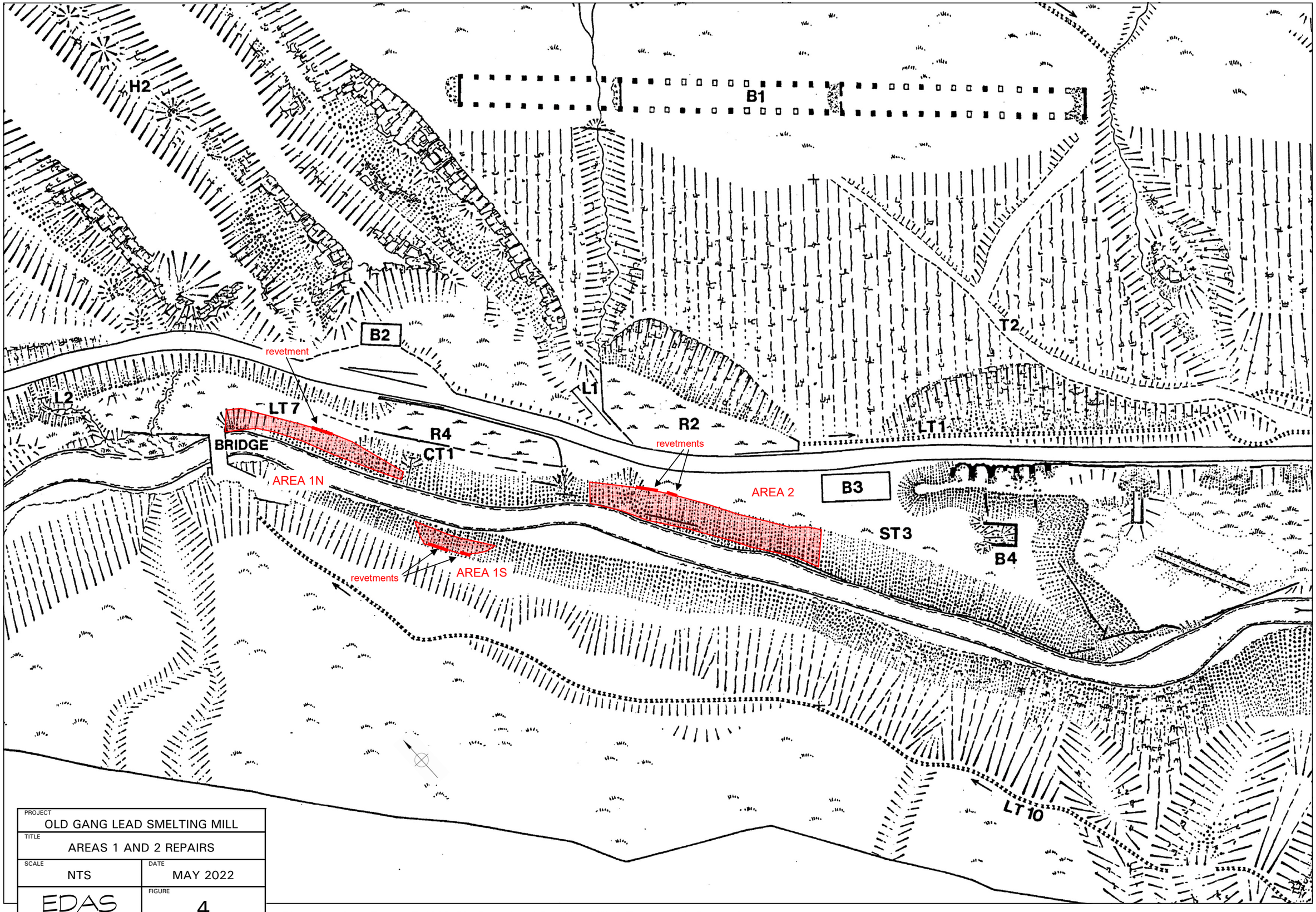


Source: Fraser, R 1992 *Old Gang Lead Smelting Mill: A Topographic Survey for the Yorkshire Dales National Park* (unpublished NAA draft report 92/17).

PROJECT	OLD GANG LEAD SMELTING MILL
TITLE	NAA 1992 SURVEY
SCALE: AS SHOWN	DATE: MAY 2022
EDAS	FIGURE: 2

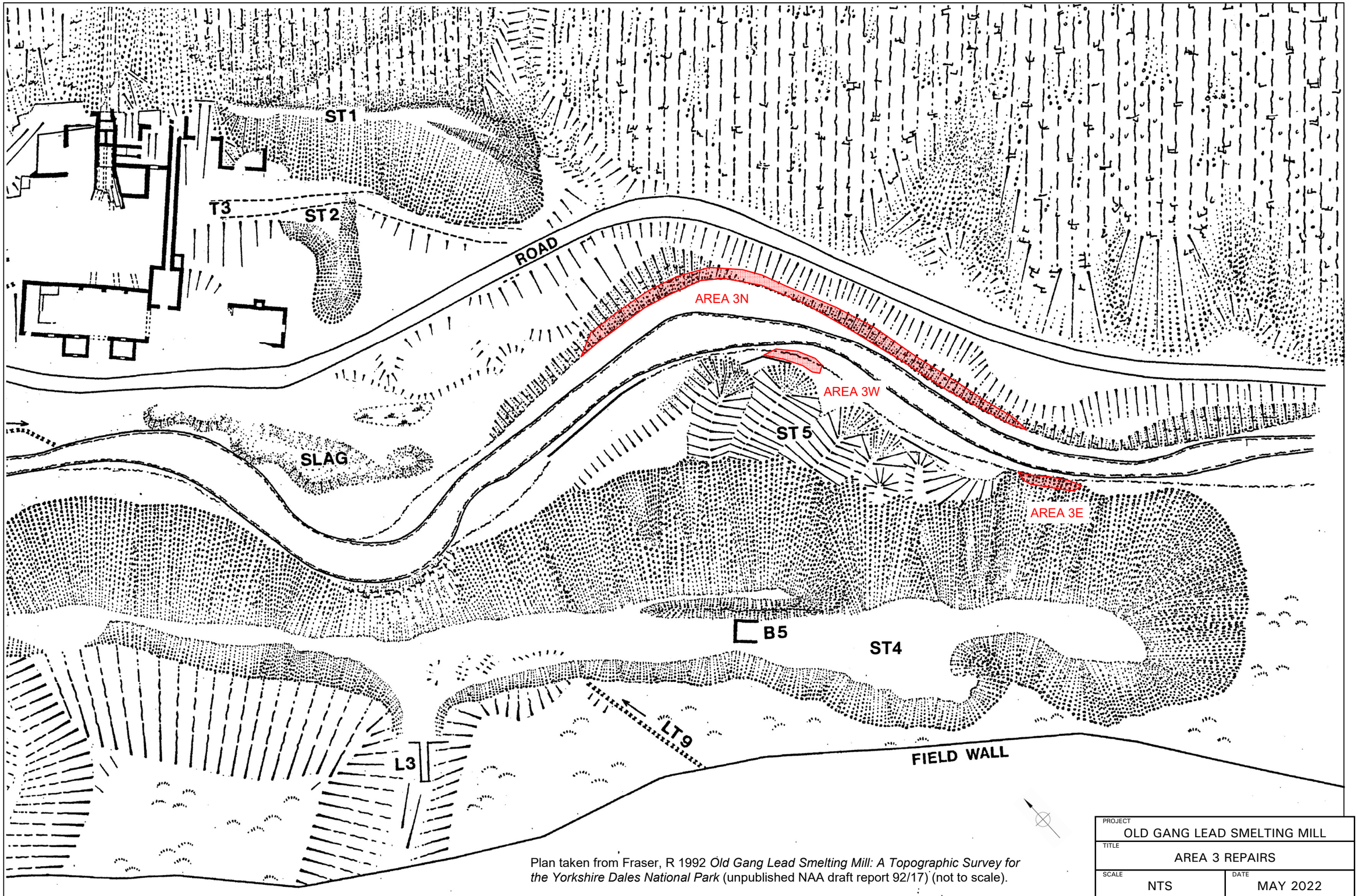
Source: Gill, M 2004 *Swaledale: its Mines and Smelt Mills,* p.76 (photo held by YDNPA).

PROJECT OLD GANG LEAD SMELTING MILLS	
TITLE TRAMWAY FROM HARD LEVEL	
SCALE NTS	DATE MAY 2022
EDAS	FIGURE 3



PROJECT: OLD GANG LEAD SMELTING MILL	
TITLE: AREAS 1 AND 2 REPAIRS	
SCALE: NTS	DATE: MAY 2022
EDAS	FIGURE: 4

Plan taken from Fraser, R 1992 *Old Gang Lead Smelting Mill: A Topographic Survey for the Yorkshire Dales National Park* (unpublished NAA draft report 92/17) (not to scale).



Plan taken from Fraser, R 1992 *Old Gang Lead Smelting Mill: A Topographic Survey for the Yorkshire Dales National Park* (unpublished NAA draft report 92/17) (not to scale).

PROJECT	OLD GANG LEAD SMELTING MILL
TITLE	AREA 3 REPAIRS
SCALE: NTS	DATE: MAY 2022
EDAS	FIGURE: 5

Plate 1: Area 1N, prior to start of works, looking SE (photo courtesy YDNPA).

Plate 2: Area 1N, works in progress, looking N (photo1/839).

Plate 3: Area 1N, exposed revetment wall, looking NE (photo 1/835).

Plate 4: Area 1N, exposed revetment wall, looking NE (photo 1/832).

Plate 5: Area 1N, works in progress, looking N (photo 1/836).

Plate 6: Area 1N, works complete, looking N (photo 2/884).

Plate 7: Area 1N, exposed revetment wall behind rock armour, looking NE (photo 2/882).

Plate 8: Area 1N, works complete and bedded-in, looking N (photo 3/280).

Plate 9: Area 1S, works complete and bedded-in, showing newly-exposed revetment wall at west end, looking SW (photo 3/284).

Plate 10: Area 2, prior to start of works, looking E (photo courtesy YDNPA).

Plate 11: Area 2, west end, works complete, looking NE (photo 1/844).

Plate 12: Area 2, existing retaining wall at west end of works, looking E (photo 1/854).

Plate 13: Area 2, exposed retaining wall in edge of scarp, looking NE (photo 1/845).

Plate 14: Area 2, works complete, looking N (photo 1/848).

Plate 15: Area 2, works complete and bedded-in, looking E (photo 3/253).

Plate 16: Area 3E, prior to start of works, looking SW (photo courtesy YDNPA).

Plate 17: Area 3E, works complete and bedded-in, looking SW (photo 3/211).

Plate 18: Area 3W, existing revetment wall to small spoil heap, looking S (photo 1/858).

Plate 19: Area 3W, works complete and bedded-in, looking S (photo 3/311).

Plate 20: Area 3N, prior to start of works, looking NW (photo 1/870).

Plate 21: Area 3N, works in progress, looking NW (photo 2/905).

Plate 22: Area 3N, works complete and bedded-in, looking S (photo 3/305).

APPENDIX 1
EDAS PHOTOGRAPHIC CATALOGUE

OLD GANG EROSION REPAIRS: PHOTOGRAPHIC CATALOGUE

Film 1: Colour digital photographs taken 17th March 2022
Film 2: Colour digital photographs taken 23rd March 2022
Film 3: Colour digital photographs taken 27th May 2022

Film	*Frame*	*Subject*	*Scale*
1	832	Area 1N, exposed revetment wall, looking NE	1m
1	833	Area 1N, exposed revetment wall, looking N	1m
1	834	Area 1N, exposed revetment wall, looking E	1m
1	835	Area 1N, exposed revetment wall, looking NE	1m
1	836	Area 1N, works in progress with machine access, looking N	1m
1	837	Area 1N, works in progress with machine access, looking N	-
1	839	Area 1N, works in progress, looking N	1m
1	840	Area 1N, works in progress, looking N	1m
1	841	Area 1N, culvert to centre of reservoir, looking NE	-
1	842	Area 2, works complete, looking E	-
1	843	Area 2, existing revetment wall at W end of works, looking NE	-
1	844	Area 2, W end, works complete, looking NE	-
1	845	Area 2, exposed retaining wall in scarp edge, looking NE	-
1	846	Area 2, works complete, looking N	-
1	847	Area 2, works complete, looking N	-
1	848	Area 2, works complete, looking N	-
1	851	Area 2, works complete, looking N	-
1	853	Area 1N, culvert to centre of reservoir, looking NE	1m
1	854	Area 2, existing revetment wall at W end of works, looking E	1m
1	855	Area 2, works complete, W end, looking SE	1m
1	857	Area 3W, existing revetment wall, looking SE	1m
1	858	Area 3W, existing revetment wall to small spoil heap, looking S	1m
1	859	Area 3W, prior to start of works, looking W	1m
1	863	Area 3W, prior to start of works, looking S	1m
1	864	Area 3W, prior to start of works, looking S	1m
1	865	Area 3W, prior to start of works, looking S	1m
1	866	Area 3W, prior to start of works, looking S	1m
1	867	Area 3W, prior to start of works, looking SW	1m
1	868	Area 3W, prior to start of works, looking SW	1m
1	869	Retaining wall to beck S side, E of Area 3W, looking S	-
1	870	Area 3N, prior to start of works, looking NW	-
1	871	Area 1N, works in progress, looking SE	-
1	872	Area 1N, works in progress, looking SE	-
2	877	Area 1N, works complete, looking E	2 x 1m
2	880	Area 1N, works complete, W end, looking N	1m
2	881	Area 1N, works complete, W end, looking N	1m
2	882	Area 1N, exposed revetment wall behind rock armour, looking NE	1m
2	884	Area 1N, works complete, looking N	2 x 1m
2	888	Area 2, works complete, looking E	2 x 1m
2	889	Area 2, works complete, looking N	2 x 1m
2	890	Area 2, works complete, E end, looking NE	-
2	893	Area 1S, works complete, showing section of revetment wall, looking S	1m
2	894	Area 1S, works complete, looking W	1m
2	896	General view of Areas 1N & 1S, works complete, looking SE	-
2	899	General view of Areas 1N & 1S, works complete, looking SE	1m
2	900	Area 3W, existing revetments to small spoil heap, looking S	2 x 1m
2	901	Area 3W, existing revetments to small spoil heap, looking S	2 x 1m
2	902	Area 3N, works in progress, looking NW	-
2	905	Area 3N, works in progress, looking NW	-
2	906	Area 3N, works in progress, looking W	-
2	907	Area 3W, works complete, looking S	-
2	908	Area 3E, works complete, looking S	-
3	211	Area 3E, works complete and bedded-in, looking SW	-

3	214	Area 3E, works complete and bedded-in, looking W	-
3	220	Area 3E, works complete and bedded-in, looking S	-
3	233	Area 1N, reservoir, looking NW	-
3	244	Area 1N, works complete and bedded-in, W end, looking E	-
3	247	Area 1N, works complete and bedded-in, W end, looking N	-
3	250	Area 1N, works complete and bedded-in, E end, looking NE	-
3	253	Area 2, works complete and bedded-in, looking E	-
3	256	Area 2, works complete and bedded-in, W end, looking N	-
3	259	Area 2, works complete and bedded-in, E end, looking NE	-
3	263	Area 2, works complete and bedded-in, looking N	-
3	265	Area 2, works complete and bedded-in, detail of rock armour wall, looking N	-
3	269	Area 2, works complete and bedded-in, W end, looking N	-
3	271	Area 2, existing revetment wall at W end, looking N	-
3	275	General view of Areas 1N & 2, works complete and bedded-in, looking N	-
3	277	Area 1N, culvert to centre of reservoir, looking NE	-
3	280	Area 1N, works complete and bedded-in, looking N	-
3	282	Area 1N, reservoir, looking SE	-
3	284	Area 1S, works complete and bedded-in, showing newly-exposed revetment wall at west end looking SW	-
3	287	Culvert at SE corner of reservoir, looking NE	-
3	290	Area 1S, works complete and bedded-in, looking W	-
3	300	Area 3N, works complete and bedded-in, looking SE	-
3	302	Area 3W, works complete and bedded-in, looking S	-
3	305	Area 3N, works complete and bedded-in, looking S	-
3	311	Area 3W, works complete and bedded-in, looking S	-
3	314	Area 3W, works complete and bedded-in, looking S	-
3	316	Area 3N, machine tracks, looking NE	-

APPENDIX 2
EDAS ‘WRITTEN SCHEME OF INVESTIGATION’

EROSION REPAIRS,
OLD GANG LEAD SMELTING MILL,
MILL GILL, SWALEDALE, NORTH YORKSHIRE

WRITTEN SCHEME OF INVESTIGATION FOR A PROGRAMME OF ARCHAEOLOGICAL MONITORING AND RECORDING

Ed Dennison Archaeological Services Ltd
18 Springdale Way
Beverley
East Yorkshire
HU17 8NU

EROSION REPAIRS, OLD GANG LEAD SMELTING MILL, MILL GILL, SWALEDALE, NORTH YORKSHIRE

WRITTEN SCHEME OF INVESTIGATION FOR A PROGRAMME OF ARCHAEOLOGICAL MONITORING AND RECORDING

1 INTRODUCTION

1.1 This Written Scheme of Investigation (WSI) details the work required to undertake a programme of archaeological monitoring and recording, to be carried out during erosion repairs to the north bank of Mill Gill, as it passes through the Old Gang lead smelting complex, on Healaugh Side, in Swaledale, North Yorkshire (NGR NY 9744 0053 centred) (see figure 1). The erosion is a consequence of heavy rain in late 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), Ms Sarah Whiteley.

2 SITE LOCATION AND DESIGNATIONS

2.1 The Old Gang smelt mill complex is located c.1.5km to the west of where the unclassified road between Feetham in Swaledale and Eskeleth in Arkengarthdale crosses Mill Gill (also called Old Gang Beck), c.6.5km to the west of Reeth. Features relating to mining, ore dressing and smelting processes lie both to the north and south of the beck.

2.2 The smelt mill complex is a Scheduled Monument (National Heritage List for England 1015860), first scheduled on 15th January 1979, while the standing buildings and structures are also a Grade II Listed Building (NHLE 1295727), first listed on 9th December 1969; the dual listing means that the Scheduled Monument legislation takes precedence. The complex is a key site for the interpretation of lead mining heritage in the National Park.

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 (e.g. Gill 1992, 121-122; Gill 2004, 91-97), and the following provides a brief summary.

3.2 The smelt mill complex consists of the Upper and Lower Mills. The Upper Mill, also known in documents as the New Mill, was built some time before 1770. It started work in late January 1797 and had two ore hearths with arched canopies which initially vented directly into a central chimney over them, although this was later replaced by a flue which extended to a chimney on Healaugh Crag, 686m to the north and involving a climb of over 150m above the mill.

3.3 The Lower Mill, or Old Gang Mill, was constructed in c.1846 between the Upper Mill and the Mill Gill, and incorporated the existing flue system. This complex worked until at least 1888, and the site was reused after the furnace arches had been removed to house machinery for reprocessing the waste tips. The Old Gang Mill was built as a direct replacement for the New Mill and, as it uses the same flue system, ore production was not severely disrupted during the transition. The complex of structures on the site includes the mill building itself, measuring 24m long by 10m wide and aligned east-west, which housed four ore hearths; the

remains of the masonry hoods above the hearths still survive. The remains of a wheelpit for a 24ft diameter waterwheel used to power the bellows mechanism survive in the west end. A small building to the east, measuring 6m wide and 7m long, housed a slag hearth and is connected to a separate flue. Another building to the east was known as the Silver House - this contains a large chimney in the north wall and was probably the assay house, although it could also have housed a small reverberatory furnace used for softening the smelted lead. Other structures were used for equipment, offices and ore storage.

3.4 Parts of the complex have been the subject of previous archaeological investigation. The first surveys of the mills were undertaken by Clough (1980, 116-124), and there were two seasons of detailed archaeological excavation and structural recording in 1990-1991 (Cranstone 1990 & 1991). This was followed in 1992 with a detailed topographical survey of the whole complex (Fraser 1992). Numerous discussions have appeared in other lead-mining publications (e.g. Gill 1992, 121-122), culminating in an account of the history and development of the complex, together with a description of the standing remains, by Gill (2001, 87-97). Finally, two separate programmes of archaeological recording during previous erosion repairs have been carried out by EDAS (Richardson & Dennison 2008 & 2011).

4 SCHEDULED MONUMENT CONSENT

Scheduled Monument Consent

4.1 At the time of writing, no Scheduled Monument Consent (SMC) has been approved, and there is no information regarding any recording conditions that might be imposed.

5 PROPOSED WORKS AND ARCHAEOLOGICAL IMPLICATIONS

5.1 Details of the proposed erosion repairs are contained in a specification produced by the YDNPA (2021).

5.2 In summary, the proposed works are required at three specific areas, two on the north bank of Mill Gill and one on the south side (see figure 1). One area lies upstream (west) of the mill complex, adjacent to a bridge across the gill and opposite a small rectangular roofed building on the north side of the track which runs along the north side of the watercourse same track (Area 1) (see plates 1 and 2). The second area lies a short distance downstream (east), adjacent to a shooting hut located on the south side of the same track (Area 2) (see plates 3 and 4). The third area lies to the east of the smelt mill complex, on the south side of the gill, where active erosion of a spoil heap is taking place (Area 3) (see plate 5).

5.3 The works involve the installation of large stone blocks or boulders, to protect the eroded sections of the edge of the watercourse (rock armour). The blocks will need to be positioned to prevent future erosion and undercutting of the banks, and so will need to be laid in a tight formation minimising gaps that water can eddy in. The total length of rock armouring required is c.40m at Area 1, c.40m at Area 2, and c.5m at Area 3 (see figures 2 and 3). The eroded banks behind the new rock armouring may need to be infilled and reinstated as necessary to provide a level and firm surface; if so, this material will be sourced from the river bed. This form of flood mitigation work has previously been successfully employed at the Grinton lead smelting mill, also in Swaledale, in 2020 (Richardson & Dennison 2020).

5.4 The NAA 1992 topographical survey (Fraser 1992, 5) noted that the terrace above the watercourse in Area 1 contained an east-west aligned leat (LT7), running parallel to the beck and surviving as a waterlogged linear depression, which took water from the mouth of the Hard Level (L2), which lies to the west of the bridge, to a reservoir (R4) adjacent to the small rectangular building (B2) (see figure 2). The reservoir is obviously a later addition to the complex, as it lies on the top of a long linear spoil heap (ST3, see below). Both long sides of the east-west aligned reservoir (R4) are formed by revetment walls, that to the south side contains a centrally-placed arched passage or culvert (CT1) which contains the remains of a wooden sluice gate which allowed surplus water to be directed south into the gill.

5.5 The terrace above the north side of the watercourse in Area 2 is formed from the flattened top of a large spoil tip (ST3), running east past a long rectangular building (B3), now restored as a shooting hut (Fraser 1992, 6); the tip is a product of waste material emerging from the Hard Level (L2) and in this area it is formed from stone fragments mixed with a dark grey and dark red-brown sand. A small largely collapsed two-celled structure (B4) also lies towards the east end of the spoil tip. The south side of the tip is retained by a series of at least seven short retaining walls, not all contemporary and set at different heights and angles in the slope.

5.6 The small area of works proposed in Area 3 lie at the north end of a series of six spoil tips (ST5) emerging from the eastern end of a much larger tip (Fraser 1992, 7) (see figure 3). It was thought that these tips relate to a level in the sloping ground to the south which has been since buried by the larger tip.

5.7 It is not envisaged that any scraping back or re-profiling of the eroded banks in the three areas will be required, and so the exposure of archaeological remains is likely to be minimal. However, there may need to be some pre-intervention recording of features that have been exposed by the erosion, such as the revetment walls in Area 2, that will then be covered up by the remedial works. In addition, some minor realignment or clearing of the watercourse may be necessary, to encourage the main flow away from the most vulnerable areas, and so some further remains may be exposed during this operation. It is envisaged that the rock armouring work will be undertaken using a 360 mechanical excavator.

6 FIELDWORK METHODOLOGIES

Aims and Objectives

6.1 The aims of the archaeological recording at the Old Gang complex will be to:

(i) undertaken what pre-intervention recording is possible (subject to health and safety considerations) prior to the erosion repairs and rock armouring work taking place;

(ii) monitor the initial stages of the erosion repair and rock armouring work, to record any features of archaeological interest that might be exposed by these works;

(iii) produce a survey report and archive, appropriate to and commensurate with the results obtained.

6.2 All archaeological work will be undertaken in accordance with Chartered Institute for Archaeologists guidelines (CIfA 2020a).

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 erosion repairs. It is envisaged that the monitoring work will be accomplished through a number of separate site visits, depending on the speed of the erosion repairs.

Documentary Research

6.4 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 Old Gang complex to inform the recording and monitoring work.

Pre-intervention Archaeological Recording

6.5 EDAS will attend the site just prior to the start of any erosion repairs, so that any features of interest that might have been exposed in the three areas of interest can be recorded. The nature of this recording will depend on the site conditions and other health and safety aspects (e.g. water level within the beck) at the time. It may, for example, include a combination of photographic survey, sketch or hand measured survey, accompanied by detailed written descriptions.

6.6 The existing detailed plan produced by NAA in 1992 will be utilised to produce a new survey drawings to show the extent of the recent erosion. Depending on what has been revealed, it may also be appropriate to record other newly exposed features in more detail (e.g. 1:50, 1:20 or 1:10 scale). All drawings would be produced by hand measurement according to Historic England guidelines (2017; 2016).

6.7 General photographic recording of the areas of proposed repair, together with close-up photography of significant details, will be undertaken in jpeg format using an SLR digital camera with 12 mega-pixel resolution. The guidelines produced by Historic England (2015; 2016, 17-21) will be followed and each photograph will normally be provided with a scale subject to health and safety consideration. 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 digital files. 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.

6.8 Sufficient notes will be taken on site in order for a detailed description of any exposed features to be prepared, in combination with the drawn and photographic records.

Archaeological Monitoring

6.9 EDAS will attend the initial phases of the erosion repair works in each of the three areas, so that any features of archaeological interest that might be exposed can be recorded. It is not envisaged that attendance will be required during the main phase of the works.

6.10 Where structures or features of archaeological interest are exposed or disturbed, EDAS will be allowed time to clean, assess and record the remains as necessary and appropriate. The recording is likely to involve a combination of photographic survey, sketch or hand measured survey, accompanied by detailed written

descriptions. Erosion repairs will not be continued 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. It is not envisaged that any finds will be uncovered by the works.

6.11 A final visit will be made on completion of the erosion repairs, so that an 'as complete' photographic record can be made.

Unexpected Significant or Complex Discoveries

6.12 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 for 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.

7 REPORTING AND ARCHIVING

Project Archive

7.1 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 2020b). The archive will comprise primary written documents, plans, sections and photographs, and an index to the archive. On the assumption that only a 2D archive will be prepared, this will be deposited with the YDNPA.

7.3 The digital archive (in this case likely to be the project report and site photographs) will be deposited with the Archaeology Data Service (ADS). The former will be deposited in pdf format while the latter will be deposited in jpeg format, together with any required meta data file and other catalogues; these will utilise ADS templates and spreadsheets.

Reporting

7.4 EDAS will produce a single report detailing the results of the archaeological recording and monitoring 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 monitoring, 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;
- 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;
- 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 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 EDAS subscribe to the Archaeology Data Service's OASIS (Online Access to Index of Archaeological Investigations) project, and all EDAS projects are fully OASIS compliant. Prior to the start of the fieldwork, an OASIS online record will be initiated and key fields completed on Details, Location and Creators forms. All parts of the OASIS online form will be subsequently completed for submission to the Archaeology Data Service and the YDNPA HER; this will include an uploaded pdf version of the entire report.

7.7 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. EDAS will also produce a formal Risk Assessment in advance of any work on site.

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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MGC (Museum and Galleries Commission) 1994 *Guidelines for the* P*reparation of Excavation Archives for Long–term Storage* and *Standards in the Museum Care of Archaeological Collections*

Richardson, S & Dennison, E 2020 *Grinton Lead Smelting Mill, Cogden Gill, Swaledale, North Yorkshire: Archaeological Recording after July 2019 Flood Damage* (unpublished EDAS archive report 2019/599.R01 for YDNPA)

Richardson, S & Dennison, E 2011 *Archaeological Recording, Retaining Wall, Old Gang Smelt Mill, Swaledale, North Yorkshire* (unpublished EDAS archive report 2011/401.R01 for YDNPA)

Richardson, S & Dennison, E 2008 *Archaeological Watching Brief, Exposed Culvert, Old Gang Smelt Mill, Swaledale, North Yorkshire* (unpublished EDAS archive report 2007/317.R01 for YDNPA)

YDNPA 2021 Specification, Old Gang Smelt Mill Watercourse, Reeth, Fremington and Healaugh, Richmondshire

E Dennison, EDAS
16th March 2022

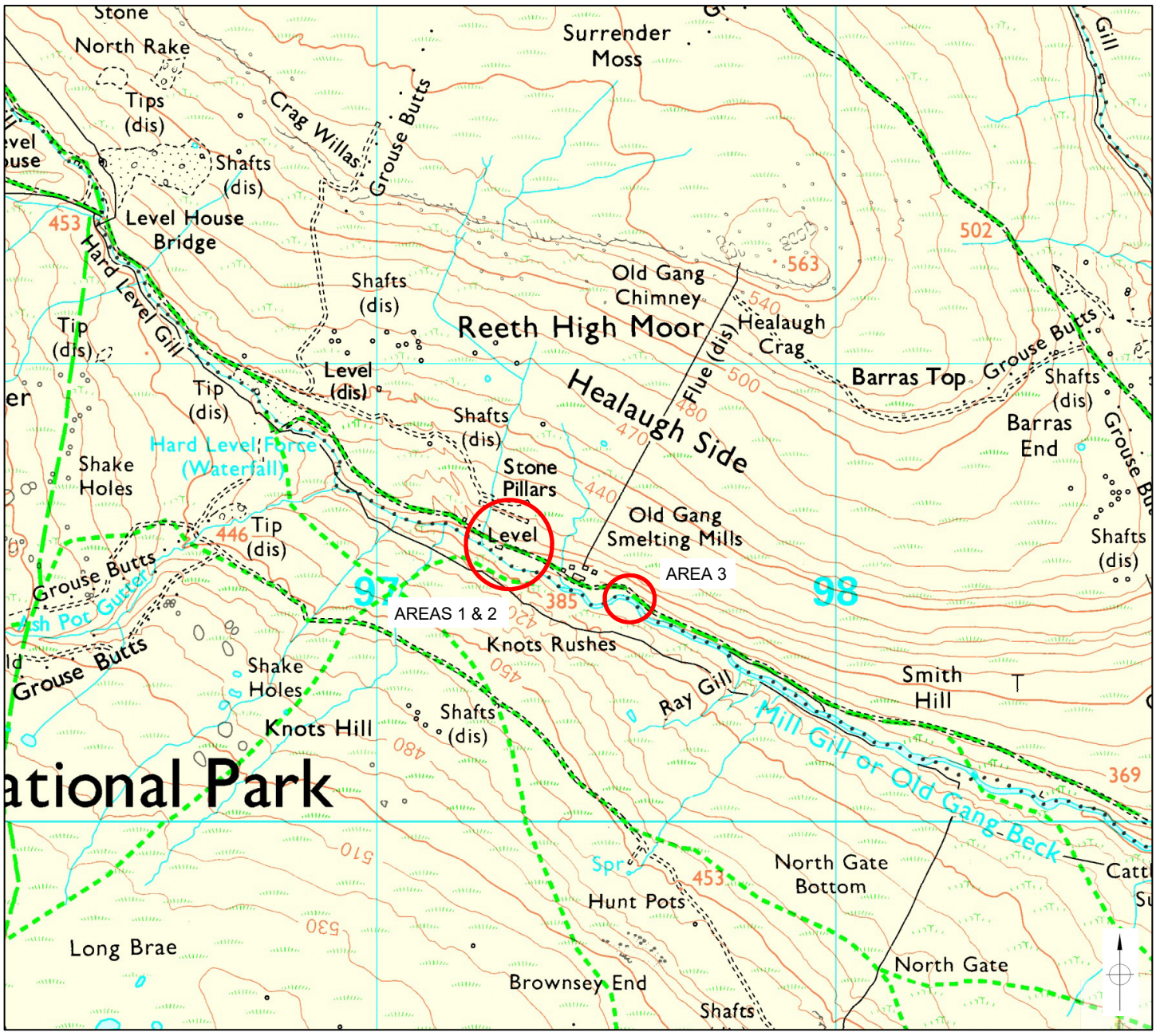
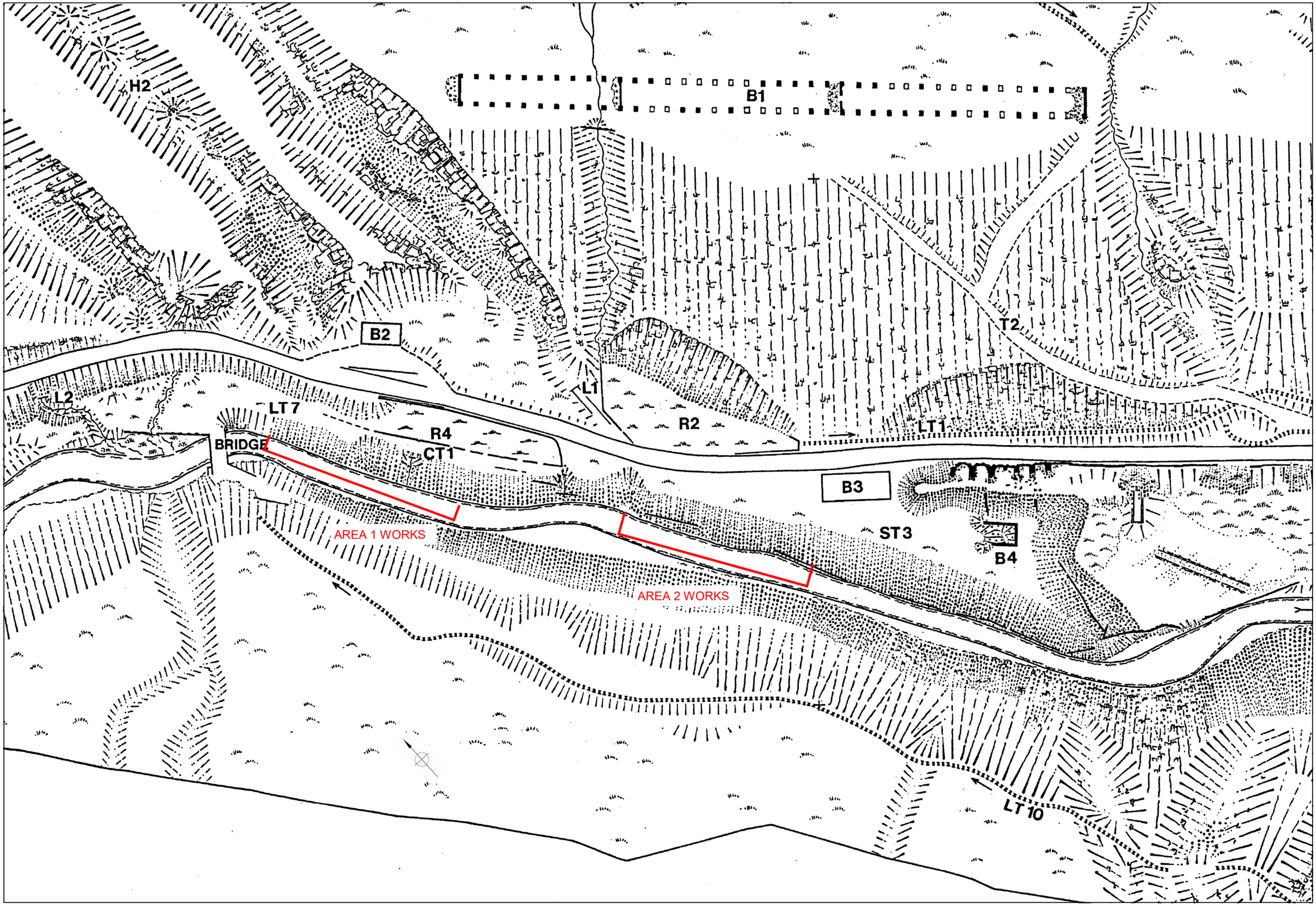
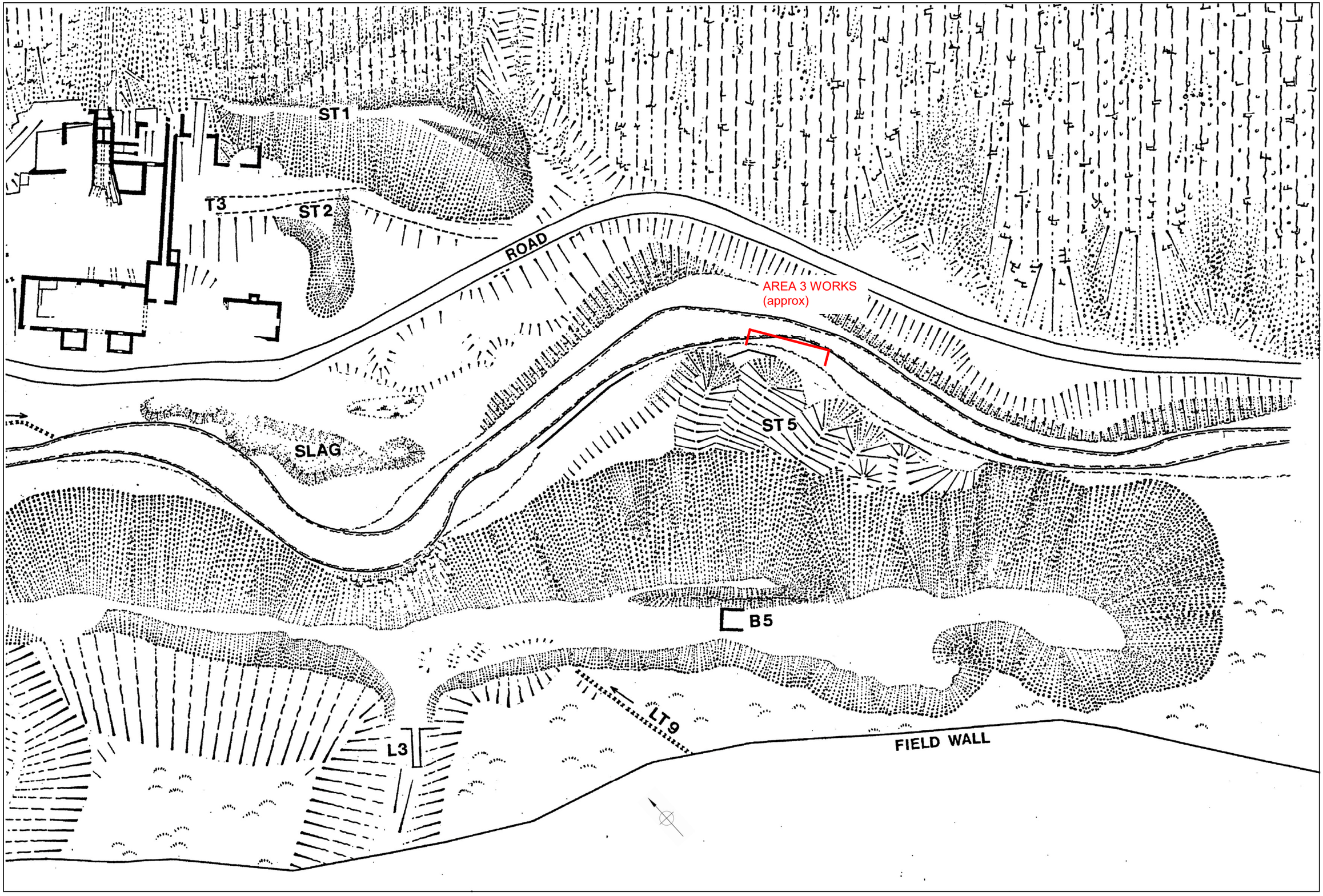


FIGURE 1: GENERAL SITE LOCATIONS
(not to scale)



Plan taken from Fraser, R 1992 *Old Gang Lead Smelting Mill: A Topographic Survey for the Yorkshire Dales National Park* (unpublished NAA draft report 92/17) (not to scale).

FIGURE 2: LOCATIONS OF WORKS IN AREAS 1 AND 2



Plan taken from Fraser, R 1992 *Old Gang Lead Smelting Mill: A Topographic Survey for the Yorkshire Dales National Park* (unpublished NAA draft report 92/17) (not to scale).

FIGURE 3: LOCATIONS OF WORKS IN AREA 3

Plate 1: Area 1 erosion to north side of gill, looking SE (photo courtesy YDNPA).

Plate 2: Area 1 erosion to north side of gill, looking E (photo courtesy YDNPA).

Plate 3: Area 2 erosion to north side of gill, looking SE (photo courtesy YDNPA).

Plate 4: Area 2 erosion to north side of gill, looking E (photo courtesy YDNPA).

Plate 5: Area 3 erosion to south side of gill, looking NE (photo courtesy YDNPA).

APPENDIX 3
YDNPA SPECIFICATION OF EROSION REPAIRS

YORKSHIRE DALES
National Park Authority

Yorkshire Dales National Park Authority

SPECIFICATION

Old Gang Smelt Mill Watercourse

Reeth, Fremington and Healaugh, Richmondshire

Central grid ref **NY 97441 00532**

BACKGROUND

Old Gang Smelt Mill is a protected heritage site - a Scheduled Monument NHLE: 1015860, the standing buildings and structures onsite are also protected as listed buildings NHLE: 1295727. The smelt mill complex is a key site for the interpretation of lead mining heritage in the National Park. Details on the layout and historical significance of the site are included in the accompanying documentation. The wider moorland surrounding and including the site is designated as an SSSi - Arkengarthdale, Gunnerside and Reeth Moors SSSI, and forms part of the Reeth Nickerson Estate.

During the 31st July 2019 cloudburst, the site suffered significant erosion and part of the watercourse edge is now unconsolidated, leading to ongoing erosion in areas adjacent to the dam (which no longer holds water) and shooting hut. A small area of spoil heap has also eroded to the east of the complex. If the watercourse remains unmanaged, it is likely that further flood events will lead to its movement and potentially to the collapse of spoil heaps and partial loss of the dam and hut which lies very close to the north of the watercourse. The site is on CRoW Access land, and the main access track is also a public bridleway ref 20.75/36/1.

PURPOSE OF THE WORKS

- To carry out emergency repairs to the watercourse edge close to the dam and shooting hut through the introduction of rock armour.
- The removal and safe relocation/disposal of material (potentially including flood debris).

GENERAL

- **All dimensions are approximate as the site is actively eroding, and should be checked by the contractor on site.** Final positioning will be agreed with the contractor prior to commencement of onsite works.

- The contractor must give the Authority and the site occupiers, Reeth Sporting Society Ltd, at least 48 hours notice of their intention to start work on site. The Authority will notify Historic England of the intention to start works.

- Old Gang Smelt Mill and the area outlined on the accompanying plan is a scheduled monument, and designated as part of the Arkengarthdale, Gunnerside and Reeth Moors SSSI (Unit 031 Hard Level Mines). It is important that the risk of damage to the ground surface, including both vegetation and archaeological features is actively managed throughout the project. All vehicle tracking off metalled routes, and all intrusive works will be subject to the presence of/or agreed in advance with a monitoring archaeologist. Should significant remains be encountered, the contractor may be required to temporarily halt works, or move to an adjacent area while archaeological recording takes place. Should the monitoring archaeologist notice erosion starting to occur because of tracking activity, then work will be required to cease until appropriate preventive measures are in place.

- Work must not commence on site without the approval of the Authority, Reeth Sporting Society Ltd, or their agent.

- Any inconsistencies in the plan or specification should be brought to the attention of the Authority prior to the start of the works.

- All works are to comply with the relevant British Standards.

- All unused or waste materials must be removed from the site and the site left tidy.

- All working practises are to conform to current health and safety legislation and Current (2015) CDM regulations. It is not envisaged that this project will ne notifiable to the HSE, but for the avoidance of any doubt, the work must take less than 30 days, involve less than 500 person days of work and involve no more than 5 workers on site at any one time.

SITE ACCESS

Access from road and storage: Access to the site is via the aggregate surfaced track (bridleway 20.75/36/1) adjacent to Surrender Bridge. Boulders may be stored in the beck. Alternative storage may be discussed between the contractor and YDNPA Archaeologist.

Machinery: Works are to be undertaken with a low ground pressure 360 tracked vehicle with a surface impact of less than 3lbs per square inch. Any damage caused to stone tracks and associated infrastructure will be repaired at the contractor's expense. Access tracks are shown on the accompanying plan.

Works to move boulders and install rock armouring should use an appropriate grabber, works to reprofile the watercourse edge and to lift flood debris will require a toothless ditching bucket.

Maintenance procedures for powered equipment must be carried out with great care. Oil and fuel spillage must be avoided. Spill kits of sufficient capacity to deal with any accidental spillage of fuel and hydraulic oils must be carried.

Site logistics: Final routes and method of transporting materials to site will be confirmed between the contractor and YDNPA Archaeologist prior to the commencement of works. In general terms, the measures required include:

- Works are to be undertaken during dry ground conditions, and work should cease during periods of extended wet weather.
- Works are to be planned by the contractor (and agreed by the Authority archaeologist) so as to minimise incidence of tracking (including, e.g. retention of vehicles on onsite overnight)
- Monitoring of both the streamside works and tracking will be undertaken by a contracting archaeologist – any evidence that erosion to earthworks or damage to vegetation is starting to occur will result in a requirement for use of mats, ramps and sandbags
- Materials removed from site to be disposed of at an approved location in agreement with the YDNPA.

The envisaged routes to undertake works are as follows:

- Access to the site along the track joining Bouldershaw Lane at Surrender Bridge – listed building NHLE 1301536.
- Once within the Scheduled Monument area, vehicles to track into Barney Beck. The exact point at which vehicles are to enter the beck is to be confirmed with YDNPA Archaeologist on-site.
- Vehicles to track along the beck to the specified areas.

HEALTH AND SAFETY

A bridleway (20.95/12/1) runs across the work site which is sited on CRoW Access land, and is frequently accessed by members of the public. The successful contractor must carry out a full risk assessment and advise the National Park Authority of any further health and safety measures required in order to protect members of the public.

CONSTRAINTS

The YDNPA Archaeologist has made various enquiries and applications to gain the appropriate advice, consents and permissions. Scheduled monument consent will be obtained for the works. As the worksite will effect a minor watercourse there will be relevant guidelines to consider (Pollution Prevention Guidelines PPG5).

Initial permissions and consultation with the affected Land Owner will be undertaken by the YDNPA Archaeologist but the contractor will be expected to liaise with Phil Scott-Priestley (office 01748 897616 / mobile 07500 958824) at GSC Greys regarding access and storage of any materials, and to maintain good relations with those involved.

SPECIFICATION

The following specification is to be used as a guide for completing the requested work and states the minimum requirements for a satisfactory result. Any uncertainty or areas of estimation should be discussed with the YDNPA Archaeologist and a decision agreed on site.

The specification requires the contractor to:

- Provide all materials necessary to complete the work, unless otherwise stated.
- Transport all materials to site.
- Store all materials, plant and equipment safely and securely when on site.
- Carry out the work in accordance with relevant consents and agreements.
- Remove and dispose of all waste materials in a responsible way.

The below items are to be read in conjunction with the accompanying plan.

Key for mapped items

Scheduled Monument
Access route
Areas of work

Specification for works

Area 1

Bank erosion adjacent to dam (approx. 40m)

Bank erosion adjacent to dam – area 2 visible in top right

Area 2

Bank erosion in front of shooting hut (approx. 40m).

Bank erosion in front of shooting hut

Area 3

Spoil heap erosion at south-east of the mill complex

- Supply and install sufficient ½ - 1 tonne stone blocks/boulders to protect eroded sections of the edge of the watercourse to the north of the dam and shooting hut – as outlined on the accompanying plan. The blocks may need to be imported from a suitable local quarry, although a number of suitable sandstone blocks may be available from within the stream channel. Blocks should be positioned to prevent future erosion of the dam and of the bank underneath the spoil heaps, and undercutting of the bank beneath the shooting hut. The total length of rock armouring required is approximately 85m (approximately 40m at Area 1 adjacent to the dam, approximately 40m at Area 2 in front of the shooting hut and approximately 5m at Area 3 in front of the spoil heaps). The contractor is to back fill as needed behind the blocks to provide a level surface. The blocks should be laid in tight formation minimising gaps that water can eddy in.
- If needed, undertake minor realignment/clearing of the watercourse to encourage the main flow away from the most vulnerable areas.
- On completion of the works the site must be cleared of all remaining materials and waste. It is expected that because of prior work planning and monitoring, that works will be completed without damage occurring to the scheduled monument or to the SSSI. The contractor (in discussion with the Authority and Historic England) must make good any damage to the access route and surrounding land which has been caused by tracking, or in the transportation to or storage of materials onsite.

START AND COMPLETION DATES

It is likely that work will have to be carried out (subject to weather constraints) during the winter of 2021/22. Works will need to be completed before the end of March 2021.

The contractor should indicate in their quotation their proposed start date and projected time needed to complete the works.

To arrange a site visit please contact Sarah Whiteley on 01969 652361/07970 994750.
Required itemised costs

Item	Cost ex VAT