EXPOSED CULVERT, OLD GANG SMELT MILL, SWALEDALE, NORTH YORKSHIRE

ARCHAEOLOGICAL WATCHING BRIEF

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Report no: 2007/317.R01
Version: Final
Date: February 2008

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EXECUTIVE SUMMARY

In September 2007, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by the Yorkshire Dales National Park Authority (YDNPA) to undertake an archaeological watching brief during the limited emergency investigation and repair of a collapsed culvert forming part of the Old Gang Lead Smelt Mill complex in Swaledale, North Yorkshire (NGR NY97300055). The culvert was aligned north-west/south-east along the north side of a track running through the complex; the track is used as a public footpath and bridleway, and provides agricultural and shooting access.

The collapse and subsequent watching brief exposed a c.1.70m section of the culvert, although a further section c.4.60m long could be traced further to the east before it was blocked by a fall. The culvert was also choked to the immediate west of the collapsed section. Beneath a failed flagstone capping, the sides of the culvert were seen to be c.0.80m deep and built of roughly coursed and squared unmortared stone. The culvert had an average width of 0.50m and was floored with neatly-cut flagstones, although several were missing around the exposed section. At the west end of the exposed section, two smaller culverts or channels (0.18m wide) could be seen, one running into the north side of the main culvert and one out of the south side; the southern channel was in line with the remains of a wheelpit positioned on the dressing floor to the south.

Although limited in extent, the archaeological watching brief confirmed that the culvert was well-constructed but entirely typical of what might be expected on such a site. It might have been built to take water from a small reservoir to the west, possibly to supply the power for the waterwheel on the adjacent dressing floor via the smaller channel leaving the south side of the main culvert. As this dressing floor was constructed in the early 19th century, this may also suggest a date for the smaller culvert, although the main culvert could have been earlier, and it might have been supplying water to the 18th century New Mill or the later Old Gang Mill. The possible remains of a sluice were identified in the overburden of the collapsed section, and this may have controlled water flow to the dressing floor wheelpit, although it appeared to be of late 19th/early 20th century date.

Some re-used sections of rail had been used to support the sides and roof of the culvert, and this suggests that it has been repaired at least once before the current phase of works. The fact that the culvert appeared to be blocked both to the west and east of the exposed section suggests that further collapse may be likely along the alignment, especially if the number of vehicles using the track increases in number or weight.

1 INTRODUCTION

1.1 In September 2007, Ed Dennison Archaeological Services Ltd (EDAS) were commissioned by Mr Robert White, Senior Conservation Archaeologist of the Yorkshire Dales National Park Authority (YDNPA) to undertake an archaeological watching brief during repairs to a hole over what was believed to be a collapsed culvert forming part of the Old Gang Lead Smelt Mill complex in Swaledale, North Yorkshire (NGR NY97300055). The scope of the work was not defined by a project design but was outlined following discussion between EDAS and the Senior Conservation Archaeologist of the YDNPA.

2 SITE LOCATION AND DESCRIPTION

2.1 The Old Gang Smelt Mill is situated on a terrace to the north of Mill Gill, a tributary of the river Swale, 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 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.

2.3 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 it uses the same flue system which meant that production was not severely disrupted during the transition. The complex of structures on the site includes the mill building itself, 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 (Gill 1992, 121-122; Gill 2004, 91-97).

2.4 The section of culvert forming the subject of this watching brief lies c.130m west of the main smelt mill complex. The culvert appears to follow a north-west/south-east alignment along the north side of a track which passes through the complex, and which is used as a public footpath and bridleway and for shooting and agricultural access (see figure 2). Being underground, the culvert had not been previously identified in a topographical survey of the site by Northern Archaeological Associates (NAA), although there is another stone-lined channel (LT1) running west from a reservoir (R2) located adjacent to the entrance to the Spence Level (L1) (Fraser 1992, 3) (see figure 2).

2.5 The culvert lies within the area of a Scheduled Monument (SM 28908), which covers the majority of the smelt mill complex and its related structures and earthworks. The work to the culvert was carried out as urgent repair works because of Health and

Safety issues. The track, which is here supported by a retaining wall in poor condition, carries the long distance Coast to Coast footpath and is a heavily used vehicular route to Reeth High Moor and the Reeth Estate shooting hut, as well as being used by agricultural traffic. English Heritage were consulted prior to the work being carried out, and the site was visited by their Historic Environment Field Advisor, Vivienne Metcalf, to discuss the urgency of the work and possible solutions. The entire smelt mill complex and flue system is also a Grade II Listed Building, although the Scheduled Monument legislation takes precedence.

3 METHODOLOGY

3.1 A small collapse on the line of the track was reported to YDNPA staff in September 2007. The initial proposal from the shooting estate was to backfill the hole with concrete. The YDNPA had a number of concerns over this: it could affect water flow through the area and result in further damage elsewhere; that the hole could be the forerunner of a greater collapse in this heavily mined area; and that vehicles trying to avoid the collapsed area would put additional pressure onto the track's retaining wall. The YDNPA therefore arranged for preliminary investigations to ascertain the nature of the hole. The approach adopted was to clean up and excavate a small area around the hole and to use this information to design and implement a more appropriate repair. The excavation and repair work, which was prescribed by the YDNPA Senior Conservation Archaeologist, was undertaken by YDNPA staff on 5th October 2007. Work was monitored by EDAS, who also undertook some of the clearance of the feature.

3.2 Investigation showed that the hole was over a culvert, which had been capped with flagstones and then sealed with roadstone, mainly mine and dressing waste. The collapse was due to a failure of the capping flags. Accordingly, a decision was made to replace and re-wall the failed sides of a short section of the culvert, insert new flag capping with stone taken from the stream outside the scheduled area, and reseal the structure to match the surrounding surface.

3.3 The exposed section of the culvert was located on the 1:200 scale topographical plan of this part of the site made by NAA, using measurements taken from adjacent structures. A plan and section of the exposed section of culvert were made at a scale of 1:20 which, together with a small number of 35mm colour prints and sufficient notes, allowed a description to be prepared. Some 1:1 profiles were also made of a number of rails incorporated into the culvert structure; all loose ironwork recovered or removed from the culvert during the course of the repairs was replaced within it prior to the roof being re-laid and sealed.

3.4 The small project archive arising from the watching brief, comprising written and photographic elements, has been ordered and indexed according to the standards set by the National Archaeological Record. It was deposited with the YDNPA (site code COG 07) on completion of the project. No artefacts were retained from the watching brief.

4 RESULTS FROM THE WATCHING BRIEF (see figures 3 and 4)

4.1 Following the clearance of overburden in the vicinity of the collapse, it was discovered that the culvert had formerly been roofed with large flat flagstones, on average 0.12m thick. Over time, several of these had also collapsed into the culvert, and so they had to be removed before clearance could take place.

4.2 Once clearance was complete, a c.1.70m section of culvert was exposed (see plate 1). The culvert was aligned north-west/south-east along the north side of the track; its line could be traced for a further 4.60m to the east, where it was blocked by a fall. The culvert was also choked to the immediate west of the exposed section by stones, soil and fallen material. Beneath the flagstone capping, the sides of the culvert were c.0.80m deep and built of roughly coursed and squared unmortared stone. The culvert had an average width of 0.50m and was floored with neatly-cut flagstones (see plate 2), although these were missing at the western end of the exposed section. Also at the west end, a smaller culvert (0.18m wide) appeared to enter the main culvert from the north, whilst opposite, a similar feature appeared to leave the south side to run to the south; the latter was in line with the remains of a wheelpit positioned on the dressing floor to the south.

4.3 Whilst the overburden was being cleared, it was observed that the flagstone roof of the culvert was supported in a number of places by re-used rails laid across its width. Furthermore, other short sections of rail had been placed vertically against the sides to prop up the flagstones. The rails had two distinct profiles (see figure 4). A high proportion of rotten wood was also present in the overburden above the smaller culverts seen in the north and south sides of the main feature, together with a 0.80m long piece of wrought-iron or steel with a U-section and pierced by several neat circular holes along one side and the base.

4.4 As stated above, all loose metal items or those disturbed during the course of the works were replaced within the culvert, which was then re-roofed using the fallen flagstones or other stones obtained from the base of Mill Gill. The overburden was subsequently replaced.

5 DISCUSSION AND CONCLUSIONS

5.1 Although limited in extent, the archaeological watching brief confirmed that the culvert was well-constructed but entirely typical of what might be expected on such a site. Being underground, the culvert had not been previously identified by NAA's topographical survey, which clearly shows that this type of survey alone is not sufficient to interpret industrial sites. On this type of site, hachured surveys should also be supported by levels (relative or AOD), so that falls along water channels and culverts can be calculated.

5.2 The smaller culvert leaving the south side of the main feature may have fed a launder to power the waterwheel formerly located in the wheelpit on the dressing floor below. As the dressing floor was constructed in the early 19th century, this may also suggest a date for the smaller culvert, although the main culvert could have been earlier, possibly associated with water supply from the adjacent reservoir (R2 on NAA's survey) to the 18th century New Mill or the later Old Gang Mill to the east. A sluice would have been needed at the junction of the two culverts to control water flow into the wheelpit launder – the rotten wood and U-section metal section noted in the overburden at this point may well form the remains of such a sluice, although probably one of late 19th/early 20th century rather than early 19th century date. The re-used rail sections observed within the culvert suggest that it has been repaired at least once before the current phase of works.

5.3 The fact that the culvert appeared to be further blocked to the west and east of the exposed section suggests that further collapse may be likely along the alignment, especially if the number of vehicles using the track increases in number or weight. Recent drainage works also appeared to have been carried out in the vicinity of the culvert, within the Scheduled Monument, particularly to the east of the collapsed

area, where the re-cutting of an existing drain (or possibly the creation of a new drain as it is not depicted on the NAA survey) on the north side of the track has occurred, with fresh spoil being deposited on the track leading to the dressing floor, obscuring this trackway's low retaining wall. It is also possible that vehicular movements associated with this unauthorised work were responsible for the collapse of the main culvert.

6 BIBLIOGRAPHY

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Gill, M C 1992 "Yorkshire Smelting Mills Part 1: The Northern Dales". *British Mining* vol 45, 111-150

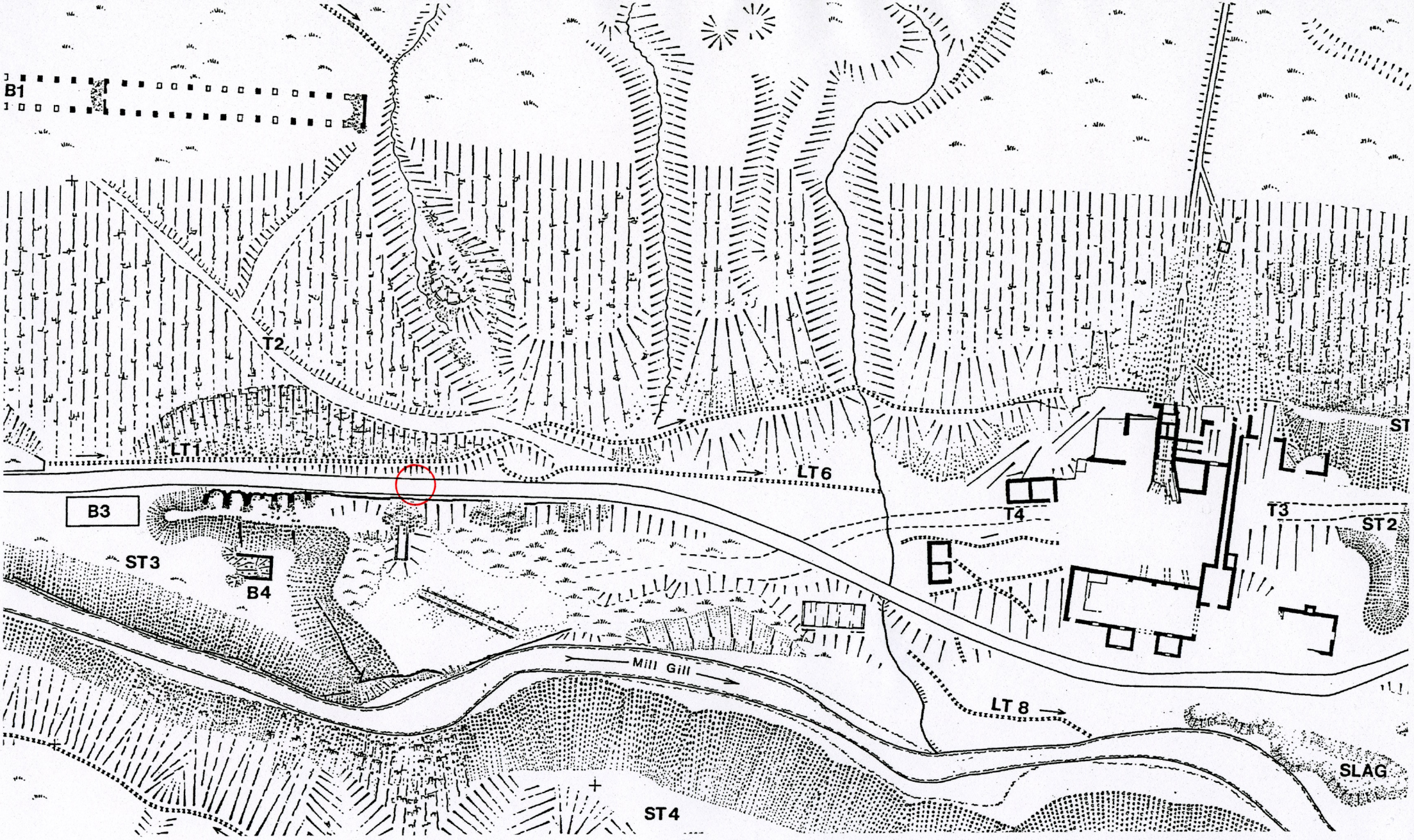
Gill, M C 2004 *Swaledale: its Mines and Smelt Mills*

7 ACKNOWLEDGEMENTS

7.1 The archaeological watching brief at the Old Gang smelt mill was commissioned by the YDNPA, through their Senior Conservation Archaeologist, Mr Robert White. Thanks are due to him, and to other YDNPA staff, for the help and co-operation in carrying out the archaeological recording.

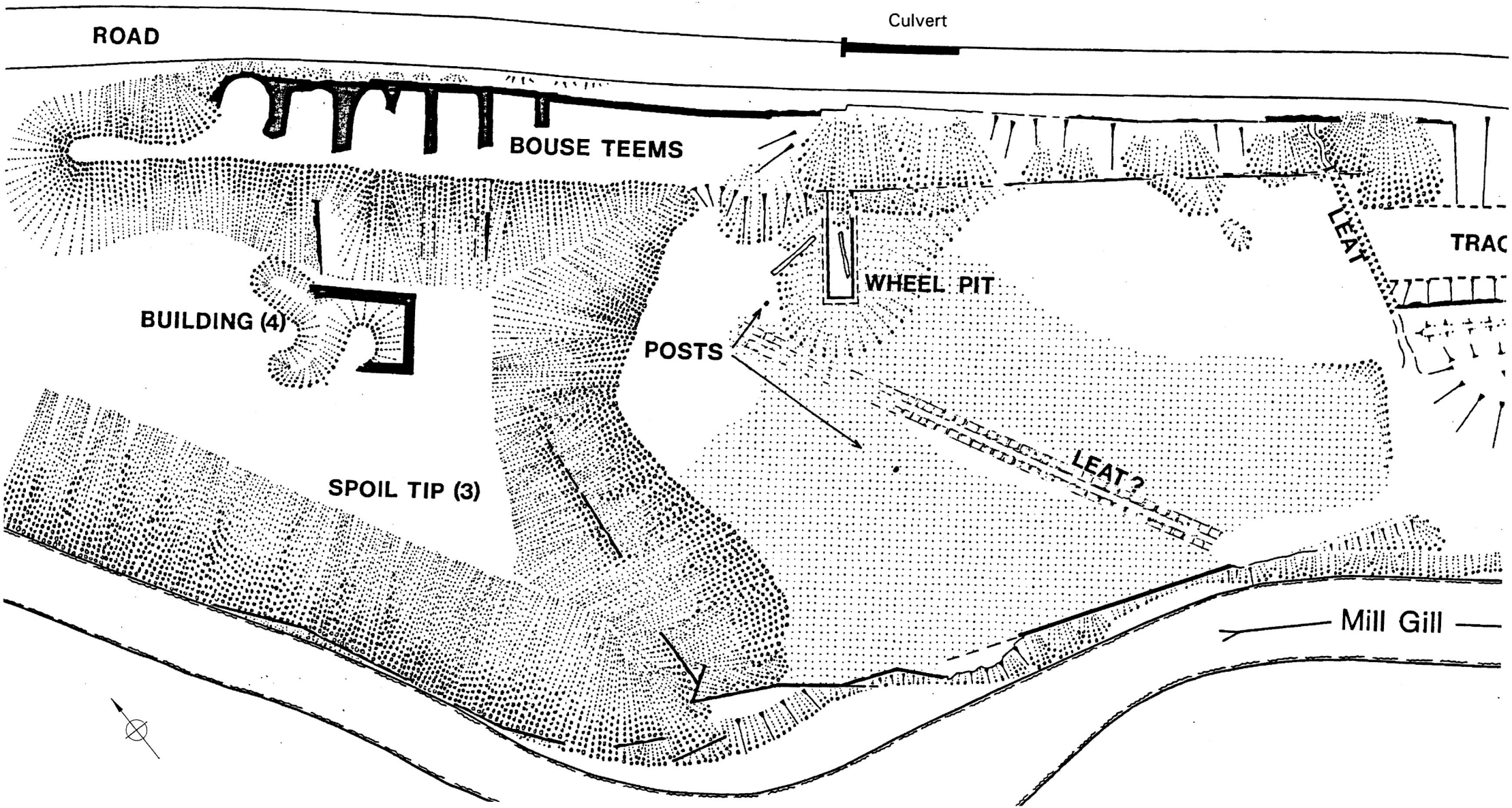
7.2 The on-site recording was undertaken by Shaun Richardson of EDAS, and he also produced the fieldwork records and a draft report. The final report was produced by Ed Dennison, with whom the responsibility for any errors remains.

PROJECT	
EXPOSED CULVERT, OLD GANG MILL	
TITLE	
GENERAL LOCATION	
SCALE	DATE
NTS	FEB 2008
EDAS	FIGURE 1



Base plan: NAA topographical survey (Fraser 1992)

PROJECT	EXPOSED CULVERT, OLD GANG MILL
TITLE	LOCATION OF CULVERT
SCALE: AS SHOWN	DATE: FEB 2008
EDAS	FIGURE: 2

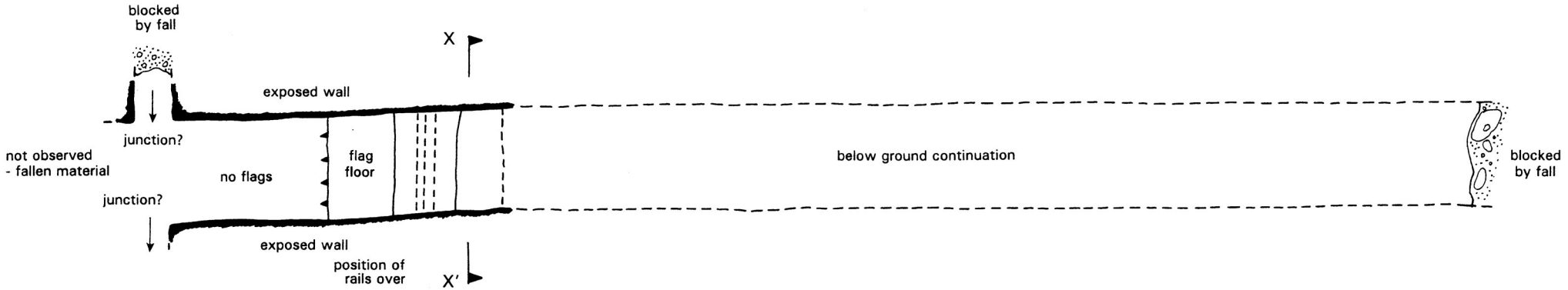


Base plan: NAA topographical survey (Fraser 1992)

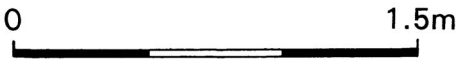
0 30m

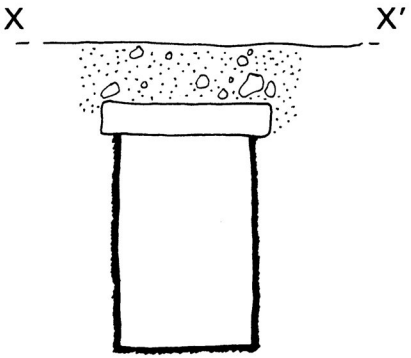
PROJECT: EXPOSED CULVERT, OLD GANG MILL	
TITLE: LOCATION OF CULVERT	
SCALE: AS SHOWN	DATE: FEB 2008
EDAS	FIGURE: 3

PROJECT: EXPOSED CULVERT, OLD GANG MILL	
TITLE: WATCHING BRIEF RESULTS	
SCALE: AS SHOWN	DATE: FEB 2008
EDAS	FIGURE: 4

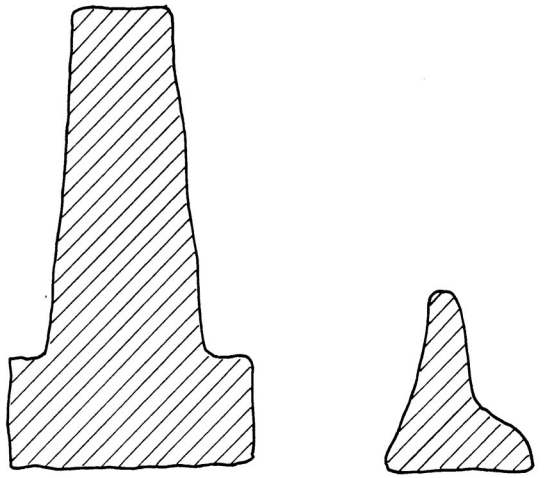


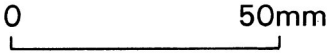
Plan of culvert





Section through culvert





Cross sections of rails used to support sides and roof

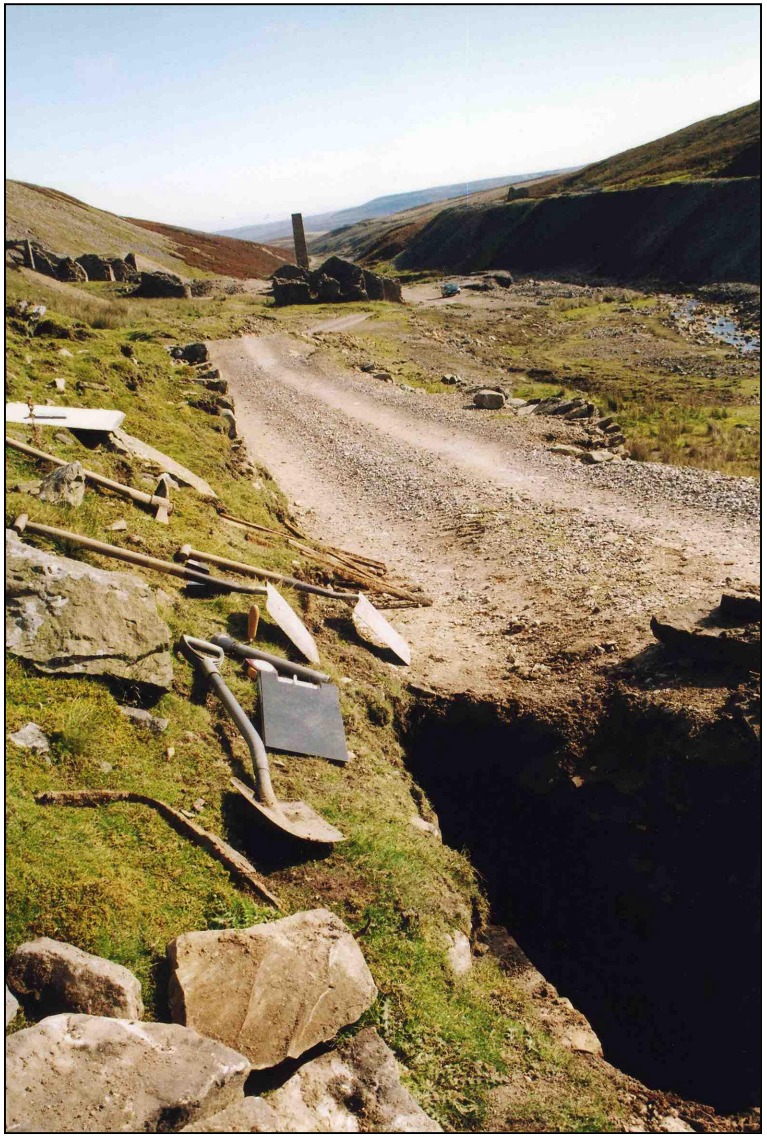


Plate 1: General view of site, looking east.

Plate 2: Interior of exposed culvert, looking east.