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KELD HEADS SMELT MILL FLUE ARCHAEOLOGICAL ASSESSMENT

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1 Introduction: Scope of the Report

1.1 Millfields Geotechnical Services Ltd have commissioned advice from The Archaeological Practice at the University of Newcastle upon Tyne on two points in connection with an Interim Development Order (IDO) condition submission at Wensley Limestone Quarry:

- *The significance of and archaeological importance attached to the flue, and depending upon the above factors, what action, if any, a responsible company should be making in relation to this feature.*
- *Any other archaeological interest which may be upon the site and the best method of detection.*

1.2 An inspection of the site was made by Dr S Linsley and Mr C O'Brien in August 1994, maps were inspected in the County Record Office, and published literature was consulted.

1.3 Features observed on the ground were:

- The remains of the Keld Heads lead smelt mill flue
- Enclosure walls which in one area are built on top of the flue
- An embankment which may be part of a dam associated with the flue
- Three circular depressions of unknown origin

No other features of archaeological interest were observed on the ground.

1.4 This report describes:

- The historical and technological context of lead smelt mill flues
- The historical and site context of the Keld Heads flue
- The condition of the Keld Heads flue within and beyond the IDO area

An assessment is given of the significance of the flue, and recommendations are made.

2 Smelt Mill Flues

Lead smelt mill flues, or "horizontal chimneys" as they were more commonly called, largely date from the first decade of the C19, and were constructed primarily to facilitate the recovery of lead and silver from the "fume" which was discharged from smelting hearths and furnaces, by condensation on the walls, roof and floor. Periodically, during periods of mill shut-down for purposes of repairing the furnaces etc., the deposited materials, sometimes known as "smelters fume", were scraped down and removed from the flue for re-smelting; the removal of the condensed deposit was sometimes assisted by directing a stream of stored water down the horizontal chimney to carry off the scraped deposits to settling tanks. It was also the case that the horizontal chimneys assisted in dispersing the still-toxic fume, which finally emerged from a vertical chimney at the termination of the flue, into the atmosphere at some distance from the smelt mill operatives. The earliest of these horizontal chimneys were only about 100 metres long, but the evident economic benefits derived from the recovery of lead and silver led to many of them being extended to considerable lengths, of up to 2.5 miles in some cases. Alternative forms of condenser were also developed,

often based on the principle of drawing or blowing the fume through water-filled tanks, but these were not to replace the essential dependency on horizontal chimneys.

3 Keld Heads Smelt Mill

3.1 Historical Context

The Keld Heads smelt mill, near Tullis Coate farm, was constructed sometime before 1854, and extended in 1855, being one of the last such mills to be commenced in the Wensleydale-Swaledale area; it replaced the earlier and nearby Preston smelt mill.

In 1854 its horizontal chimney was only about 800 ft long and a Stokoe condenser was situated at about the half way point along the flue. At the time of the mill extension in 1855, the horizontal chimney was also extended in a north-westerly direction to its present full length of nearly 2.5 miles, terminating in a square cross-sectioned stack just a few hundred yards north-west of the Cobscar smelt mill whose short horizontal chimney it joined; another Stokoe-type condenser was probably located near the junction. The Keld Heads smelt mill is believed to have ceased operations in c.1888.

3.2 The Condition of the Flue and Associated Structures

The flue, as it runs across the IDO site both to the north and south of the Richmond to Redmire road was examined on 17 August 1994. To enable a better understanding and appreciation of the surviving remains of the flue, the section to the north-west of the IDO site as far as the terminal stack was also examined. The flue system leading from the Keld Heads mill site to the Preston road was not examined, but an account of the remains there is given in Raistrick (see note on sources).

Within the IDO site

The alignment of the flue across the fields south of the Richmond to Redmire road is well preserved but no complete section of the flue survives because of collapse and perhaps some robbing. The flue had been constructed with short vertical walls which provided the springing for an arched roof. At no point can the floor of the flue be seen because of the collapse of the arch, but it had been around 40 inches wide. In parts the outer vertical walls of the flue are around 1.5 feet thick and stand to a height of about 1.5 ft above ground level.

North of the Richmond-Redmire road the alignment of the flue is less well defined across the IDO site and in part it coincides with the alignment of a dry-stone wall which bounds part of the site. The evidence of Ordnance Survey maps suggests that a wall here predated the flue, was replaced by it in 1855, and then reconstructed along the centre line of the flue after c.1888; stones from the flue may have been re-used as walling material in the latter phase. Nearby, and to the west of the flue, a marshy and reedy area, with a slight embankment of the west, may indicate a former dam, with a fairly straight-line conduit or drain entering the area from the north west; although there is no evidence for such recorded on OS maps, it remains possible that the dam was built and abandoned between the dates of the OS maps consulted (that is 1854 and 1911). There are also three depressions in the ground to the east of the flue alignment which may have been bell pits or trial shafts, although the absence of spoil heaps or

shaft mounds may suggest otherwise. An alternative suggestion is that they have resulted from quarrying.

Beyond the IDO site

To the north-west of the IDO site the flue is quite well preserved, although again, no complete section survives. The remaining structures of Cobscar smelt mill, which lie only a few hundred yards from the flue, are of considerable interest and importance, as are the two flue sections, remains of a possible condenser house, and the vertical stack at the termination of the flues. Socket holes within the vertical stack may have been used for platforms to facilitate the scraping of residues. The stack is basically complete and sound but some small pieces of its outer masonry have become detached. The view of the main flue from the site of the stack is particularly impressive.

3.3 Other Archaeological Features

An embankment and three circular depressions were observed, as described above (3.2). The embankment is thought to be associated with the flue, while the depressions are of unknown origin. They may be natural rather than archaeological features. No other archaeological features were observed. On the land north of the Richmond-Redmire road, between the quarry face to the west and the enclosure wall to the east, the vegetation is, in the main, growing directly on the rock with no significant soil horizon (and in places the rock shows through on the surface). The probability that there might be any buried archaeological features or horizons on this land is slight. Within the enclosed land to the east of this and south of the road, the ground has been cultivated and there is a greater depth of soil. No features were observed on the surface. While it is possible that archaeological features could lie below this soil, it is not likely that, if there were any, they would remain intact after ploughing of the shallow soils unless they were rock-cut. Observation of the land at the time of topsoil strip would check this, but in general it is felt that significant archaeological findings are unlikely to be made.

4 Assessment

The entire flue system is of considerable interest, and the removal in quarrying of any part of it is bound to be an archaeological loss, for its very existence, though variable in quality, throughout its length demonstrated the efforts made to secure complete recovery of smelter fume. Moreover, the view down the length of the flue from its termination, as it crosses the IDO site, is particularly dramatic. However, there are other, and better, examples of horizontal chimneys such as Grassington in North Yorkshire or Allenheads and Langley in the Northern Pennines, and the section of the Keld Heads flue which passes over the IDO site is the least interesting section along its length. For these two reasons there is not a strong case for the absolute protection of the feature across the IDO site.

In view of the historical interest of the flue and its reasonably good state of preservation within the IDO area the following recommendations are made for recording in advance of quarrying:

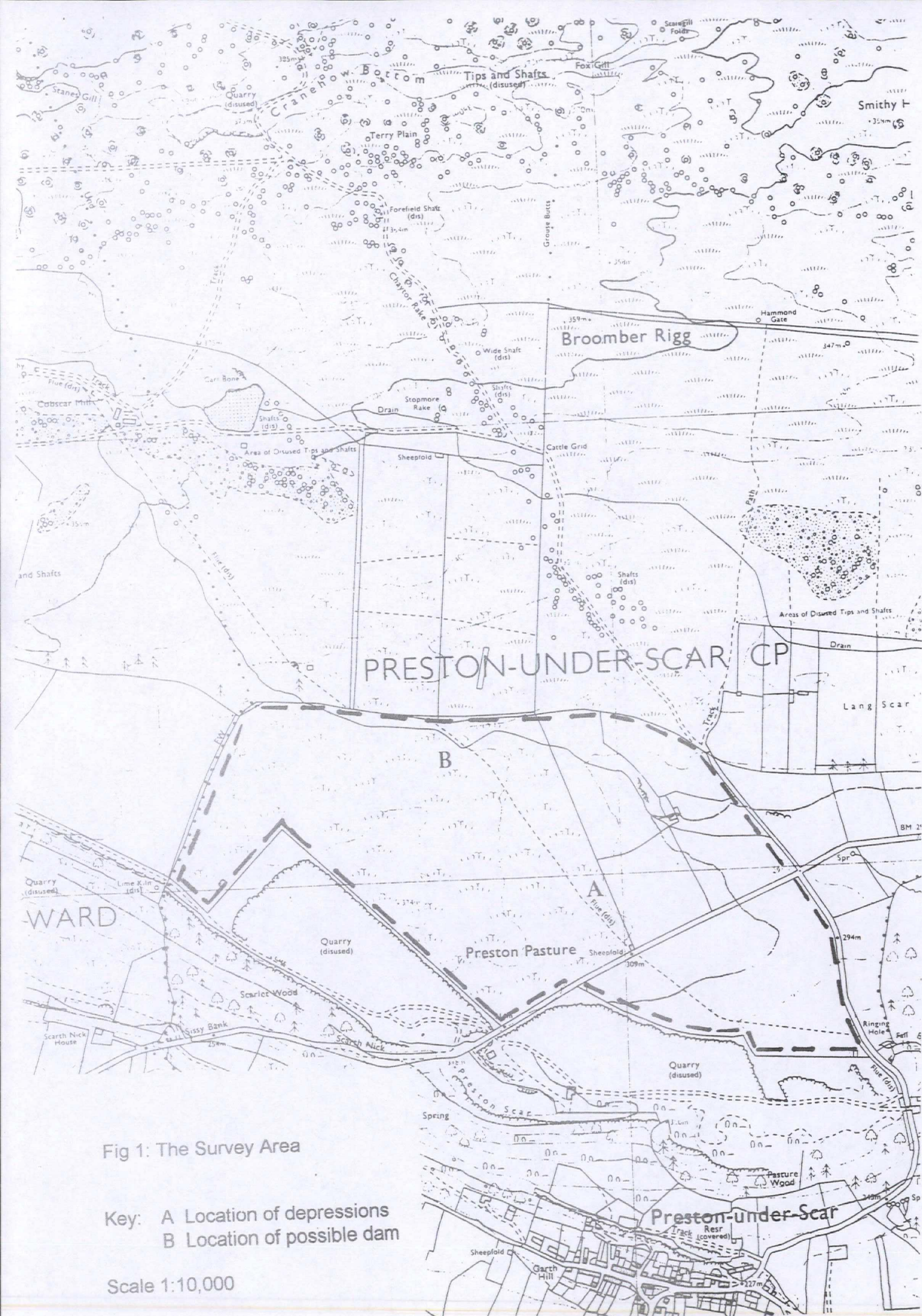
5 Recommendations

- 5.1 Three archaeological sections should be made across the flue: one in the field below the Richmond-Redmire road, one above the road, and one where the flue coincides with the boundary wall, with full recording in each case. Exact locations may be determined at a later date.
- 5.2 The possible dam noted above should be more closely examined and surveyed and drawn out at a scale of 1:2500, or larger if this is necessary to record significant detail.
- 5.3 The three depressions noted above should be more closely examined and surveyed to fix their position on a 1:2500 scale map. This can be done within the context of the topsoil strip prior to quarrying.

APPENDIX: SOURCE REFERENCES

Historical data are taken from:

- A Raistrick *The Lead Industry of Wensleydale and Swaledale, Vol 2 The Smelting Mills*. Moorland Publishing 1975.
- R T Clough *The Lead Smelting Mills of the Yorkshire Dales and Northern Pennines*. Keighley 1962.



PHOTOGRAPHS

- 1 Remains of the flue in pasture south of the Richmond - Redmire Road, within the survey area.
- 2 Remains of the flue looking downhill from close to Cobscar Mill. The survey area is in the middle distance.



