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Snailbeach New Smeltmill, Worthen with Shelve, Shropshire

Mark Bowden, Olaf Bayer and Mike Williams

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SNAILBEACH NEW SMELTMILL WORTHEN WITH SHELVE SHROPSHIRE

Archaeological and Architectural Investigation

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SUMMARY
The New Smeltmill served the Snailbeach lead mine from 1862 until about 1895. Its buildings and other infrastructure have suffered partial demolition, decay and neglect and are heavily overgrown but it is considered one of the best preserved examples of its type in Shropshire, and possibly in the country. It is a Scheduled Monument and has been placed on the Heritage at Risk Register. Some emergency conservation work has been undertaken but further research is needed to understand and properly manage the site. The analytical earthwork survey reported here is a first step in that process and has elucidated some of the site's complexity despite the difficult ground conditions.

CONTRIBUTORS
Survey was undertaken by the authors at the request of Jenny Marriott, then of Historic England Planning Group, West Midlands. Aimee Henderson, Heritage at Risk Project Officer in the West Midlands team, has supplied additional information. All photographs in this report, except the front cover image, were taken by Mark Bowden in February 2018.

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DATE OF SURVEY
Survey was undertaken in November-December 2017 and February 2018.

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Cover photograph: the slag mill from the east, Mark Bowden, May 2016

'Lead is found in the district between the Stiperstones and Corndon, in an area generally known as the Shelve country. This used to be one of the richest lead areas in Britain, but now the seams have been exhausted or so fragmented that mining is barely profitable. The activities of the lead-miners have left a stark and unique landscape which many consider beautiful in its poverty.'

Trevor Rowley 1972, 209

CONTENTS

INTRODUCTION

The Shropshire metal orefield is compact but rich and has been exploited since the Roman period. The minerals found include ores of lead, zinc and barytes. The lead mining region around the Stiperstones has been described as 'one of the most evocative industrial landscapes in Britain' (Trinder 2016, 166). Within that region Snailbeach lead mine is one of the best preserved historic mining landscapes in the country and extensive parts of it, including the New Smeltmill site, were Scheduled as an Ancient Monument following a Monuments Protection Plan study by David Cranstone in 1991 (English Heritage 1992). The core of the mining site had been surveyed in some detail by the then Lancaster University Archaeology Unit in the late 1980s (Trueman and Gill 1990) but the detached lead smelting site was excluded from this study.

Level 3 survey – the highest level of analytical survey (Historic England 2017, 33-5) – of the 19th-century lead smelting complex at Snailbeach was requested by West Midlands Planning team in 2016. The site is on the Heritage at Risk (HAR) Register and is considered to be one of the best-preserved examples of its type in Shropshire, and perhaps in the country (Barnes 2011 i, 87). Some emergency propping and repairs have been done via Management Agreements; however, the earthworks and ruined smelters had not been recorded. The smelters are deteriorating quite rapidly and are subject to weather erosion, with collapsing brick and stone work, and invasive plant growth.

Associated features such as trackways, flues and reservoirs continue to deteriorate with no adequate record. The completeness and survival of these features significantly raises the importance of this site which needs recording before it deteriorates further (Historic England (HE) records its current condition as 'very bad and at immediate risk of further rapid deterioration or loss of fabric' (HAR Register)).

The brief specified that survey was to be confined to the earthworks and ruined structures. Only the footprints of the roofed buildings were to be recorded. No building recording was required as that will be subject to a separate survey (Kelleher 2015). The HE West Midlands office holds a photographic record of the site. In addition to understanding how the various parts of the site relate to one another, the survey aimed to understand: what the standing remains of the smeltmill represent; what is visible and how it relates to the smelting process; whether it might be possible to relate the surviving masonry to the smeltmill at Pontesford nearby, its predecessor. It is hoped that the information from the survey might help the Shropshire Mines Trust deliver more off-site interpretation of the structure. This understanding is crucial in helping to take decisions about the site's conservation in terms of approach and prioritisation (Barnes 2011 ii, 4, 15).

HISTORY

Lead ore from the very productive Snailbeach mine was exported for smelting until a water-powered smelter was built at Pontesford in about 1784, following the acquisition of the nearby Nag's Head Colliery, which supplied coal for the smelters. A description of the Pontesford smelt house by ML Moissenet, published in French in 1862, has been translated and re-published (Martel and Gill 1992). The colliery closed in 1862 and the Pontesford smelter was abandoned in favour of a new site at Snailbeach, a safer location closer to the mine where fumes could be dispersed away from settlement. The New Smeltmill was built in 1862 about 1km north of Snailbeach mine and began to operate the following year. From 1877 it was served by the Snailbeach District Railway, a light railway which connected it both to the mine and to the main line at Pontesbury Exchange Sidings, for importing coal and exporting the smelted lead (Barnes 2011 i, 79; Tonks 2007). Between 1878 and 1883 the railway carried on average 14,000 tons of minerals per year (Trinder 2016, 158).

The smelting complex is said to have originally housed at least four reverbatory smelters and a hearth in the adjacent slagmill. The complex was built under the management of James Ray Eddy, who also managed the Cupola Smelt Mill at Grassington, Yorkshire; the general layout of the New Smelt Mill is 'almost identical' to the Grassington mill (Trueman and Gill 1990 i, 18, 24). Material was delivered to the furnaces from a tramway above the smelt house. Four (or more) flues ran to a condensing chamber on the eastern edge of the site from which a single flue ran uphill to the south, discharging the fumes through the Resting Hill chimney. The flue walls acted as a condenser from which substantial amounts of lead were scraped. The slag from the furnaces was still rich in lead, so was re-smelted in the slag mill. This also had a flue running to the south-east. A steam engine may have been located externally to the north or south of the slag mill to provide a blast for the slag hearth. Four ponds cut into the slope to the north-east are said to have been reservoirs to provide water for this engine (but see below). The smelters, slag mill and ancillary buildings were bounded by a stone wall which survives to full height along the north-west side of the complex and incorporates a privy (Barnes 2011 i, 80-1).

The smeltmill closed in 1895 (though one hearth was re-used briefly in 1897 – Barnes 2011i, 115), after only 33 years in operation, but its period of use spanned a time when Shropshire produced about 10% of the national output of lead and Snailbeach was the most productive mine in the orefield; it was considered by some to be one of the richest mines in Europe (Brown 1976, 83; Trinder 2016, 155). The flue was partly demolished but the chimney survived as it served other parts of the mine. The closure of the smeltmill has been attributed to the loss of a major client (Barnes 2011 i, 81) but it occurred at a time when the Shropshire lead mining industry was in sharp decline generally (Trinder 2016, 156).

The remains are unusually complete for a monument for this type and date and, with the exception of the hearth itself, much of the internal arrangement of the slag mill is visible. Buried archaeological deposits within the floor of the furnace structure have the potential to provide information on the layout and function of the

furnaces (List Description, Scheduled Monument no 1017764). In addition, a waste heap survives well and appears to have been little disturbed since the complex ceased to operate.

The elements of the site that are known to exist therefore include: a smelt house, slag mill, flues (including a link to the chimney on Resting Hill in the main Snailbeach mine complex), ponds, railway lines, a boundary wall, a waste tip and a privy (Barnes 2011 i, 82-4).

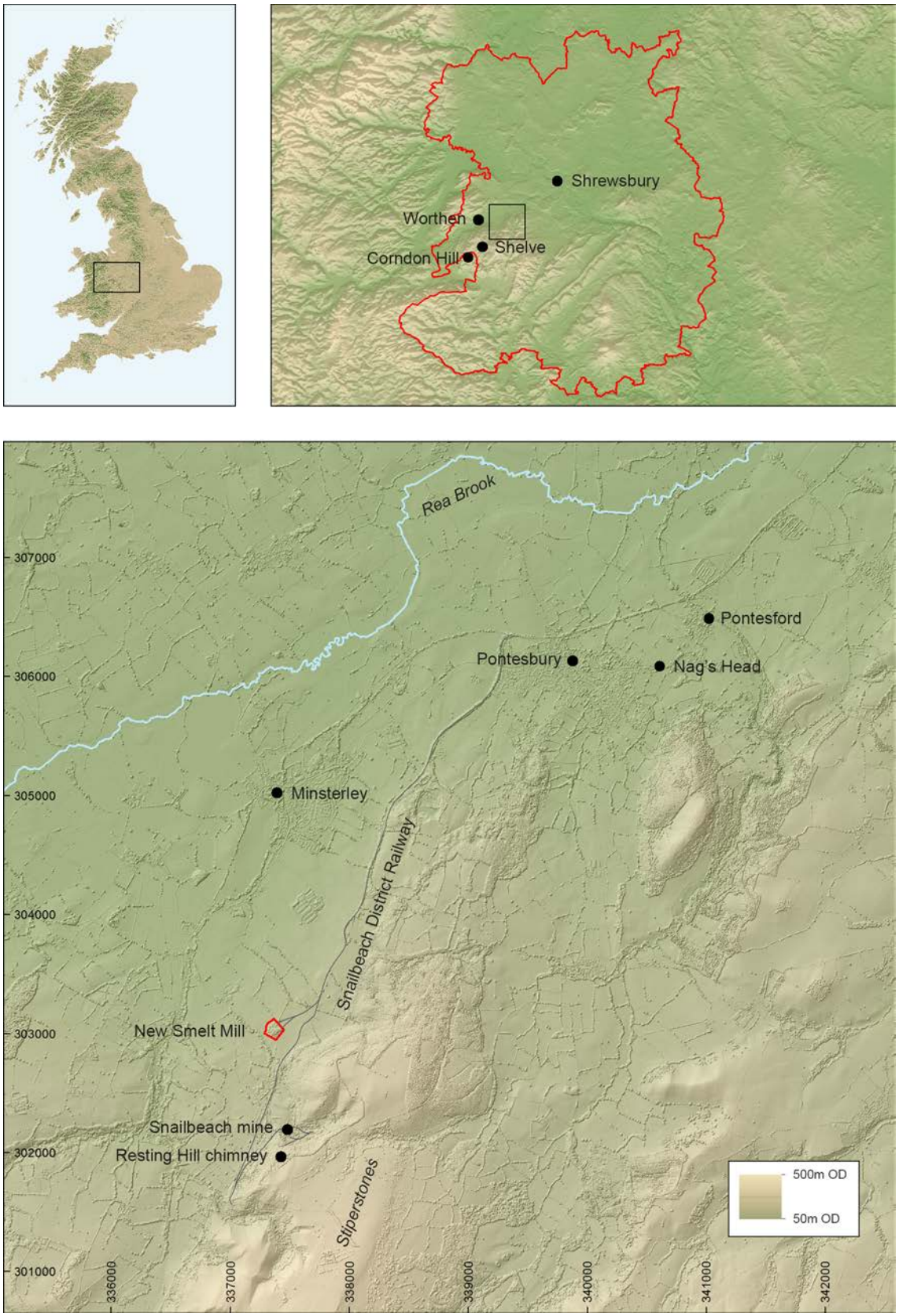
Shrewsbury
Worthen
Shelve
Corndon Hill
Rea Brook
Pontesford
Pontesbury
Nag's Head
Minsterley
Snailbeach District Railway
New Smelt Mill
Snailbeach mine
Resting Hill chimney
Stiperstones
500m OD
50m OD
307000
306000
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Fig 1(previous page): location map. Contains digital surface model data derived from 90m SRTM topography data courtesy of CGIAR http://srtm.csi.cgiar.org; and 2m photogrammetry ©Airbus Defence and Space Ltd; Bluesky International Ltd; Getmapping PLC. Rivers data derived from OS data © Crown copyright and database right (2018)

DESCRIPTION

The site occupies a sub-rectangular plot of land, mostly under woodland and considerably overgrown, on a north-west facing slope between 180m and 190m OD (Fig 1 and see Fig 12). The total area is just less than one hectare. The principal structures were built into the slope, with the change of elevation utilised in the arrangement of processes. Parts of the site were also levelled for the construction of railway tracks and a yard between the principal buildings. There is one occupied dwelling on site, Lower House, including what is believed to have been the site offices, though the building has been substantially extended and altered. There is one other major historic roofed building on site, the slag mill. The privy is still roofed, though in poor condition, as is one other ancillary building attached to the southern corner of the walled enclosure. All other remains consist of ruinous walls and earthworks. The trees all appear to post-date the period of industrial use. The entire site is Scheduled (no 1017764) and is recorded in the National Record of the Historic Environment (NRHE) as no 1126494.

*Fig 2: structure (**c**) at the north-east end of the smelt house, looking south-west*

Smelt House

The main smelt house was the largest building on site but has been largely demolished. Its range of smelters occupies a central location within the site, running in a line approximately from north-east to south-west (see Figs 11 and 12). It effectively formed the south-eastern side of the rectangular walled enclosure. The

smelters are designed so as to be charged with fuel and raw materials delivered from the tramway above, later served by the railway, with their flues discharging beneath the tram and rail lines. The smelt house is ruinous and heavily overgrown, though in places the rear wall stands nearly to full height of about 3.5m-4.0m and most of the plan is visible. Nothing survives of the roof. The building had rubble stone walls with red brick used in the arched tunnel (see below) and flues, some sills and part of one surviving door jamb. The upstanding sections of wall include blocked openings in addition to the tunnel and flues. There is a setback in the inner face of the rear wall at a height of about 1.8m above present ground level, visible in places. The mouths of five hoppers or shutes are also visible at the top of the rear wall. The opposite (north-west) side faced the yard and was probably the front elevation but only survives as low overgrown footings.

*Fig 3: tunnel from pit (**d**) (foreground) looking north-west to chamber (**e**)*

The central section of the smelt house consists of two wide bays, described below. A smaller room was located at either end. These rooms were of triangular plan due to the splayed side walls of the adjacent bay. The one at the north-east end (**a**) was entered from the ground floor of the building and included an angled loading shute in the back wall, presumably for delivering fuel or other material from the adjoining tramway. The jambs and angled sill of this shute are of red brick. The shute in the south-western room is currently hidden by undergrowth. This latter room adjoined the main gateway to the site. At the south-western end of the building there is an external square chimney (**b**), the base of which projects from the back wall. The adjacent part of the south-west end wall survives up to a height of about 2m. It retains two inserted windows and part of the brick jamb and kneeler of a segmental-

headed doorway in the front, north-west, elevation, which was possibly the main entrance to the smelt house.

The smelting equipment itself has been removed but the internal walls and other features provide evidence of the original internal layout. The smelt house was designed to provide an efficient, roughly symmetrical arrangement of processes which appears to have been a development of those at its predecessor at Pontesford, and contrasts with the vernacular construction that has been recorded in earlier lead smelters in other areas.

*Fig 4: tunnel to chamber (**e**) (foreground)*

There are some other buildings attached to the smelt house. That at its north-eastern end, which was separated from the smelt house by a narrow passageway, survives only as footings (**c**); this is shown as an unroofed structure on the 19th-century plan of the site (Shropshire Archives 4743/48) and on OS mapping (2nd edition 1:2500, 1902) so it may always have been a small enclosed yard rather than a building (Figs 2, 10 and 11). The building at the south-west end extends beyond the line of the yard wall and is still roofed but was inaccessible at the time of survey. There are some other related structures, such as a stone-lined pit (**d**) that is clearly designed to receive material from the railway above the flues (Fig 3), though separate from the material that would have been emptied directly into the furnaces from the tramway through the shutes; it discharges down an arched tunnel, about 1.5m high, beneath the tramway into a chamber (**e**) that is central to the range (Fig 4). The late 19th-century plan (Shropshire Archives 4743/48) indicates that there was a similar pit and tunnel further to the south-west; however, the location of this

on the ground now is occupied by what is certainly a collapsed flue, indicating that some modification has taken place since the (un-dated) plan was drawn.

Evidence of processes

The smelt house interior was divided into two wide bays or alcoves, formed by splayed walls projecting from the rear (south-eastern) elevation. (These are shown as external projections on late 19th-century maps.) The splayed walls extended across about half the width of the building. The bays are separated by the tunnel, which passed through the rear wall and connected the rectangular pit to the south-east (d) to the ground floor of the smelt house. The two wide bays appear to have been the positions of the smelters but in a layout that differed from that described at the Pontesford smelters (Martell and Gill 1992, 300-7). The back walls and splays of each bay have internal setbacks with the remains of brick sills, approximately 1.8m above present ground level, which may have been related to the former smelters. Each bay retains two brick-arched flues, one at each end of the back wall, situated above the setback. The floor of each bay has a full-width shallow rectangular pit immediately in front of the back wall, also presumably related to the smelters. The arrangement of walls and flues suggests that the smelters were of the reverbatory type, without a pumped air blast, but not of the same design used at Pontesford until 1862. Tentative interpretation of the currently visible evidence suggests that the splayed bays may each have contained a single smelter located end-on to the back wall, connected to the two flues at the south-eastern end and with the furnaces at the north-western end, or possibly two smaller smelters each with a single flue.

Slag Mill

The slag mill is of notably different proportions to the smelt house. It is mostly intact and retains its roof. The walls are of similar stone rubble, with red brick quoins, jambs and heads, and a gabled slate-covered roof. The roof was repaired in 2011 but parts of the walls have collapsed or are hidden by vegetation. It was built to a wider rectangular plan and at right angles to the north-east end of the smelt house and together with the adjoining walls formed part of the boundary of the enclosed yard. Internally it is open to the timber roof but formerly contained walkways or floors and is the height of a two-storey building. Like the smelt house it appears to have been built to utilise the slope of the site. It was divided into two rooms of roughly equal size by a pair of closely-spaced cross walls, with the ground floor in the south-eastern end about 1.5m higher than that in the north-west end. Slag hearths need an air blast and this may have been supplied from a steam engine in one of the small buildings formerly attached to the sides of the slag mill (OS 1:2500 map 1882 – Fig 10) but which now survive as no more than earthworks or wall footings.

The openings in the walls seem to be related to the internal arrangement of processes. Windows and doors, some blocked or partly collapsed, are located in the ends and the south-west elevation facing the yard. Windows and doors are segmental-headed with brick rebates for frames (the frames have been removed). Most of the openings for ventilation have arched heads and are of similar

proportions but do not have rebates. The windows are at ground floor level, their heights reflecting the different ground levels in the two ends of the building. Double-width doors, presumably for carts or trolleys, are located in the end of the lower, north-west, room and in the side elevation of the south-east room; the head of the latter has collapsed but the size of the opening suggests that the door was of double width. The south-eastern end has a single-width door, above which is a tall arched opening that formerly housed an overhead external flue. The angled jambs of the opening reflect the angle at which this flue exited the building. The flue is identified on a late 19th-century site plan (Shropshire Archives, 4743/48). The rear elevation of the slag mill has no windows but there is a single arched opening for the ventilation of the narrow space between the internal cross walls; the opposite end of this space has a segmental-headed opening. The restoration of the roof included the rebuilding of a domestic-type chimney and a raised ventilation louvre above the lower, north-west, room.

In addition to variations in the external openings, internal features of the two ends of the building also suggest that they were used for different functions (both rooms are currently used for storage, obscuring evidence). The lower, north-west, room end has a cobbled floor which incorporated walkways, possibly for tracks or rails, linking the area near the cross walls with the door in the end wall. The floor in the higher, south-east, end comprises a wide plinth enclosed by pits running parallel with the north-east side and south-east end walls. These pits have brick sides and are covered by floor boards. It is not clear whether this flooring is original but it indicates that the two ends of the building contained different processes or possibly different stages of the same process.

The most distinctive internal feature is the pair of cross walls extending up to the roof apex, which are probably closely related to the original functional layout. The wall facing the lower room is of stone rubble with brick jambs but that facing the upper room is built in red brick above the floor level and rubble below. The joint between the brick and rubble sections in this wall varies in height, suggesting that the brick is not original and may represent a later re-build. The purpose of the cross walls is not immediately clear. The space between them may have formed some form of ventilation for slag hearths either side, although the separation of the walls, approximately 1m, suggests that the space may itself have formed a built-in slag hearth. The upper parts of both walls have tall arched openings with no rebates, indicating that they were built for ventilation. Similar openings are shown in published drawings of 19th-century slag hearths, which were generally built in to the structure of existing vernacular buildings (Stratton and Trinder 1989, 29; Lamb 2017, 1-5). Closer inspection would be needed to ascertain if any evidence survives of former walls or other structures between the cross walls that may have related to a slag hearth in this position.

The recently-restored chimney is connected to an angled brick flue which spans the upper part of the space between the cross walls and leads to a high opening in the cross wall of the upper room. This arrangement seems to be a later alteration, suggesting a change in use of the upper room. It might also confirm that the brick section of the upper room cross wall was an alteration. The upper room cross wall

retains marks left by the removal of an attached structure beneath the ventilation opening, possibly some kind of smoke hood.

The slag mill is Listed at Grade II (no 1307989). This is to be subject to a separate survey (Kelleher 2015) and is not considered in further detail here.

*Fig 5: opening of flue (**h**) in the rear wall of the smelt house*

Flues

The flues from the smelt house are brick- and stone-arched structures largely below the ground surface (**f**, **g**, **h** and **j**). They are 0.9m wide and 1.1m high. They have all collapsed to some degree. Flue (**f**), for instance, is visible as a deep trench for about 15m and beyond this collapsed section there are two small holes in the top of the surviving section. Flue (**g**) appears to be the best preserved but part of its course is currently under impenetrable vegetation (shaded on Fig 12). Flue (**h**) is also well preserved (Fig 5) but there are two short collapsed sections. Flue (**j**) has collapsed adjacent to the smelt house and there is another collapsed section to the south of the railway. The flues led from the individual smelters to meet at a chamber to the south-east side of the site, requiring them all to take curving or angular courses. This chamber is now buried beneath soil and agricultural debris beyond the site boundary but a photograph (Brown 1976, fig 129) shows it as a circular stone-built structure. Its position is indicated on historic OS maps (e.g. 2nd edition 1:2500, 1902, Fig 10). From this chamber a single flue led 1.04km to the chimney on Resting Hill above the main Snailbeach mine site and 125m higher than the smelting site.

Fig 6: buttress or support for slag mill flue with arched hollow below, looking north-west

The flue from the slag mill was apparently overhead (see above) where it exited the mill; some of its massive brick- and stone-built supports survive (Fig 6). However, built into the bases of these supports and now almost entirely buried are arched openings lined with iron hoops or sheets (Fig 7). The purpose of these openings is unclear – they may be for a second, lower-level, flue. Further to the south, by the eastern corner of the smelt house, this flue met the rising ground level and thereafter ran underground. A length of it has collapsed (**k**).

The flues are Listed at Grade II (no 1055031).

Other buildings and enclosing wall

Lower House incorporates what is believed to have been the site offices (Barnes 2011i, 81). It occupies a position alongside the main entrance to the site. It has been much extended and is now a private residential property. To its south-east, at the other side of the site entrance and outside the line of the yard wall, is another roofed building, possibly a later addition, now used for storage; its original purpose is not known but it was attached to the southern end of the smelt mill.

The enclosing wall of the site, built of stone rubble, survives well along the north-western perimeter, standing to its full height. It incorporates a stone- and brick-built privy on its inner face. There are five entrances through the wall. Two of them placed opposite each other in the shorter walls are wide enough for wheeled vehicles, as is one opposite the north-west gable of the slag mill; the others, opening

into the lower part of the yard, are pedestrian entries. The area enclosed within the yard wall is just over 0.27 hectare.

Fig 7: buttress or support for slag mill flue, looking south-east, showing iron lining in arch

Tramway and railways

The central section of the tramway that extended along the rear of the smelt house can be seen as a level strip defined by scarps on either side (**m**). These scarps are sharply defined but only about 0.2m high. At either end the tramway has either collapsed into the void structures below it (shutes, flues) or is obscured by vegetation.

From 1877 the smelting complex was served by a 2ft 4inch (0.71m) gauge railway, a branch of the Snailbeach District Railway (Tonks 2007). This entered the site as two separate lines from the north-east. The more northerly line branched within the site, leading to the slag mill and slag heap, and to the western corner of the site, with another line extending apparently through the main site entrance (OS 1:2500 maps 1882 and 1902); the other led to the tops of the furnaces. Both lines survive partly as earthworks.

The lower, more northerly, line is visible as a narrow level platform running between ponds **1** and **2** but beyond (**n**) is not identifiable, except possibly by some amorphous mounds on its line (**p**); this is probably because it was carried overground at a high level, probably on trestles, for parts of its course. (A photograph of the main mine site (Brown 1976, fig 119) shows tram lines carried on trestles.)

*Fig 8; the trackbed of the upper rail line alongside pond **4**, looking south-west*

The upper line that served the smelt house is visible as a level platform running along the north-western edge of pond **4** with a significant drop of about 2m to its north-west (Fig 8). It must have been carried on a bridge across the slight natural declivity to the west of pond **4**, and there are some slight amorphous earthworks at this point. Further to the west it is raised on a slight embankment (**q**), no more than 0.2m high.

The 1902 1:2500 OS map shows the upper, southerly branch, as abandoned but still visible as earthworks, but the tracks of the northerly branch, serving the slag mill and reaching to the slagheap, apparently still in place. Mid-20th-century maps show short lengths of embankment surviving immediately beyond the site boundary (EH 1992) but there is now no sign of the railway lines approaching the site from the north-east. However, lidar indicates that the lines followed by the railway do still have some expression on the ground surface to the north-east as they converge on the main line, which also survives partly as a slight earthwork (Stiperstones and Corndon Hill Country Landscape Partnership).

Ponds

There is a series of four sub-rectangular ponds lying along the north-eastern edge of the site. These are variously described as settling tanks (Pearce 2008, 113) or as reservoirs (OS maps; Barnes 2011 i, 81, 83) for the steam engine which provided a blast for the slag mill. The uppermost pond **4** still holds water and is at least 1.8m

deep. A drain has been cut at its northern corner but not to the full depth of the pond (unless there is an underground pipe). The others are all completely silted and appear as flat areas, distinguished only by their retaining dams, which survive no more than 0.7m high; the scarp marking the upper side of pond **1** is about 1.6m high, however, perhaps because it has been built up to support the railway line which ran along the top of it. There is an inlet at the southern corner of pond **3** (see Discussion below). Part of a brick-built retaining wall is visible on the north-western side of pond **2** (Fig 9). Pond **1** is almost square; the higher ponds are longer.

*Fig 9: retaining wall along the northern side of pond **2***

At a very late stage a drain has been cut through silted-up ponds **1** and **2**. It cuts across the eastern edge of **2** and crosses the lowest pond on a sinuous course, suggesting that it was cut around an obstruction, though nothing is now visible in this location. A ceramic pipe is exposed within this drain cut at (**r**) to the west of pond **1**. The north-eastern boundary of the site is now demarcated largely by a deeply-cut drainage ditch beyond the site fence; this is shown as a watercourse on historic OS mapping (Fig 10). A further short drainage ditch (**s**) cut from near the western corner of pond **1** discharges into the field to the north.
Further late disturbance is visible in pond **3** where there is a small hollow and an amorphous mound near its eastern side and a cut, probably as a means of access rather than a drain, near its western corner.

Between pond **3** and the embankment for the railway to its south is a levelled area. There is a slight oval hollow but no signs of structures could be seen at the time of

survey. This is shown as a blank area on all available historic mapping. It may have been an area for the storage of materials delivered from the railway.

Waste heap

The surviving waste heap lies outside the north-western boundary of the site, in a pasture field on gently falling ground. It is elongated and seems to have been developed from the southern end, though OS mapping shows that a railway line also approached it from the north-east at (p). A trackway lies along the top of the waste heap, which is about 4.8m high at maximum. A northerly extension to the heap at a lower level, only just over 2m high, suggests that there is some phasing within the heap; this is shown on the 1902 1:2500 OS map, indicating that the heap had been added to since the 1st edition map of 1882 was surveyed (Fig 10). There is some minor disturbance on the surface of the waste heap but otherwise it seems to be well-preserved. However, it also seems to contain a very small amount of material for a site that was operating for over 30 years. It seems possible that waste has been removed, although the OS mapping suggests that the waste heap has never been more extensive than it is now.

The waste heap has a separate entry in the NRHE, no 1395578.

Other earthworks

There is an area of confused earthworks to the north-east of the slag mill. Immediately adjacent to the mill are overgrown wall footings that may be the remains of buildings associated with a steam engine. Between these and pond 1 are what looks like quarrying and dumping (t) and possibly structures related to the railway (see above). These are cut by the late drain mentioned above, with a ceramic pipe exposed at (r). Whether the area at (t) has actually been quarried is uncertain. At (u) disturbance by burrowing animals has exposed fine slag and brick fragments, suggesting that this is a dump of mixed materials – the area is also shown as an area of stone dumping on the OS 2nd edition 1:2500 map of 1902 (Fig 10); it is up to about 2.3m high.

The yard is divided by a steep scarp about 0.9m high between the slag mill and Lower House. Adjacent to the slag mill this is a stone wall face – the northern wall of a building shown on historic mapping which is another possible location for the steam engine. At its south-western end this scarp deviates from its straight course, perhaps as a result of the railway line which apparently ran into this corner of the yard (OS 1:2500 maps 1882 and 1902 (Fig 10)).

DISCUSSION

The circular chamber where the flues from the smelters met has been described as a condensing chamber. It has been suggested that 'any vaporised lead and other products could be washed out using water and run into settling ponds' (Pearce 2008, 113). If this is the case it might explain some of the ponds on site. The top pond (4) is probably too high on the slope to receive water from the chamber but the other three might be settling tanks. It is worth noting that, as mentioned above, there is an inlet in the southern corner of the uppermost of these three ponds (3); though silted it could be the outfall of a tunnel from the condensing chamber. The top pond (4) might be the reservoir for the steam engine for the slag mill; the engine would have required clean, cool water for the condensers and clean water for the boilers. This difference in function might explain the difference in current condition between the top pond, which still holds water, and the other three which are entirely silted.

The purpose of the enclosing wall has been described as 'a protection from the wind and as a means of defining property' but also for security (Barnes 2011a, 81, 83). There would certainly have been a need to protect the relatively high value product of the site, some of which must have been stored, if only briefly, before transhipment.

The un-dated 19th-century plan (Shropshire Archives 4743/48) shows the site recognisably with the buildings arranged around the yard, railway lines and the four ponds to the north-east. However, there are some anomalies. As noted above, the plan appears to show a pit and tunnel where there is now a collapsed flue (f) towards the southern end of the range of smelters. The plan also suggests that the flue from the slag mill by-passed the condensing chamber where the flues from the smelt house met. It also shows an unidentified straight linear feature emerging from beside the upper railway line near (g) and at right angles to it, heading off in a south-easterly direction. The plan is drawn in different media and appears to be unfinished. It may reflect, to some extent, intentions that were never carried out; it would therefore not be safe to assume the existence of any features shown on this plan which are not corroborated by OS mapping or by what survives on the site today.

Despite the relatively short period of use of the site there is evidence of alterations. This is evident in the standing buildings and something of the chronological and technical complexity in the earthworks has been brought out by the analytical survey.

RECOMMENDATIONS FOR FURTHER RESEARCH

Smelt house: detailed survey following vegetation clearance and consolidation, to show walls, footings, setbacks, pits and other details. Further research would then be needed into types of furnaces and hearths.

Slag mill: as intended (Kelleher 2015), following further repair and decontamination if necessary, detailed survey to produce a plan and long and cross sections; the plan to include floor details; the cross section to include elevations of the two cross walls. A check for evidence of former floors, joist holes, etc, is needed. Detailed survey of the remains of the attached buildings is required, following vegetation clearance.

Ponds: research into their possible uses is required, by examination of the silts for instance.

Waste heap: analysis of the material in the waste heap could give significant information about the processes being carried on at the site.

The survey reported here, though it has recorded considerable detail in the earthworks and ruined structures on site, should not be regarded as definitive. Any future general clearance of vegetation across the site should be followed by further detail survey to elucidate features currently obscured.

METHOD STATEMENT

The dense woodland precluded the use of Global Navigation Satellite System (GNSS) for surveying. However, three control points were fixed by a Trimble R8 survey grade GNSS receiver in open ground to the south and west of the site to tie the survey into the National Grid. Survey control was then established by Trimble S7 total station theodolite (TST) to create a closed traverse of 12 stations and a link traverse of 4 stations marked by wooden pegs. Further resection and survey control points were temporarily marked by plastic pegs. Points of hard detail and archaeological features (soft detail) were also recorded by TST; some additional detail was subsequently hand-measured and drawn into this control framework. Despite the dense vegetation across the site most areas could be accessed for survey; only one small area on the south-east edge of the site was found to be totally impenetrable (shaded on Fig 12). The method described was deemed to be appropriate, despite the suggestion that use of lidar might obviate the need for ground survey and might even pinpoint 'specific areas for vegetation clearance'(Kelleher 2015, 5); it is not clear how lidar, even at the highest possible resolution, could replace ground observation for this purpose. Certainly lidar at the resolution available (Stiperstones and Corndon Hill Country Landscape Partnership) does not provide a level of detail equivalent to that obtained by the ground survey.

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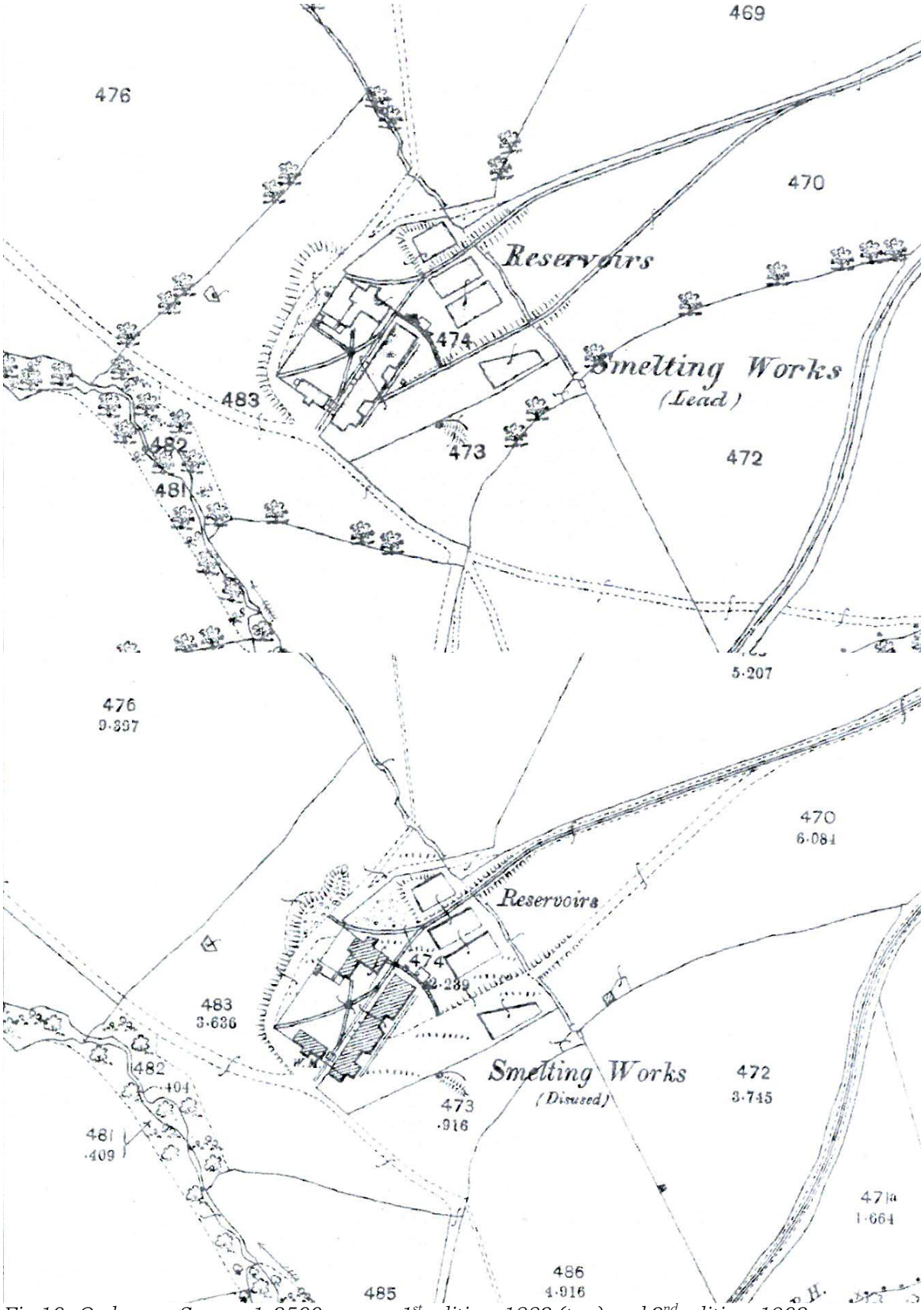

Fig 10: Ordnance Survey 1:2500 map – 1st edition, 1882 (top) and 2nd edition, 1902 (below)

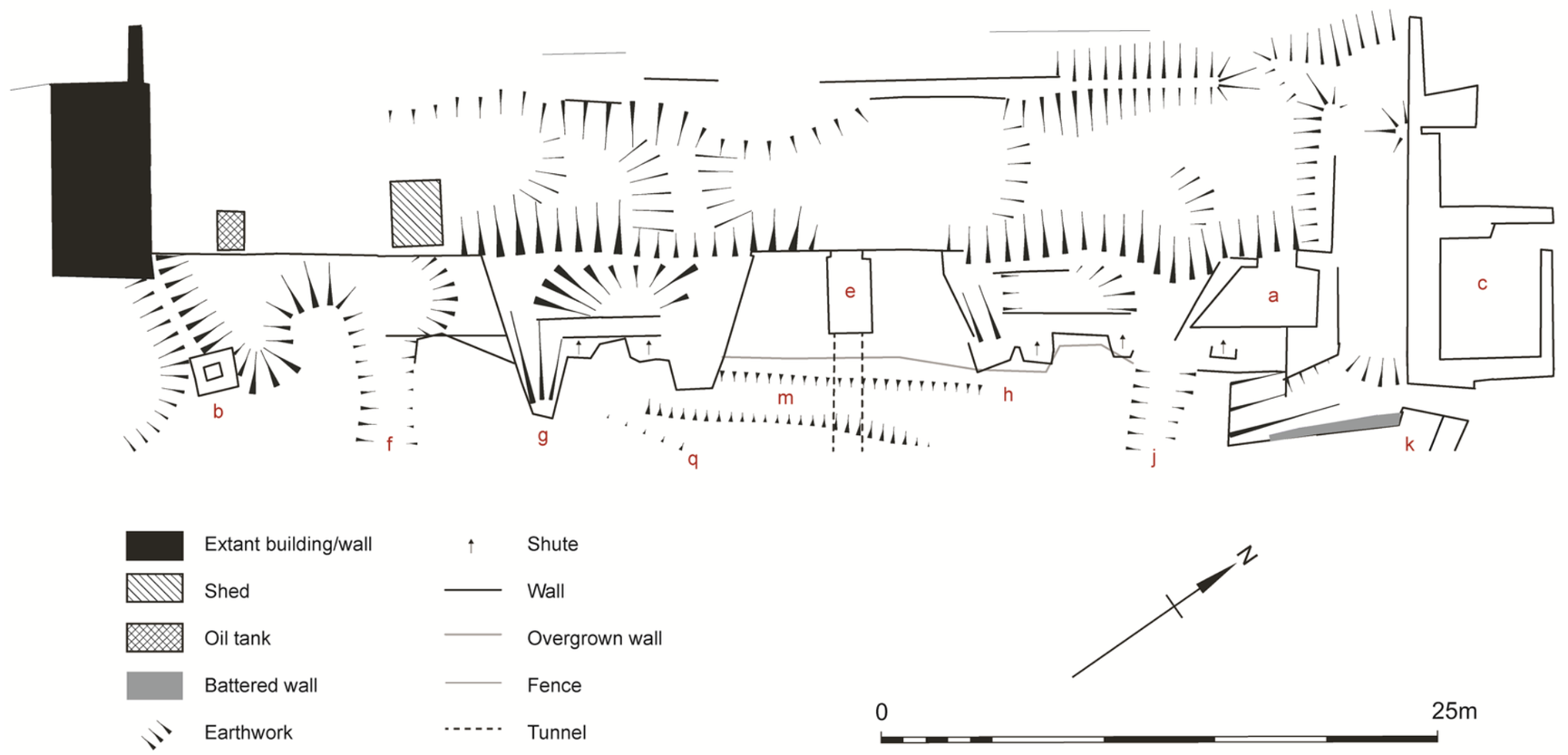

Fig 11: Plan of smelt house, 1:250 ©Copyright Historic England

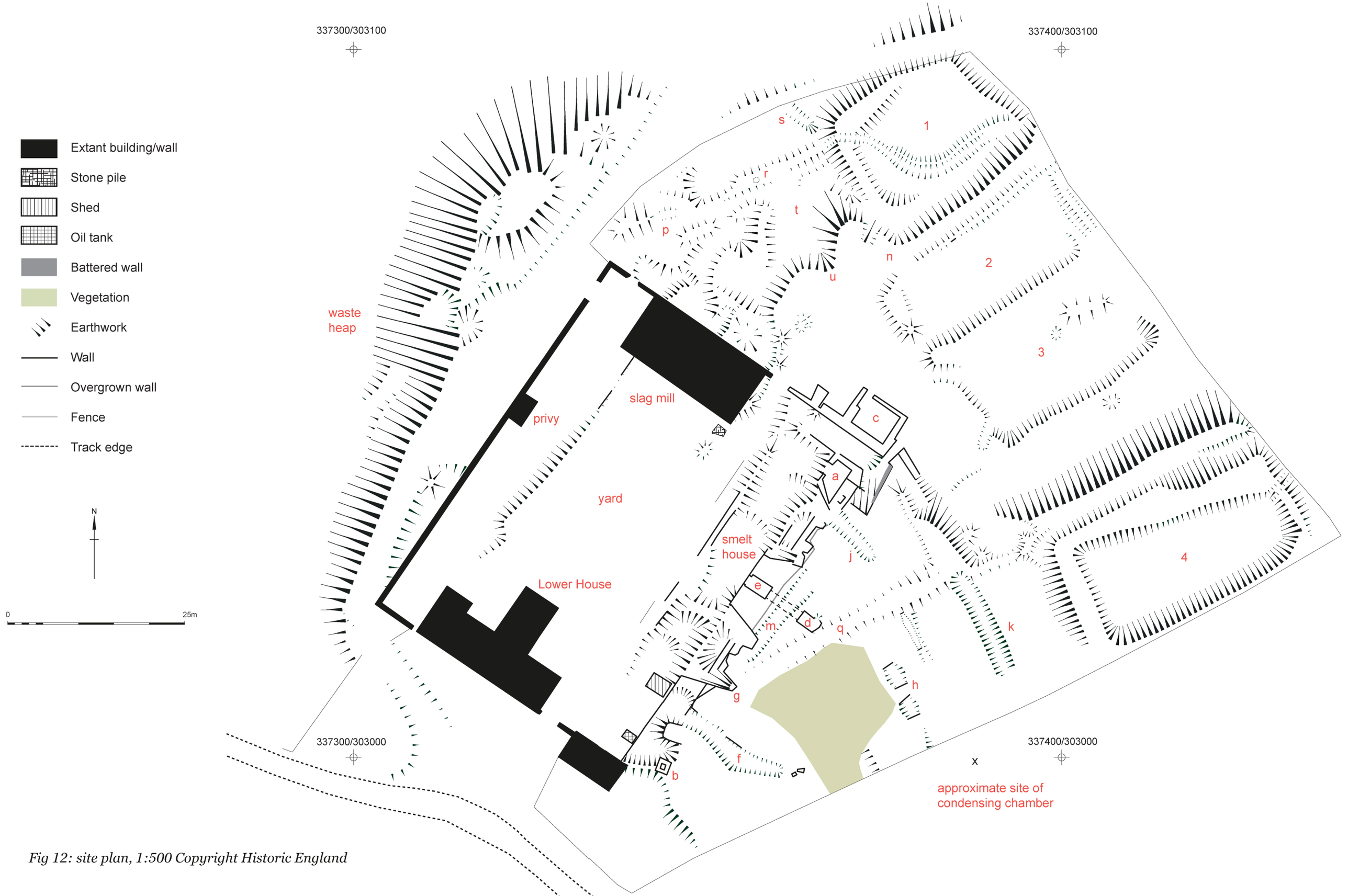

Fig 12: site plan, 1:500 Copyright Historic England

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