



Wheal Call, Kenidjack, St. Just, Cornwall

Archaeological recording of the dressing floors prior to works



Historic Environment Projects

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The views and recommendations expressed in this report are those of Historic Environment Projects and are presented in good faith on the basis of professional judgement and on information currently available.

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Cover illustration

The collapsed section of the revetment wall to the Wheal Call dressing floors.

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Abbreviations

CRO	Cornwall County Record Office
HER	Cornwall and the Isles of Scilly Historic Environment Record
HE	Historic Environment, Cornwall Council
NGR	National Grid Reference
OS	Ordnance Survey
NT	National Trust

Summary

As part of the Unlocking Our Coastal Heritage project delivered through the Rural Development Agency, the South West Coast Path and the National Trust, a number of archaeological sites were selected for conservation, enhanced management and interpretation. One such site consists of the remains of a 19th century dressing floor adjacent to the Kenidjack Stream in St. Just, part of the St. Just Area of the Cornwall and West Devon Mining Landscapes World Heritage Site. Sections of the granite walling revetting the dressing floor adjacent to the stream had begun to collapse, which, if left unchecked, would significantly affect this otherwise fairly well-preserved and accessible site.

A scheme of works is proposed to re-build the failing sections of walling to safeguard the site and enable continued access to it. Historic Environment Projects were asked to provide a suitably detailed pre-works record of this part of the Wheal Call site, working to a brief supplied by the National Trust Regional Archaeologist. In addition, HE Projects were asked to record the wider context for the affected wall, and to undertake surveys of the nearby arsenic calciner and stamps engine house.

The survey used a combination of direct measurement, rectified photography, total station and high precision GPS survey to record the affected stretches of walling making up the spalling floor revetment wall, the adjacent stamps engine house, the calciner and other dressing floor structures, together with the line of the flat rod run from the Wheal Call Great Wheel to the pumping shaft and sections of leat passing through the site.

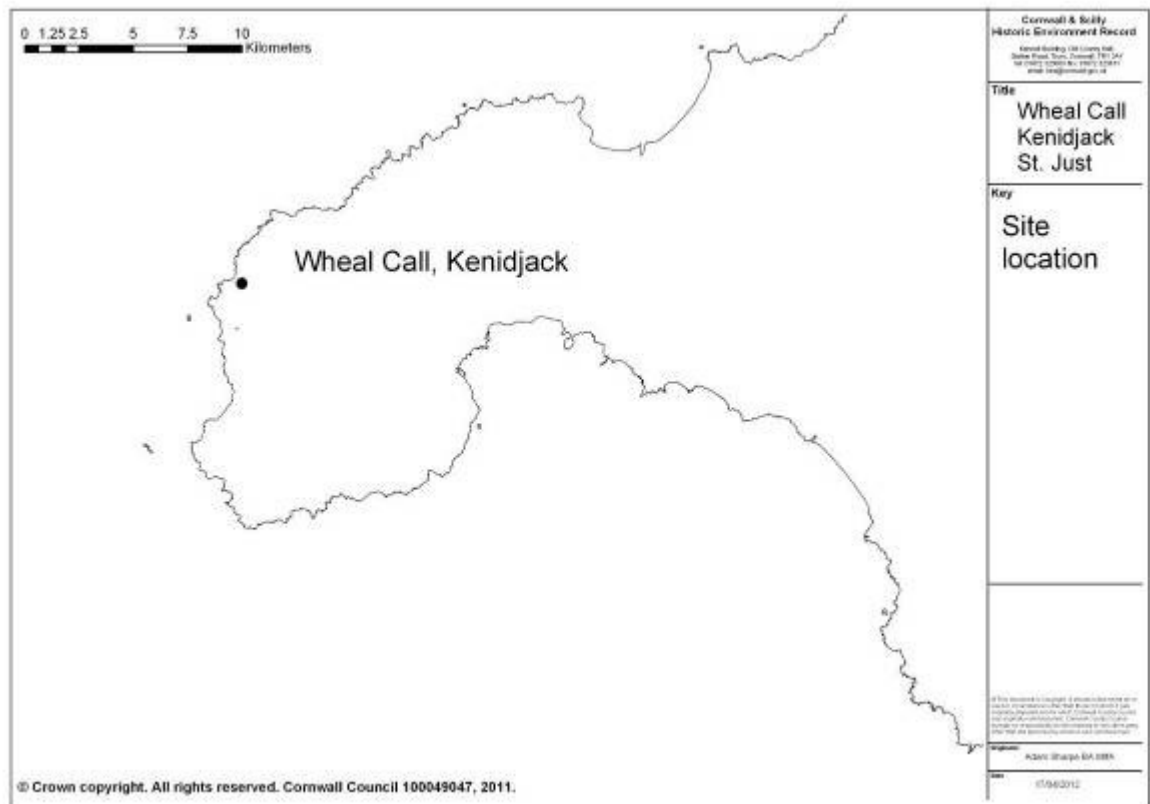


Fig 1. The location of Wheal Call, Kenidjack, St. Just.

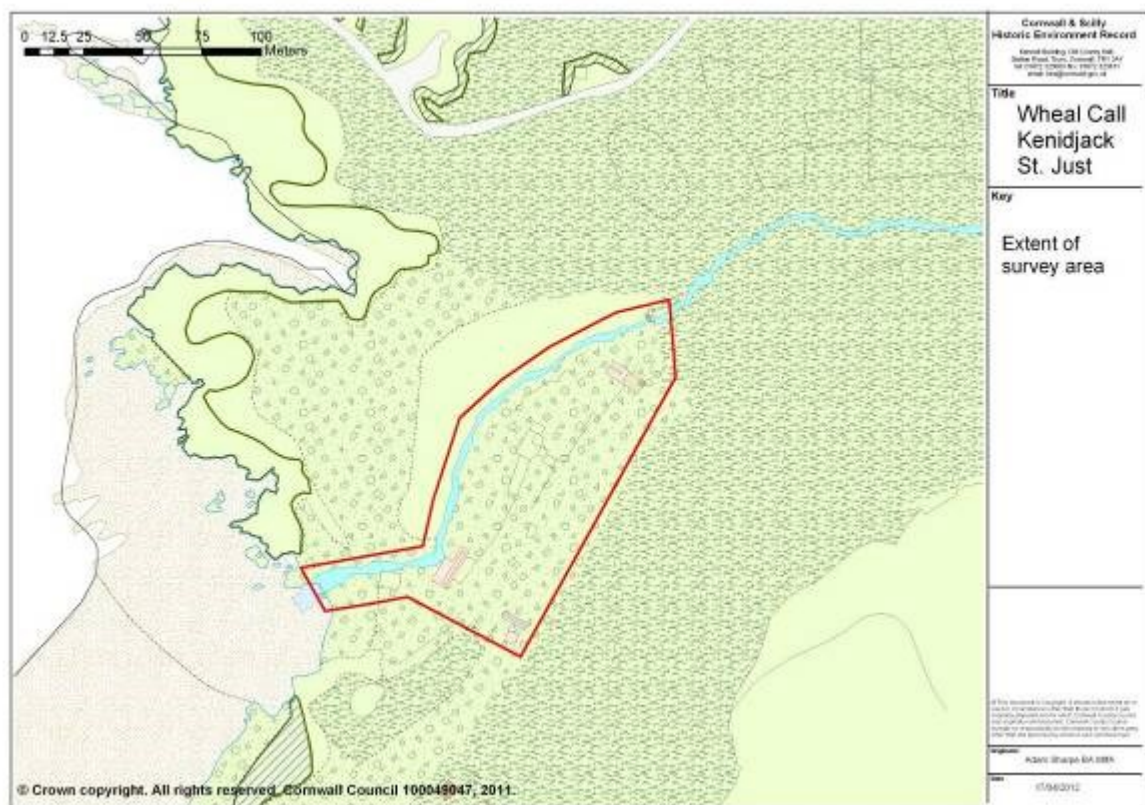


Fig 2. The extent of the survey area at Wheal Call, Kenidjack.

1 Introduction

1.1 Project background

As part of the *Unlocking Our Coastal Heritage* project delivered through the Rural Development Agency, the South West Coast Path and the National Trust, a number of archaeological sites were selected for conservation, enhanced management and interpretation. One such site consists of the remains of a 19th century dressing floor adjacent to the Kenidjack Stream in St. Just, part of the St. Just Area of the Cornwall and West Devon Mining Landscapes World Heritage Site (Fig 11). Sections of the granite walling revetting the dressing floor adjacent to the stream had begun to collapse, which, if left unchecked, would significantly impact on this otherwise fairly well-preserved and accessible site.

A scheme of works is proposed to re-build the failing sections of walling to safeguard the site and enable continued access to it. Historic Environment Projects were commissioned to provide a suitably detailed pre-works record of this part of the Wheal Call site, working to a brief supplied by the National Trust Regional Archaeologist.

The survey used a combination of direct measurement, rectified photography, total station and GPS survey to record the affected stretches of walling making up the spalling floor revetment wall and the adjacent stamps engine house, calciner and other dressing floor and associated structures.

It is anticipated that an archaeological watching brief will be carried out during the works programme.

1.2 Aims

The project aim is to provide a suitably detailed record of the walling revetting the dressing floor which is to be the subject of the conservation works, and to produce a survey of the adjacent dressing floor structures.

The project objective is to produce a report on the survey with a focus on interpretation, presentation and understanding, together with a CAD survey of the site.

1.3 Methods

1.3.1 Desk-based assessment

During the desk-based assessment historical databases and archives were consulted in order to obtain information about the history of the site and the structures and features that were likely to survive. The main sources consulted were as follows:

- Cornwall HER.
- Images of England online listed buildings database.
- Early maps and photographs (see Section 8).
- Published histories (see Section 8).

1.3.2 Fieldwork

The recording of the sections of walling proposed for conservation by re-building or by localised repair was achieved through a combination of direct measurement and photography. The remainder of the site was recorded using a combination of total station and high precision GNSS (GPS) equipment, together with direct measurement and photographic recording.

Scaled black and white photographs of the walling from its north were taken on a 35mm camera using fine grain B&W film. In addition, high resolution (10Mp) digital photographs were taken from the same viewpoints using a DSLR. The other standing structures on the site were photographically recorded using a similar methodology.

1.3.3 Post-fieldwork

The finalised survey drawings were scanned and converted to files in AutoCad format, whilst the photographs were archived to HE standards.

3 Location and setting

The dressing floors at Wheal Call are centred at SW 35361 32247, adjacent to the Kenidjack Stream in the parish of St. Just at an average height of 25m OD. The BGS record the underlying bedrock as late Devonian hornfelsed slates and siltstones of the Mylor Series. The soils are recorded as well-drained humose gritty loams of the Moor Gate series. The survey location is shown on Figure 1 and the survey area on Figure 2.

4 Designations

4.1 International

The Wheal Call dressing floors lie within the St. Just Mining District Area of the Cornwall and West Devon Mining Landscapes World Heritage Site, inscribed in 2006.

4.2 National

The site lies within the Cornwall Area of Outstanding Natural Beauty and the Aire Point to Carrick Du Site of Special Scientific Interest (SSSI).

4.3 Regional/county

The Wheal Call dressing floors lie within an Area of Great Historic Value (AGHV), a Heritage Coast, and an Area of Great Scientific Value (AGSV)

4.4 Local

The site is owned and managed by The National Trust.

4.5 Access

Gold status path number 114/110/1 runs down the valley through the site adjacent to the dressing floors on their north side. The dressing floors form part of an area of open access land under the CROW Act 2000.

5 Site history

Early references to mining in the coastal strip to the north of Cape Cornwall are somewhat thin on the ground, though tanners were recorded as working at Boscean by 1508, and by 1537 a stamping mill had been set up. It seems likely from the field evidence and from documented activity elsewhere along this stretch of coast that the mining of lodes outcropping in the cliff faces would have been under way by the mid 16th century.

In 1787, tin bounds were recorded at 'Great Trelewack or Porthledden' immediately to the south of Cape Cornwall, as well as 'Little Trelewack' and 'South Weeth' in the tenement of Boswedden. The sett was defined '*from the tail of Trelewack Adit to Hill as far as the said South Weeth Bounds extend, on Trelewack Load – an in Great Trelewack or Porthledden Bounds as far as such Bounds extend on said Load, and all the Little Trelewack Bounds to Hill with Ten Fathoms on each side of the said Load*'. The sett was let to William Bennetts of St. Just, tinner at one fifteenth dues. Tow men were permitted to work (Noall 1973). The earliest direct reference to mining the lodes at the western end of the Kenidjack Valley dates to 1815, when 'Boswedden Stamps' were

mentioned at a site where 'there is a very productive mine working thereon' (Noall 1973 quoting from the Royal Cornwall Gazette 3/3/1815).

A substantial working of the lodes crossing the western end of the valley seems to have been under way not long after, when, in 1822, Wheal Castle, Wheal Caul (alternatively referred to as Wheal Cole or Wheal Call) and Boswedden were working a lode under the sea bed. Wheal Caul (sic) was, at the time, equipped with a 65' diameter water wheel – the largest ever erected in Cornwall and one of the largest ever erected in Britain, and there seem to have been a chain of small stamping mills stretching back up the valley almost all the way to its source.

Wheal Cole and Wheal Castle (on Kenidjack Head) were resumed in 1836 after a period of closure, employing 100 men, two women and 26 boys, and were producing both tin and copper. By the 1840s the mine incorporated a number of former smaller setts, including Praze, Wheal Williams, Wheal Zennor and Yankee Boy. Lode names within the sett suggest other earlier small-scale setts within Wheal Cole and Wheal Castle, including Boynes, Skidney, Little Weeth, Red Weeth and White Weeth. Given the paucity of level ground which could site dressing floors in this part of the Kenidjack Valley, the stream was culverted or diverted over parts of its length and a substantial terraced area revetted by a masonry wall was created to the south of the stream. In 1841, the mine was referred to as 'Wheal Cole and Wheal Castle, or Wheal Castle and Boswednan, including Praze', whilst Symons' map of 1857 (Fig 8) showed an arrangement of structures in the lower part of the valley, a 'water stamps' and 'water whim' being specifically named on this source, though the pumping engine house was also shown. In 1858, Warrington Smyth, the Crown Agent, began to suspect that the mine was working lodes beneath the foreshore and seabed (and therefore within ground where dues should be paid the Duchy of Cornwall and the Crown), but the mine ignored his request for clarification on this matter. In 1860, when Warrington Smyth personally inspected the workings he found that this was indeed the case, and had been so for many years.

As elsewhere in the St. Just Mining District, the lodes were followed out under the seabed, where they improved in richness, though beyond the killas/granite junction the quality of the ore was found to deteriorate and become more difficult to work. The mine employed a diagonal shaft to access these under-sea workings, but by 1862 the returns from sinking this shaft had become so discouraging that, following the death of the purser, Richard Pearce, the mine was virtually idle.

By 1864, the inclined shaft had reached the 95 fathom depth and the surface arrangements of the mine had become considerably more complex. Its staff now numbered 155. At this time Spargo reported that the mine was worked by a 40" cylinder pumping engine (installed by 1857, see Fig 8) supplemented by a 52' diameter water wheel, a 28" cylinder stamping engine supplemented by a 20' diameter water wheel, and a 30' diameter water wheel for winding materials and ore. However the under-sea sections of the lodes had by this time been found to be patchy in quality and often of poor quality, and the mine management decided to work out the better reserves in an attempt to break even, though they feared that, given the poor returns from the mine, if the Crown and Duchy enforced their leases it would be forced to close. Results continued to be poor, as was reported in 1867 and losses were rising and Wheal Castle had been explored half a mile under the sea almost without profit (Noall 1973). By 1871, an amalgamation with the adjoining Wheal Cuning seemed the only guarantee of survival for the mine. The under-sea workings were suspended.

However, even this proved fruitless, given the difficulties in working the seaward part of the mine to any economic benefit, and in 1874 the Boscean, Boswedden and Wheal Castle sections of Wheal Cuning United were advertised for sale as a going concern. The unprofitability of these mines would have been well-known locally however, and no sale ensued. As a result, only the Wheal Cuning section of the mine remained at work and a valuation of the mine in 1875 mentioned a 36" (or 37") cylinder pumping engine with one 10 ton boiler (probably an error, see below) equipped with flatrods to both

Praze and Wheal Call Shafts, a 28" twin flywheel stamping engine with two 14 ton boilers (again probably an error – these are more likely to have served the pumping engine as the 10 ton boiler would have fitted into the boiler house adjacent to the steam stamps engine and would have been of a more appropriate capacity for it, whilst the OS 1877 mapping depicted a building suitable for two boilers adjacent to the pumping engine house), the Wheal Call Great Wheel, and a number of horse whims and water whims together with everything else on the mine.

Wheal Cuning United is recorded as having closed in 1876, and the 1st Edition OS 25" mapping (Fig 9), dating to 1877, marked Wheal Castle as 'disused', though the adjoining Boswedden mine (probably the name used during a brief reworking of part of Wheal Call) was not so marked.

An attempt was made to re-work the Wheal Castle section of the mine in 1883, a new whim engine house being constructed on Kenidjack headland to work an inclined shaft in Wheal Castle Zawn, and Engine Shaft in Wheal Call may have been re-opened at the same time. The enterprise was short-lived, and had folded by 1886. A particularly useful photograph of Boswedden/Wheal Call taken by Gibson after a light fall of snow and reproduced in Noall (1973) and other sources clearly shows the engine houses and other structures substantially intact, with equipment still on the dressing floors, the waterwheels in their pits and the headframe in place above Praze Shaft. The detail in this image suggests either that the mine had only recently stopped work (and that the image dates to around 1876) or that the mine was mothballed for a few years pending a potential re-opening which, in the event, never occurred. Some roofs had already lost their slate coverings, suggesting that the mine was no longer working.

In early 1893, following a particularly hard winter when Bostraze Bog, which feeds the Kenidjack Stream, had frozen solid, there was a sudden and dramatic thaw. The resulting floodwater swept down the valley destroying the culvert which carried the stream next to the former Boswedden/Wheal Call dressing floors, causing substantial damage and destruction. The 2nd Edition of the OS 25" mapping dating to *circa* 1907 (Fig 10) shows that many of the mine buildings in the lower Kenidjack Valley had been swept away, reduced to ruins or had become unroofed and the culverts had gone. The map shows that the destruction of the pumping engine house clearly followed the closure of the mine (and was not, as has sometimes been suggested, the result of a practice demolition exercise by US Army engineers in the run-up to D-Day), whilst the boulder wall revetting the seaward end of the dressing floors has been progressively undermined by the sea, and has now substantially collapsed (Figs 23-25). A collapse of the part of the walling revetting the dressing floor near the stamps (Fig 16) was reported to the National Trust in 2007 by Adam Sharpe of the Historic Environment Service, Cornwall County Council.

The seaward part of the Kenidjack Valley, together with Porthledden Cliffs, Cape Cornwall and the cliffs backing Priest Cove to its south were donated to the National Trust in 1987 by H. J. Heinz Co. Ltd. Some conservation work to the remains of the stamps engine house were carried out by the National Trust in the years immediately following this acquisition, together with the removal of some of the material infilling the gap between the pit for the Wheal Call Great Wheel and the adjacent hillside to reduce ground pressure on its masonry.

6 Survey results

See Fig 45.

Wheal Call or Boswedden was a somewhat unusual mine, even for West Penwith, given the mixture of water and steam power which it continued to rely upon until its closure in the late 1870s. Water power had long been of high importance in this mining district, the extensive and complex leat systems tapping the Kenidjack, Cot Nanjulian and Portheras streams having apparently been in use for centuries. Survey of these water

systems makes it clear that it was routine practice for water to be passed from one stamping mill to the next without being returned to the natural watercourse, and a photograph of the upper Kenidjack Valley at Nineheads Stamps near Carn Praunter shows the stream bed to have been completely dry at the time, all of its water having been diverted into the leat system leading away down the valley. There were at least fourteen waterwheels on the Kenidjack Stream between the Boscean Mine dressing floors opposite the Poorhouse at Kenidjack and the sea, fed by a series of leats whose ultimate water source lay far upstream near Nancherrow Bridge. Other stamping and corn mills were served by sections of leat further upstream, and it is clear that the Kenidjack Stream had been one of the major power sources for industrial sites around St. Just for centuries.

Use of water power

Given this tradition and the cost and difficulty of transporting coal to the seaward end of the Kenidjack Valley, it is not unsurprising that Boswidden Mine (*sic*) was using a recently-erected waterwheel to work its pumps in 1822, though the massive size of the wheel (at 65' in diameter, this was one of the largest ever erected in Britain) clearly required some particularly complex hydraulic engineering. This wheel powered pumps in at least two shafts utilising extensive runs of flatrods, and was eventually (by 1864, according to Spargo) replaced by an only slightly smaller waterwheel (52' in diameter), again working pumps in both Engine and Praze Shafts (Fig 22). Water shortages during the summer months may well have prompted the mine adventurers to install a 40" cylinder pumping engine by 1857 (see Fig 8), though accounts suggest that this was only used when required, the waterwheel being the principal source of pumping power on the mine. Spargo also reported that both water and steam were used for stamping the ore, utilising a 20' diameter water wheel and a 28" cylinder stamping engine (Figs 13-14, 35-39, 46). It is unclear whether these were used concurrently, or whether, again, the selection of power source was dependant on the availability of sufficiently large supplies of water at different times of the year. Unusually, Wheal Call apparently used a further substantial waterwheel (in this case of 30' diameter) as its principal means of winding ore and waste. Given that this was the case, the provision of water to this wheel would probably have taken priority over the others on the mine in times of relative drought. It is very likely, however on the evidence of an archive Gibson photograph (Bullen 2000, 16), that the stamping engine was also capable of winding from a number of shafts).

Post-abandonment activities

Whilst it has been suggested in an unpublished manuscript description of the Kenidjack Valley put together by the late Clive Carter in the 1980s that US Army engineers had used the Wheal Call pumping engine house for demolition practice in the period prior to D-Day, no demolished masonry survives from this structure, and as the structure is not depicted on the 1907 OS 25" mapping, it is far more likely that it was dismantled after the mine closed, the stone being salvaged for re-use (Fig 18). The removal of much of the reusable masonry making up the other mine structures also seems to have taken place on the evidence of their current condition. Much of this activity would have taken place following the closure of the mine in 1876, when equipment, fixtures and fittings, roof coverings and timberwork would have been removed when the site contents were sold off. It is also quite possible that local people subsequently utilised the site as a source of building stone; the removal of many of the quoins and other pieces of worked stone from the structures would have further weakened them and hastened their collapse. The absence of any rubble from the collapsed eastern end of the dressing floor revetment wall may also be a result of such activity.

Other significant damage is known to have taken place as a result of the sudden thaw following the Great Freeze of the winter of 1892. The resultant flood which swept down the valley resulted in the destruction of the stream culverts, a number of buildings in the valley bottom, and, quite possibly, the eastern section of the elevated part of the dressing floor near the stamps (Trounson 1968 suggests that this event occurred

around 1902; two similar incidents may have taken place, the latter compounding the effects of the first). The present stream course does not follow that which it occupied in 1877, and now passes through the site formerly occupied by the pumping engine boiler house and its adjacent large coal yard, making difficult comparisons between features shown on archive mapping and photographs and those making up the site today. Fortunately the photograph taken by one of the Gibson family of St. Ives predates the reshaping of the valley bottom by the flood(s), recording the site as it was just after it ceased work.

Site vegetation

Given its proximity to the sea and the influence of concentrations of phytotoxic minerals resulting from former ore dressing processes, vegetation growth across much of the site has been slow and almost wholly limited to gorse mixed with some heathers; brambles, grasses and some ferns (including abundant bracken) have developed in more sheltered spots or those with deeper, damper and less contaminated soils (Fig 12). Japanese knotweed has been a significant problem along the course of the Kenidjack stream (which has carried viable sections of rhizome downstream from an original planting site well inland). Where these have taken root the plants have been the subject of intensive stem injection treatment by the National Trust for the best part of a decade. Isolated patches of this highly invasive plant are still found adjacent to the stream bank on its southern side near the dressing floors and treatment continues on an annual basis.

Stamps engine house

The granite-constructed stamps engine house (Figs 13-14, 35-39, 46) seems from documentary evidence to have been erected by 1857 (Symons 1857 mapping, Fig 8), presumably during a major re-organisation and re-equipping of the mine, in particular to increase ore dressing capacity in response to rising production. This is now the most visible structure on the dressing floors, and, although apparently deliberately partially demolished (probably during the early years of the 20th century, though possibly as a result of the US Army demolition exercise alluded to by Carter), sufficient remained for it to be conserved by the National Trust in the late 1980s.

The upper brick section of its chimney has been lost, together with the whole of the rear wall (Fig 38), much of the bob wall (Fig 36) and parts of the side walls (Figs 35, 37), whilst the absence of the cylinder bedstone suggests that the engine was removed for sale, rather than having been scrapped on site (bedstones were viewed as parts of engines and always sold with them). Rubble, including quoins, surrounds the engine house and partly covers its loadings, perhaps suggesting an interrupted episode of deliberate demolition. Given how much of the structure has been lost, full details of its layout are uncertain, though there are paired doorways immediately behind the bob wall (that to the west having a higher cill elevation than that communicating with the boiler house to the east), a centrally-sited cylinder door in the rear wall and a plug door opening in the bob wall. One photograph in Bullen (2000, 17) taken following the removal of the engine and flywheels and probably dating to the 1890s indicates that the north eastern wall of the building was windowless; it is likely, therefore, that there were a pair of lintelled windows in the rear wall, and probably also a further pair of lintelled windows in the seaward elevation. The massive granite loadings to the north of the engine house (Fig 39) contain the slots for twin flywheels and the crank, as well, almost certainly, for a narrow winding drum on the north eastern flywheel. The stamps were set on the south-western side of the loadings, and the centreline of the stamps axle can be inferred from the locations of hold down bolts within the loadings. The stamps themselves seem to have been in five groups set at the base of an earthwork slope which would have sited the (probably timbered) ore chutes, the levelled platform at the head of this feature being a former roadway or tramway linking the stamps to the production shafts nearer the sea. A few fragments of timber surviving at the base of this ramped slope, together with a couple of corroded iron pins represent all that now appear to survive of the stamps themselves, though it is possible that the stamps

anvils (if formed of granite blocks) may be buried beneath the rubble and vegetation which covers this area.

Boiler house

Immediately upstream from the stamps engine house are the very low remains of the house for a single boiler (see discussion above and Fig 40). In 1877 the OS showed the building as measuring 12.5m x 5.5m in plan; the northern section of this structure would also have served as the coal store and stoking area. A Gibson photograph (Bullen 2000, 16) shows that the boiler house had a curving northern end wall, and consequently a somewhat unusual roof hip layout (the roof was beginning to lose its slates at the time the Gibson photograph was taken). The interior of this building has been badly damaged and has no visible surviving features – presumably in part because of activities associated with the removal of the boiler for sale or scrapping, but also very likely as a result of the collapse of the roof of an adit running just beneath the structure which drained workings on the lode outcrop working running up the valley side to its east north east and which continues on the northern side of the valley to Zawn Buzz an Gen. Open gunnises can be seen close to the boiler house in the adjacent valley side, whilst there are clear collapse hollows within the boiler house floor and immediately adjacent to its southern wall. Those upslope from the boiler house which are now enclosed with an NT-constructed safety wall cut through the line of the lower of the two leats on the hillside (Fig 36). The mouth of the adit cannot be identified, but is likely to lie between the boiler house and the nearby stream, a deep lobby leading out towards the watercourse from immediately north of the boiler house.

Water-powered stamps

Just upstream again is a small water-powered dressing floor, sited on a platformed area cut into the valley side – this is not shown on the OS 1878 25" mapping, though may be one of the structures shown on Symons' 1857 map (Fig 8). The remains of a small, well-constructed granite masonry wheelpit occupies its eastern end, together with the remains of a structure attached to its south-western side where a small number of heads of stamps would have been sited (Fig 41). Other wall fragments revetting the southern side of the platform probably originally formed part of a buddle floor – one infilled buddle can just be made out in this area. This site is presumed to pre-date the development of the Boswedden/Wheal Call steam stamps and its associated dressing floors. Indications that this site was modified may suggest that its structures continued to be used during the operation of Wheal Call, but this is unlikely to be the site of the 20' stamping water wheel, the pit being far too short to accommodate a wheel of this size. It may be significant that Symons' 1857 map of the St. Just Mining District (Fig 8) labelled 'water stamps' adjacent to the pumping wheelpit further down the valley, and it is possible that power was also taken off the pumping wheel to power stamps in an area of the site where no structures now survive. The water powered stamps building adjacent to the steam stamping engine house was clearly derelict by the late 1870s, as can be seen from the Gibson photograph, and still at that date retained some stamps frames, but its high standing gable wall has now substantially collapsed or has been taken down to allow the re-use of the shaped granite blocks of which it had been constructed.

Dressing floors and other mine structures

The product from the steam stamps appears to have been passed to a series of parallel settling tanks to their north west, some parts of whose walls were revealed during vegetation clearance in 2012 (Fig 27); these were not depicted by the OS in 1877. Again, these features had been damaged following the closure of the mine. The majority of the lengths of the tanks are now infilled with rubble and soil and are obscured by gorse, though their northern ends have now been made visible through vegetation clearance. The collapse of the north eastern end of the dressing floor revetment wall has clearly truncated the ends of some of the tanks.

The section of the dressing floors enclosed by this revetment wall covers a substantial area. No features were shown in this area on the OS 1877 mapping, though the Gibson photograph hints at a complex arrangement of tanks, frames and timberwork. This area would have been used for primary ore concentration, very likely using the surviving settling tanks as well as other features which have left no surface traces. It is known that this section of the dressing floors was constructed following the diversion of the stream, whilst the evidence for the flatrod tunnel running beneath it strongly suggest that the flatrods linking the 52' pumping water wheel in the massive pit at the end of the valley to Engine Shaft were already in operation when it was constructed. Map evidence (Symons 1857) suggests that the culverting and diversion of the stream occurred post-1857 (by when the pumping engine house had been constructed) and probably pre-1864 (Symons 1864). The rods would have been driven by a sweep (crank) attached to the waterwheel axle, though the machinery arrangements housed in the uniquely designed northern part of the wheelpit are currently not clearly understood, and are not shown on any available mapping or diagram. The flat rods would have been carried on tall bob stands eastwards along the southern side of the stream, continuing across the seaward end of the dressing floors in a masonry-revetted trench (Fig 17) before passing into a 15m long masonry tunnel beneath them (Fig 15), from the northern end of which they crossed the stream on bob stands and terminated at a counter-weighted angle bob immediately to the south of Engine Shaft (Fig 18). Given that the pumps in the shaft were also served by the adjacent pumping engine, there must have been some means for de-clutching the flatrods when this alternative source of power was used. To the south west of the waterwheel, a shorter run of flatrods served pumps in Praze Shaft near the coast on the south side of Porthledden. The 52' water wheel was still in place in its pit at the time the Gibson photograph was taken.

The surviving section of walling revetting this part of the dressing floors on its northern side is 32 metres long, and stands to a maximum of 3.5m high (Figs 15-16, 48). It has been truncated at its eastern end, either by collapse or by deliberate demolition, little rubble being evident at the foot of the wall line and it is uncertain what its full extent was in this direction, though it might have been around 11m longer. At its western end, the footings of the wall can be traced for a further 12.5m. Again, no rubble which would have resulted from a simple collapse can be seen, and it is possible that the absence of upstanding masonry reflects either deliberate demolition, or alternatively that only the wall foundations were constructed at this end, and a planned extension of the revetting wall was not undertaken. The recent collapse, centred 23m from the current eastern end of the wall, is 4.5m long and a maximum of 2.7m deep, cutting back a maximum of 1.7m into the dressing floor platform it revets. The flatrod tunnel entrance is 8.0m from the current eastern end of the revetment walling, and extends seawards for 13m before it is blocked by a collapse close to its original western end (Figs 15-17, 48).

An artificially levelled area 60m long and a maximum of 25m deep at its centre had been created to the south of the stream course to site the majority of the dressing floor functions, this being created in part through a substantial build up of material behind the revetment wall to the north and in part by cutting in to the hillside to the south. The 1877 OS 25" mapping (Fig 9) shows a group of six elongated rectangular buildings running down the valley from the stamps, occupying this platformed area. That nearest to the engine house (shown as measuring 14.25m x 6.5m in plan on this mapping) would have provided a roofed area over the stamps, but the others would have covered the remainder of the dressing and concentrating equipment. Given that the mine produced some copper as well as tin, one of these would have been the bucking and picking shed where the bal maids would have hand-separated ore from waste. Most of these buildings have been almost wholly demolished, and are now represented by linear tumbles of masonry and occasionally surviving sections of stone revetment.

Other buildings were shown by the OS in 1877 as measuring 27m x 6.5m in plan (this, the closest to the stamps now survives largely as a section of revetting wall), another to its west measures 14.5m x 5.0m in plan (again, only fragments of walling survive in

a sea of dense gorse and brambles); to their south-west are two buildings shown as measuring 18.5m x 6.25m in plan and 17m x 5.0m in plan. To the north-west of the calciner (and incorporating it at its south-western end) was an L-shaped building measuring 8.0m x 6.25m in plan, with an extension measuring 3.5m x 3.0m and a small yard extending to the south west; almost nothing of this now survives (Fig 34). The 1877 OS also showed an extension attached to the south western corner of the calciner measuring 2.5m x 3.0m in plan.

Two leats were shown by the OS on the valley side to the south-east of the dressing floors, together with service tracks on both sides of the valley (Figs 43-44). The stream was shown as being culverted in a section running from just to the east of the pumping engine house south westwards to a point not far to the west of the stamping engine house, this forming the bridging point for a mine roadway (Figs 9, 19, 42). The stream also appears for OS map evidence to have been culverted at its seaward end.

Two small round buddles surviving at the downstream end of the dressing floors (Fig 32) would have been associated with the tin house where the tin concentrate was finally cleaned up after calcination; this location is shown on the 1877 OS as being occupied by a roofed building. Upslope (and beyond the southern end of the core part of the survey area), a further rectangular building measuring 6.0m x 4.25m adjacent to the principal roadway through the site on the south eastern side of the valley may well have been the mine, whilst adjacent to Porthledden the OS depicted a large U-shaped roofed structure, probably of timber construction given the field evidence. The boulder wall which revets the dumps on the cliff edge at this location has, over the past two decades, been significantly lost to collapse (Figs 23-25), and the small buddles which were sited here, and which survived until the late 1980s, have now almost wholly eroded into the sea. A large roofed structure (measuring 12.25m x 4.0m) shown adjacent to the south-eastern (upslope) wall of the pumping wheelpit has left almost no traces except a linear arrangement of granite slabs at ground level, which might have sited machinery, possibly the documented water-powered stamps. A further large water wheel providing winding power for the mine was fed by the upper leat, and the survey evidence suggests that a fairly large masonry structure formerly existed on its seaward side, presumably housing its winding drum. Only the masonry-revetted platform for this now survives, and it may be that the building was of timber construction, given the absence of any significant rubble. On the northern side of the stream from the Great Wheal Call pumping water wheel, the 1877 OS showed a pair of unidentifiable structures, though the 2012 GPS survey showed that the westernmost of these was a small building containing a pair of small buddles (Fig 26), parts of which still survive, whilst that immediately to its east was a reservoir pond. On the southern side of the stream, the fragmentary remains of at least one buddle appears to have been sited within a levelled area revetted by a now largely destroyed boulder wall. Erosion here has pushed the top of slope adjacent to the coast back by at least 7.5m since 1907, much of this having occurred since the late 1980s following significant loss of the boulder wall to wave action (Figs 23-25). The final large building on the mine was formerly sited just upstream from the pumping engine house on the northern side of the stream; this is likely to have been the count house or mine office, but now survives only as a truncated platformed area.

The 1907 OS 25" mapping indicates that most buildings were demolished following the closure of the mine. The fact that some had disappeared almost completely between 1877 and 1907 strongly suggests that they may well have been substantially constructed of timber, as was common for 19th century Cornish dressing floor structures, or that the materials making up some were reclaimed for re-use. It should be noted, however, that it is known that the OS commonly only surveyed more substantial ruins, omitting slighter remains, even if they survived at the time of their visit. By this date the stream culverts had been destroyed by the 1892/3 flood waters and the stream had established something like its current course.

An undated Gibson photograph (reproduced in Trounson 1968, p62, Noall 1973, p119 and in Bullen 2000, p16) provides a useful view of the site from the south east, the image probably taken during the mid 1870s when the mine had only recently stopped work. The stream culvert was still intact, dating the view to before 1892. The stamps engine house and its boiler house still retained most of their roof coverings, as did the count house and pumping engine house, though the adjacent boiler house had lost almost all of its roof covering. Winding rope stands can be made out between the stamps engine house and Praise Shaft, whose headframe was still standing (perhaps indicating that some pumping had recently been carried out), whilst the pumping and winding water wheels and the roofed dressing floor sheds on the cliff edge at Porthledden survived at the date the photograph was taken. Water still flowed in the leats, the sluice gates were still functioning and a launder connected the main leat to the pumping water wheel. No mine staff can be seen on site and there appears to have been a recent light fall of snow.

A further photograph reproduced by Bullen (Bullen 2000, p17) shows the scene of devastation following the 1892 flood. The pumping engine house was not included in this view, but the stamps engine house was clearly still intact and retaining its roof timbers (though not its roof covering); the more lightly-built boiler house had been almost completely demolished, as was common when boilers were removed for re-use or scrapping. On the northern side of the stream, the linear spoil dump appears far more extensive than is the case today; to its south, there appears to have been a large scale collapse of the north eastern end of the dressing floor retaining wall. A fragment of arched culvert still stood across the stream near the water stamps close to the stamps engine house.

Other features

Two rough lines of boulders parallel to the stream on its eastern side appear to be the remains of an entraining wall for the stream (Fig 20), whilst a stretch of what appears to be a narrow infilled channel to its south-east (Fig 21) probably represents part of the original site drainage arrangements. Neither feature was shown on available historic plans or maps. The very substantial linear spoil dump on the northern side of the stream to the south-west of Engine Shaft was not depicted on the 1877 OS map, but was shown on their 1907 2nd Edition. It is uncertain whether its absence from the earlier mapping was simply that it was not depicted, as shaft sinking would have produced a considerable amount of waste material, and this would always have been the most appropriate area of the site on which to dispose of it, or that it in part represents evidence for the short-lived 1883-1886 reworking of part of the sett as Wheal Castle, which was the name given to the former Wheal Call sett on the 1907 OS mapping. If this is the case, the presence of the spoil dump suggests that extensive but undocumented work was undertaken utilising Wheal Call Engine Shaft as part of the Wheal Castle operations.

Arsenic calciner

The only recognisable structure to survive in the core area of the dressing floors is a small reverberatory arsenic calciner (Figs 28-31, 47) and the associated building attached to its western side. Despite some probably deliberate demolition, some collapse and some clear post-abandonment modifications, it is possible to interpret many elements of this relatively rare structure.

The eastern section of the building was the calciner itself, which measures approximately 7.0m x 4.8m in plan (its original length is difficult to determine given the loss of its rear wall), standing to a maximum height of 2.85m. There are two rectangular openings at ground level on the southern elevation. One of these (most probably the easternmost) would have been the hearth where the fire was set, whilst the other would have been where the ore was discharged once roasted (the 'wrinkle hole'). A lintelled, relatively narrow rectangular opening in the western elevation of the calciner allowed the ore dressers to rake the ore within the oven to ensure its full

calcination and, once this had been achieved, to rake it into the discharge hole. Drill holes and iron pins set into this wall probably held the fixings for iron doors closing off the opening when the oven was in use.

The oven itself has a relatively flat-arched firebrick roof which can be seen from a small area of collapse in its rear southern corner adjoining the discharge opening, and is largely infilled with silty material. The connection between the oven and its hearth is unclear as a result of this infill. The arsenical and sulphurous flue gases resulting from the calcination of the ore would have been led from the rear of the oven via a now-collapsed lintelled flue and into the base of the nearby chimney, which is represented by a the 1.1m high base of a rectangular masonry plinth which measures 800mm wide and 960mm deep. The upper sections of the chimney have been wholly demolished, but these would have been either circular or (more likely) rectangular in section; the chimney would have been relatively short, probably only a few metres in height. The upper walling of the calciner has all been demolished, though would have supported a roofed area within which the tin concentrate could be dried and fed into the oven below via a small opening in its roof.

The structure immediately downslope, measuring 5.6m x 4.5m in plan, standing to a maximum of 3.25m is integral in construction with the calciner on its northern elevation, though of less robust construction, but its walling clearly butts the calciner on the southern side. This may suggest a rebuild during the life of the building. Like the calciner, it was constructed of semi-coursed rubble mine waste, partly-shaped water-rounded beach cobbles and occasional fragments of broken brick set in a soft lime mortar which has suffered significant erosion; some areas of facing have collapsed as a result. All wall openings and wall corners are framed with roughly-squared granite quoins.

The building served as a coal store and a shelter for the calciner operative. It seems to have been accessible via a doorway in the northern side of the western elevation, though there is also a part-blocked doorway near the middle of its northern elevation (this may have been converted into a window during a rebuild of the structure). It is assumed that the walls would have included at least one window, possibly in the western elevation and possibly also in the southern elevation, to light its interior. The building has been substantially modified in ways which would render it unusable for its original purpose, presumably following the closure of the mine. These modifications include the part-blocking of the northern doorway, the construction of a small plinth in front of the oven opening and a large, roughly-faced rubble plinth occupying the whole of the south-western corner of the building. Another revetted plinth has been constructed against the north eastern wall of the calciner. The interior of the building is obscured by tumbled rubble and the original elevation of its floor surface could not be established. Given that this was, in part, a coal store it may well have been roughly cobbled. The small extension shown attached to the north-western corner of the building seems to have left no trace, and may have been a timber-constructed lean-to store. A low revetment wall just to the north west incorporates a re-used mortar stone for an early single head of stamps (Fig 31). Very little evidence now survives for the elongated roofed building which formerly extended 22m to the north east of the calciner other than parts of its south eastern wall (Fig 33).

The other buildings on the dressing floors, which now survive in only fragmentary form, cannot, on present evidence, be assigned certain functions. They have clearly been deliberately demolished, having lost the majority of their quoining, and the positions of doorways and wall openings cannot be established from what remains.

7 Recommendations

The dressing floor wall (Figs 15-16, 48)

Funds have already been identified to make good the recent area of collapse in the dressing floor revetment wall, though other sections of this feature should be monitored for further indications of weakness and incipient failure. Some thought may need to be given towards stabilising the broken ends of the walling through localised rebuilding. The repairs should be in dry stone masonry with earth packing, as in the original construction. The collapsed material should be excavated away from the foot of the wall, sorted and the rebuild carried out so as to match original coursing, where this exists.

The stamps engine house and boiler house (Figs 35-40)

The stamps engine house was conserved in about 1990 by the National Trust. The work has survived well and there does not seem to be any need for any further conservation attention to this building at the moment. The boiler house was not repointed in 1990, and what survives of its walling is becoming increasingly precarious. Full repointing together with some localised rebuilding to provide necessary stability would ensure its future survival.

The reverberatory arsenic calciner (Figs 28-31, 47)

The reverberatory arsenic calciner at Wheal Call represents one of a tiny number of surviving examples of this type of formerly more or less ubiquitous mine structure. A conjoined pair of calciners of this type was consolidated by the NT at Wheal Coates, and represents the best-preserved in Cornwall. There are also examples at Wheal Edward (substantially demolished) Wheal Ellen, Porthtowan (overgrown and substantially collapsed) and Tywarnhaile, Porthtowan (another pair, in fair condition but lacking public access).

Whether or not enhanced access to Wheal Call is envisaged in the future, it would make sense on the grounds of rarity alone to conserve this example. As well as repointing in lime mortar, revealing and consolidating wall heads, replacing lost wall facings where their loss is causing instability and treating any significant scrub growth in and immediately adjoining the building, it would be sensible to move some of the collapsed rubble from the interior of the building to make it more readily accessible and interpretable. Ongoing scrub maintenance will also be required.

Porthledden boulder wall (Figs 23-25)

The boulder wall which formerly revetted the lowest part of the Wheal Call dressing floors is probably now beyond repair without the expenditure of very large amounts of money, and a strategy of managed retreat is probably now the only sensible option. However, it should be noted that erosion of the mine waste deposits and archaeological features constructed on them (and contained within them through a build up of deposits during the operation of the mine) appears to be progressing year on year (this amounting to 7.5m since 1907, most of this having taken place within the past two decades), and there can be no doubt that within a few years this material will have been almost completely washed away by sea action, potentially leaving the Wheal Call Great Wheelpit exposed. Some consideration should be given to periodic monitoring of the erosion and for the recording of features which are already exposed and likely to be lost to this process, or, in the case of buried sections of timber launder or other early mine features, which will be revealed by future erosion. Ongoing erosion will also eventually destroy the access route from the valley bottom to the path leading past Praze Shaft towards Cape Cornwall.

Access

Access to and through the Wheal Call site is currently not easy by reason of the scrub vegetation which covers much of it and the rubble which has accumulated in some areas. The 'footbridge' into the site from the valley path on the northern side of the stream shown on current OS mapping has not existed for at least 20 years, and access across the fast-flowing and occasionally quite deep stream downstream from the Coast Path footbridge at Edge O' Beyond is only possible in a couple of locations – in both

cases using slippery rocks in the stream as stepping stones. This is clearly awkward (and potentially dangerous) for walkers who have made their way down to Porthledden along the valley path, who then wish to carry on to Cape Cornwall. A formalised lower crossing point (by means of a sensitively constructed bridge) would certainly be gratefully appreciated by visitors. It would also provide a simple way to provide enhanced access to the Wheal Call site and to create a useable through route from Kenidjack to Cape Cornwall, though might be objected to by the Environment Agency as something which might potentially create a flood risk. Given its probable location near the seaward end of the stream and the topography of this area, any enhanced flood risk would, however, be limited to immediately adjacent areas in the lowest part of the valley.

There is also considerable potential to re-open the already existing historic trackways on the southern valley side which formerly served two sets of water powered stamps a little way upstream from the steam stamps (Figs 43 and 44). These could be made readily accessible through the removal of a few gorse bushes and the annual strimming of their bracken cover. A short section of new path route would have to be identified to safely link these to the valley floor at Wheal Call and some discussion concerning possible routes has been initiated with the local NT Warden. Consideration should also be given to significantly reducing the scrub cover over parts of the Wheal Call site, both to increase access and interpretation potential, and also to create a more diverse mosaic of nature conservation habitats.

Interpretation

The Wheal Call site is currently wholly uninterpreted. Fixed interpretation would be inappropriate in this austere landscape of ruins and wild nature, and other means should be considered to assist visitors in understanding what remains of this complex site. In some areas of Cornwall, on-line guides are currently being trialled, utilising smart phone gps capability, but the mobile phone signal in the lower Kenidjack Valley varies between very poor to completely absent, probably ruling out this approach.

The creation of a downloadable guide to the archaeology of the lower Kenidjack Valley (much of which is owned and managed by the National Trust) should be considered. This could explain the crucial importance of water power in the operation of the mines of the St. Just district, the large number of water-power stamping mills and other structures strung out down the valley, including the well-preserved and recently-consolidated 'Carn Praunter' complex (Botallack Bottoms Stamps) near Edge O' Beyond, and some of the principal features of interest at Wheal Call, including the stamps engine house, the leats and outcrop workings, the arsenic calciner and the winding and pumping wheelpits. It could also set out preferred access routes (avoiding open mineshafts and eroding cliff edges). In order for this approach to work to best effect, some sites in the valley would have to be cleared of ivy or scrub to make them more readily visible – in particular Nineheads Stamps and the pair of stamping mills on the opposite side of the stream near Carn Praunter (the carn of the preacher), allegedly named for John Wesley, who is supposed to have preached there to an audience of miners, but possibly also to some of the other remains of stamping mills between these sites and Wheal Call. Not all of these sites need to be made accessible, but all should be made visible. Regular maintenance work should also be carried out to ensure that Catchers' Pool retains its nature conservation interest, and does not become choked with reeds and its banks overgrown with willows.

8 References

8.1 Primary sources

Gascoyne, J. 1699, *Map of Cornwall*

Martyn, T. 1746, *Map of Cornwall*

Norden, J. 1726, *Map of Cornwall*

Ordnance Survey 1809, *1st Edition 1" to the mile mapping*

Ordnance Survey, c1880. *25 Inch Map* First Edition (licensed digital copy at HE)

Ordnance Survey, c1907. *25 Inch Map* Second Edition (licensed digital copy at HE)

Ordnance Survey, 2012. *Mastermap Digital Mapping*

Tithe Map and Apportionment, c1840. *Parish of St. Just* (digital copy available from CRO)

8.2 Reports and publications

Bullen, L.J. 2000, *Mining in Cornwall, Volume Three: Penwith and South Kerrier*, Stroud

Burt, R., Waite, P. and Burnley, R. 1987, *Cornish Mines: metalliferous and associated minerals 1845-1913*, University of Exeter

Collins, J.H. 1912, *Observations on the West of England Mining Region*, Truro

Dines, H.G. 1956, *The Metalliferous Mining Region of South-West England*, HMSO

Noall, C. 1973, *The St. Just Mining District, Monographs on Mining History No 5*, Truro

Ordish, H. G. 1967/1968, *Cornish engine houses: a pictorial survey, Vols 1 & 2*, Truro

Sharpe, A. 1989, *Cape Cornwall: an assessment of the survival of archaeological features and an evaluation of their potential within the area purchased for the National Trust by H.J. Heinz Co. Ltd.*, Cornwall Archaeological Unit Report 1989R003

Spargo, T. 1865, *The Mines of Cornwall: 1. The Land's End Peninsula*, Reprinted Truro 1959

Trounson. J. H. 1968, *Historic Cornish Mining Scenes at Surface*, Truro

8.3 Websites

<http://www.heritagegateway.org.uk/gateway/> English Heritage's online database of Sites and Monuments Records, and Listed Buildings.

9 Project archive

The HE project number is **2012018**

The project's documentary, photographic and drawn archive is housed at the offices of Historic Environment, Cornwall Council, Kennall Building, Old County Hall, Station Road, Truro, TR1 3AY. The contents of this archive are as listed below:

1. A project file containing site records and notes, project correspondence and administration.
2. Electronic drawings stored in the directory R:\Historic Environment (CAD)\CAD Archive\Sites W\Wheal Call 2012018
3. Black and white photographs have been incorporated into the National Trust archive
4. Digital photographs stored in the directory R:\Historic Environment (Images)\SITES.U-Z\Wheal Call recording 2012018
5. English Heritage/ADS OASIS online reference: cornwall2-123610
6. This report text is held in digital form as: Historic Environment\Projects\Sites\Sites W\Wheal Call recording 2012018\Report\Wheal Call dressing floors recording report.doc

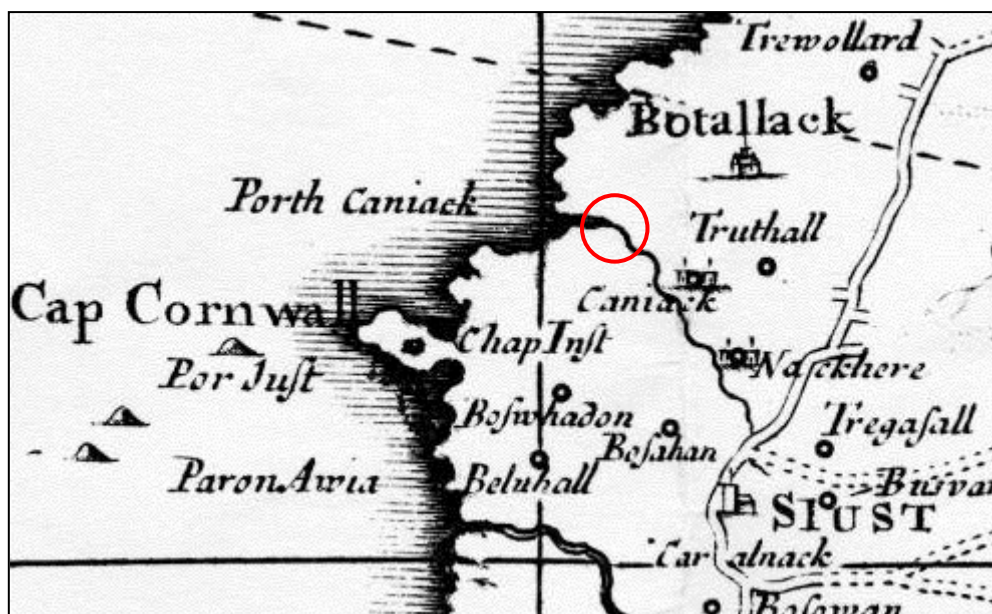


Fig 3. An extract from Joel Gascoyne's 1699 map of Cornwall, showing the location of Wheal Call.



Fig 4. Norden's 1724 map of Cornwall, showing the location of Wheal Call. The crosses surrounded by dots are Norden's symbol for active mines.



Fig 7. An extract from the southern section of the 1840 St. Just Tithe Map. Nothing is shown of Boswedden Mine on this source, although stamping mills were shown upstream.

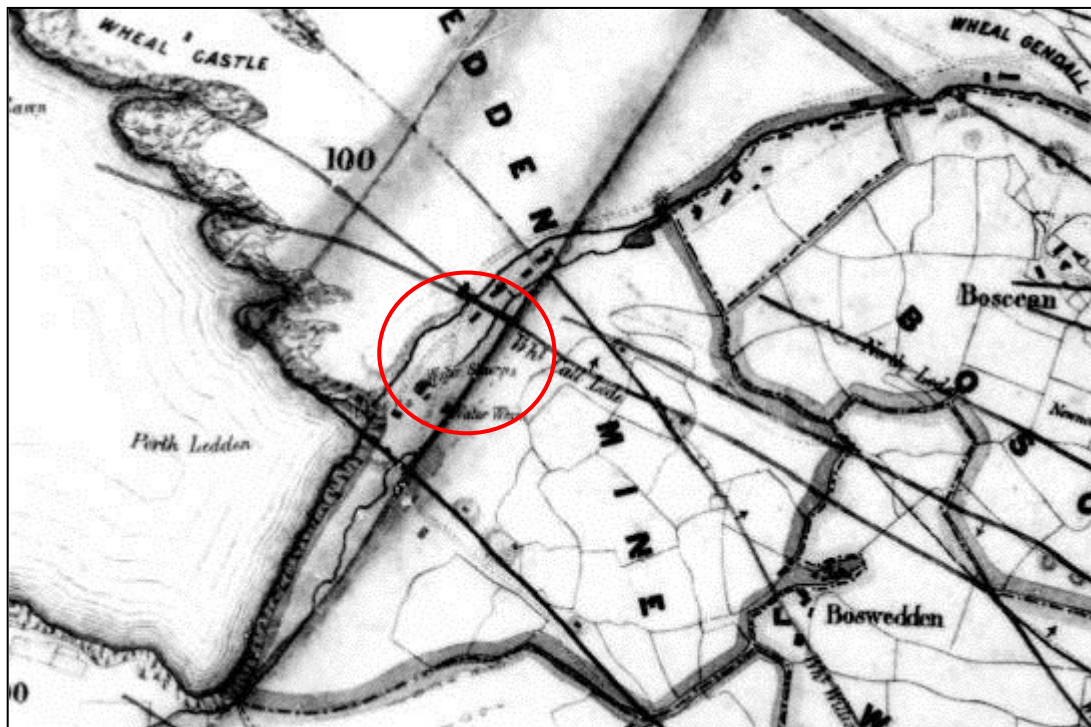


Fig 8. An extract from Symons' 1857 map of the St. Just Mining District, showing structures at Boswedden Mine.

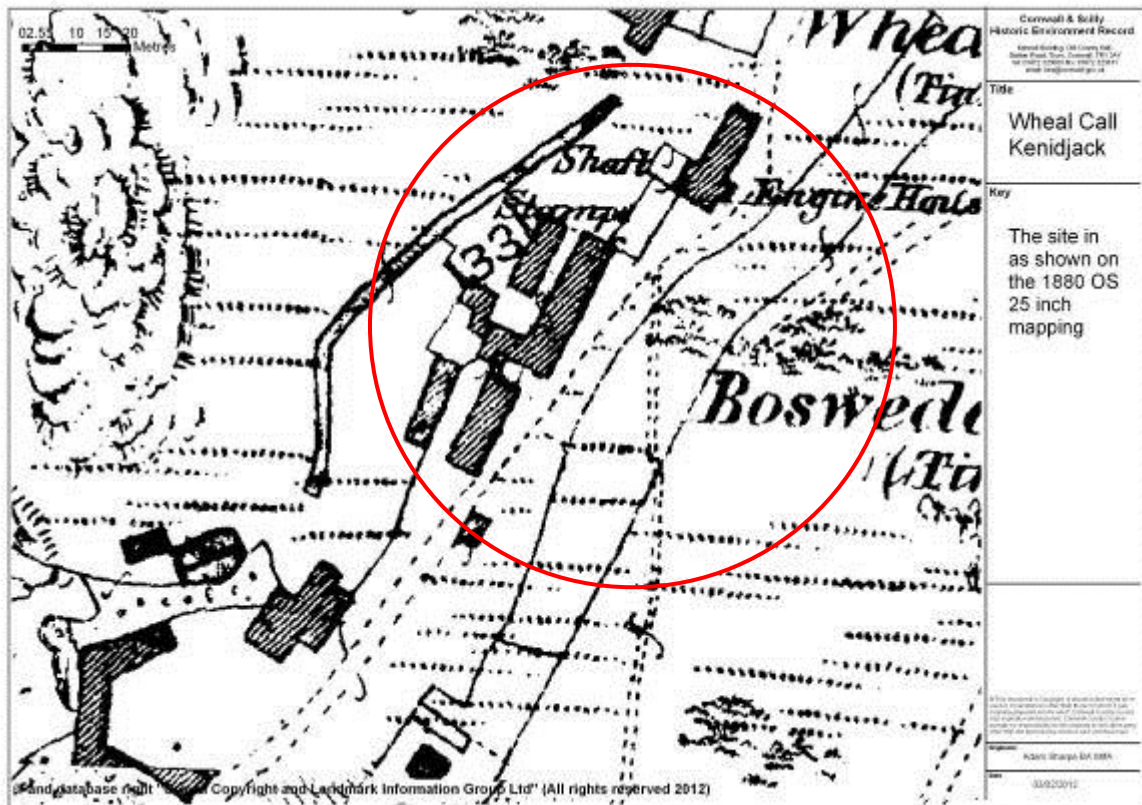


Fig 9. An extract from the circa 1877 1st Edition OS 25" to a mile mapping showing the layout of the Boswedden mine buildings and dressing floors at that date.

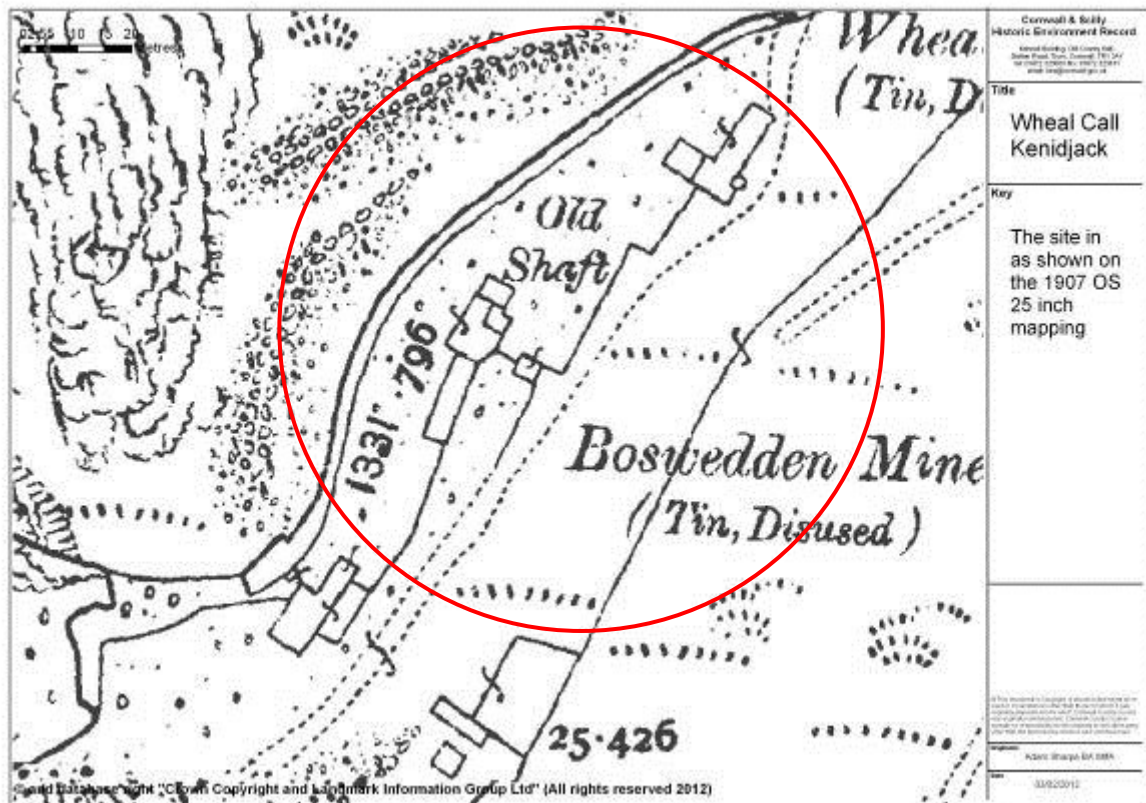


Fig 10. An extract from the circa 1907 2nd Edition of the OS 25" to a mile mapping. Boswedden mine had clearly become disused by this date.

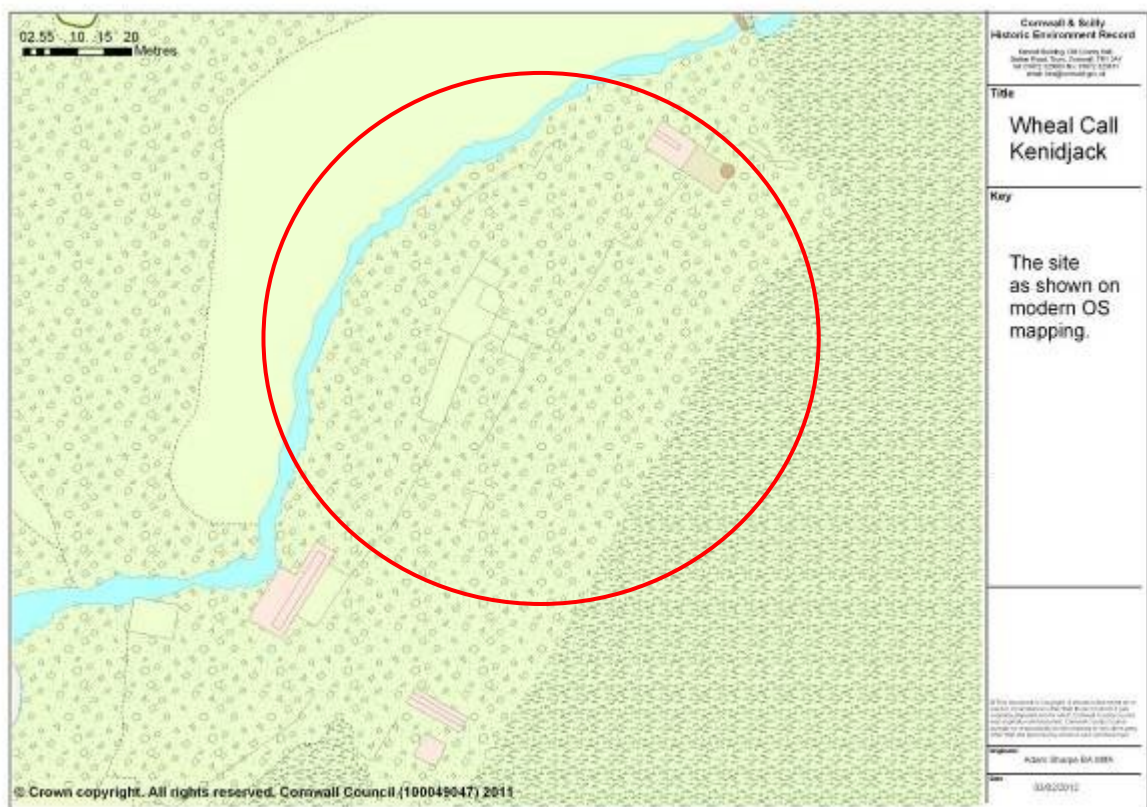


Fig 11. Modern OS mapping showing the surviving features of the Wheal Call/Boswedden Mine site.



Fig 12. A 2005 Cornwall County Council aerial photograph of the lower Kenidjack Valley, showing the scrub which has grown up over much of the site. The blue line indicates the former route of the flatrods.



Fig 13. A general view of the Wheal Call dressing floors from the north west showing the calciner (upper right) and stamps engine house (upper left).



Fig 14. Looking down onto the Wheal Call dressing floors from the north, showing the stamps engine house to the left, the calciner at centre and the Great Wheel pit to the right.



Fig 15. The dressing floor retaining wall from the north east, showing the entrance to the flatrod tunnel (centre).



Fig 16. The dressing floor retaining wall from the north west, showing the area of collapse.



Fig 17. The flat rod trench running across the dressing floors from the Great Wheel. The collapsed end of the tunnel from the east is more or less at the point from which this photograph was taken.



Fig 18. The angle bob loading adjacent to Engine Shaft (immediately to its right), with the remains of the pumping engine house bob wall to its right again.



Fig 19. The entrance to the only surviving section of the culvert which originally carried the mine roadway across the valley from north to south.



Fig 20. The boulder wall in this view probably served as an entraining wall for the stream, and continues the line of the dressing floor retaining wall to the east.



Fig 21. The stone filled trench (lower right to centre) in the lower part of the site which may have been a water channel.



Fig 22. The free-standing pit for the Great Wheel which pumped Engine and Praze Shafts, with the pit for the winding water wheel and some of the mine leats clearly visible on the slopes above.



Fig 23. The remains of the boulder wall which formerly retained dressing floors above Porthledden, but is now very much eroded away.



Fig 24. Another view of the remains of the boulder retaining wall, showing the substantial erosion which has taken place to the deposits which it formerly retained.



Fig 25. Early timber features including a launder eroding out of the base of the deposits formerly retained by the Porthledden boulder wall.



Fig 26. An eroding tributers' round buddle set just above Porthledden. A further example has now almost completely disappeared.



Fig 27. Kernow Maintenance Services brush-cutting vegetation from the remains of the settling tanks sited on a levelled area retained by the adjacent walling.



Fig 28. The eastern elevation of the reverberatory arsenic calciner, showing the part-blocked door, and the chimney stump (middle left).



Fig 29. An overview of the calciner and adjacent structures from the south east, showing the dilapidated state of most of these buildings.



Fig 30. The reverberatory arsenic calciner from the west, showing the hearth opening (right) and discharge opening or wrinkle hole (left).



Fig 31. The northern elevation of the calciner, showing the offset doorway and the stamps mortarstone incorporated into the low wall in front (bottom left).



Fig 32. One of the small round buddles to the west of the arsenic calciner where the calcined tin would have been cleaned up at the end of the dressing process.



Fig 33. The buttressed wall immediately downslope from the arsenic calciner. The function of the buttresses is unknown.



Fig 34. The dressing floor building immediately downslope (north) of the calciner, showing its partial survival.



Fig 35. The stamps engine house from the east, with the remains of the boiler house walls in the foreground.



Fig 36. The stamps engine house from the north, showing the loadings to its north and workings on the outcrop of one of the Boswedden lodes to its left and running under its boiler house.



Fig 37. The stamps engine house from the west, showing the paired doorways behind the bob wall.



Fig 38. The remains of the substantially demolished rear wall of the stamps engine house, showing the remains of the original cylinder opening.



Fig 39. The paired flywheel slots and central crank slot in the loadings immediately to the north of the stamps engine house.



Fig 40. The low remains of the stamps engine boiler house. A collapsed adit leading into the outcrop workings on the hillside to the right runs beneath the centre of the building.



Fig 41. The wheelpit for a small and early set of water powered stamps just to the east of the steam stamps and their associated dressing floors.



Fig 42. A collapsed section of the culvert which carried the Kenidjack Stream under the dressing floors, this part originally of arch headed form.

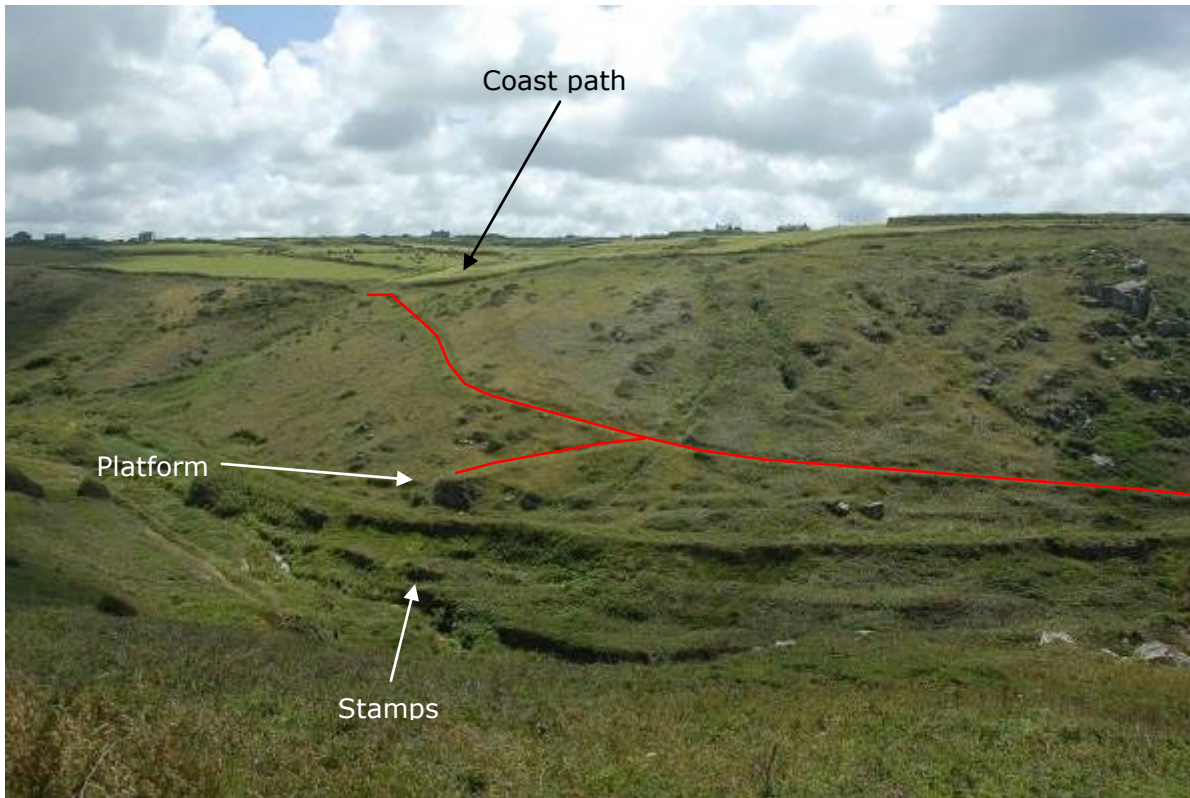


Fig 43. The eastern part of the possible access route to Wheal Call (in red).

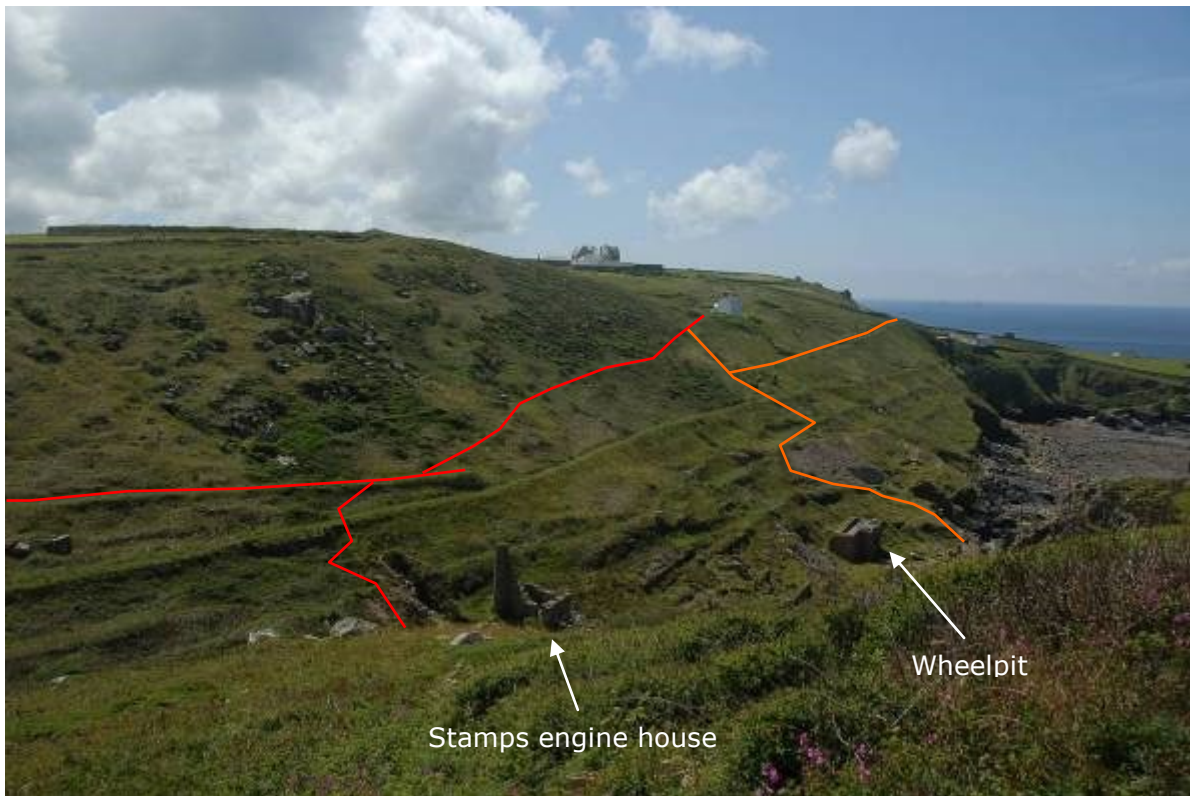


Fig 44. The western part of the potential access route to Wheal Call (red) and the currently-used path routes to Cape Cornwall (orange).

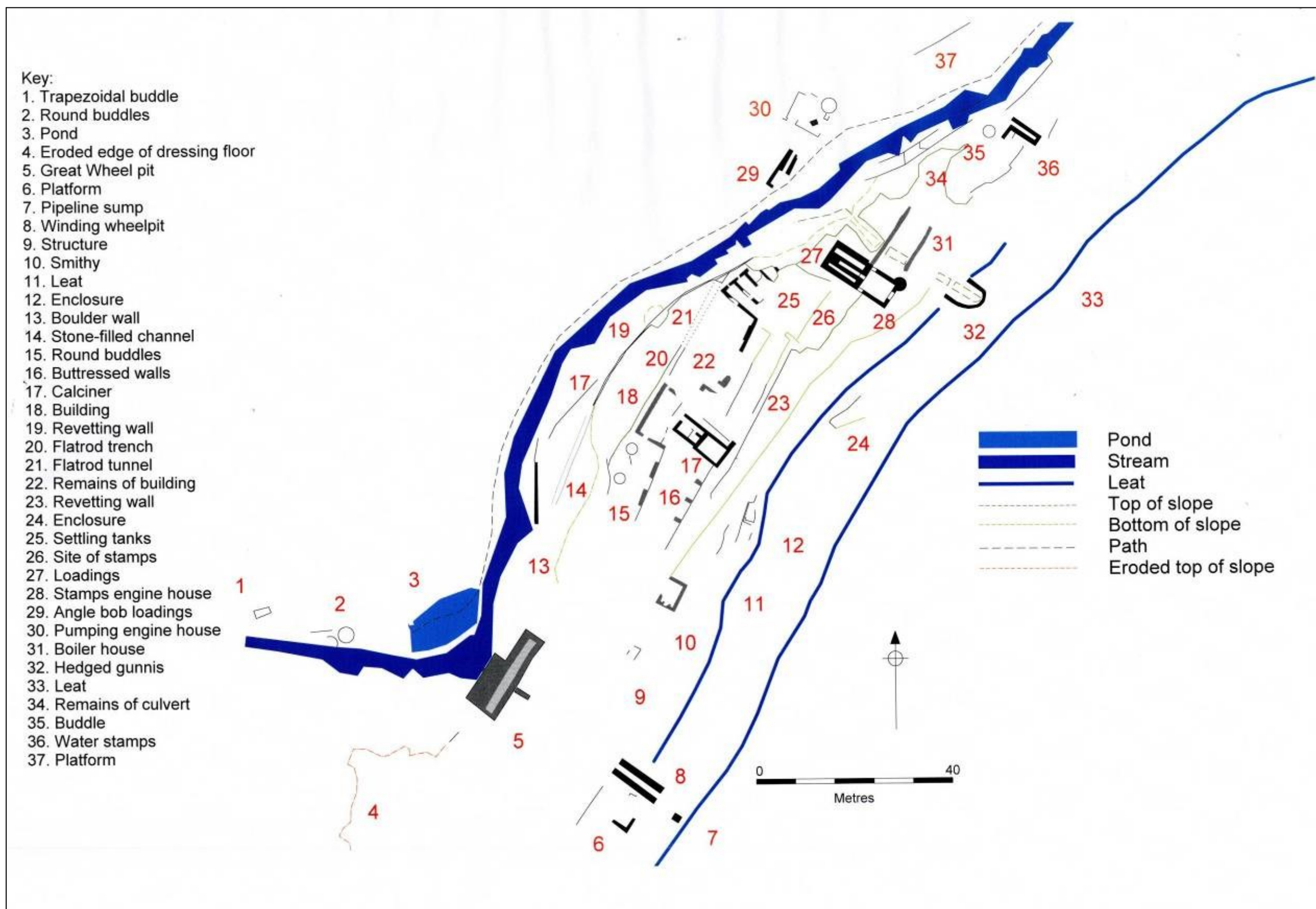


Fig 45. The 2012 survey of the Wheal Call dressing floors and adjacent features.

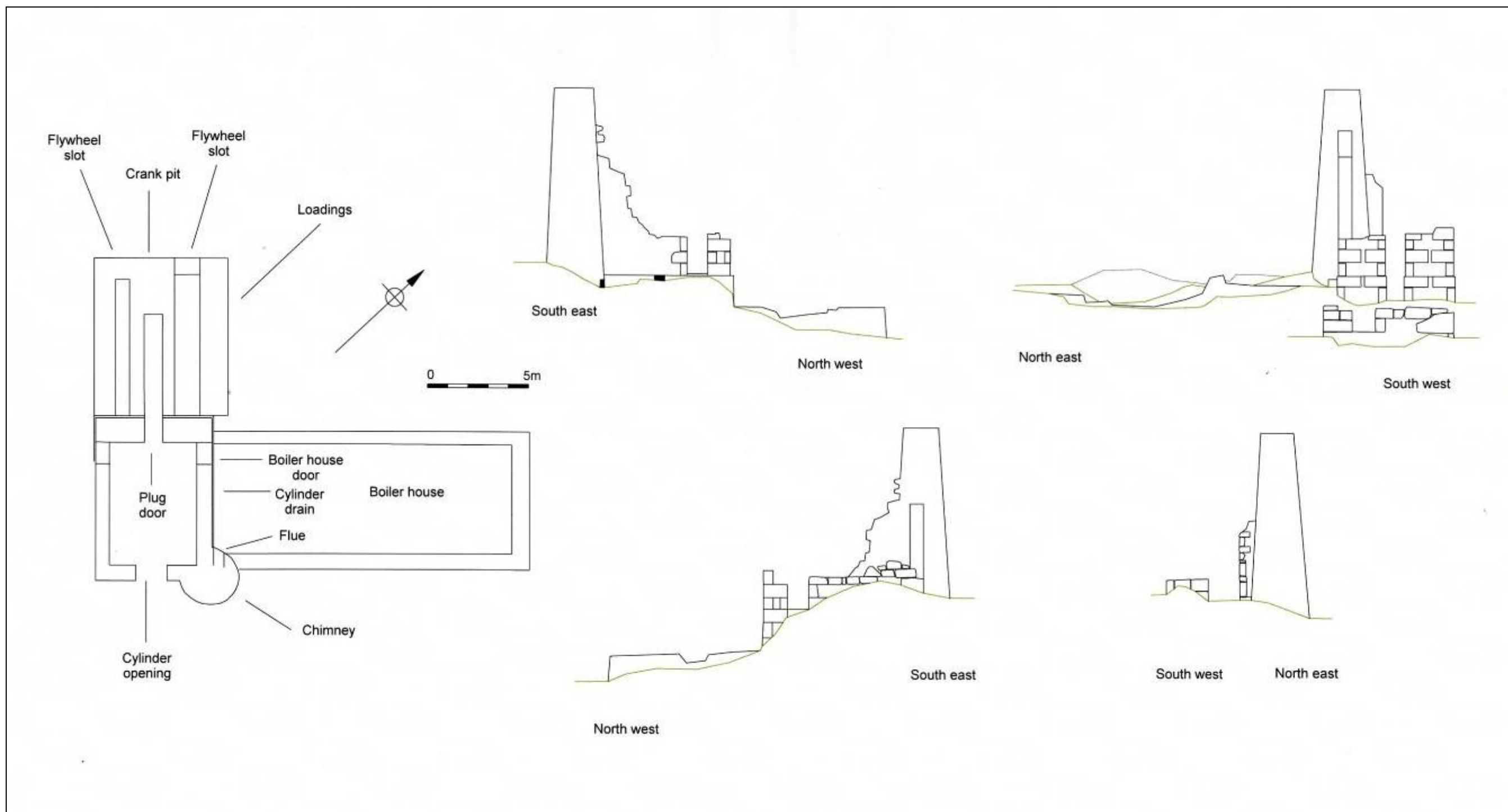


Fig 46. The 2012 survey of the ruins of the stamps engine house.

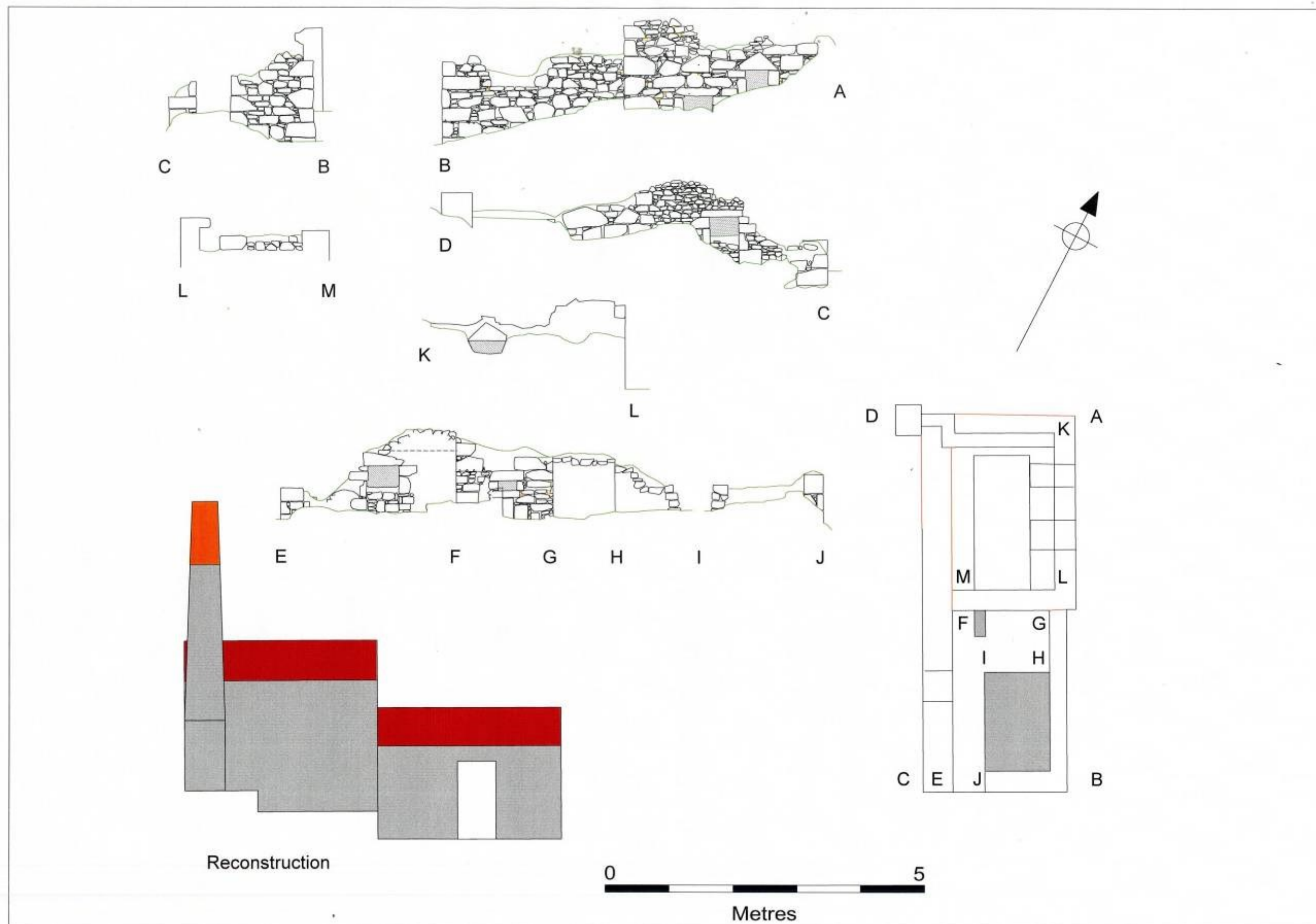


Fig 47. Plan and elevations of the Wheal Call reverberatory arsenic calciner, together with a reconstruction of its likely original appearance.

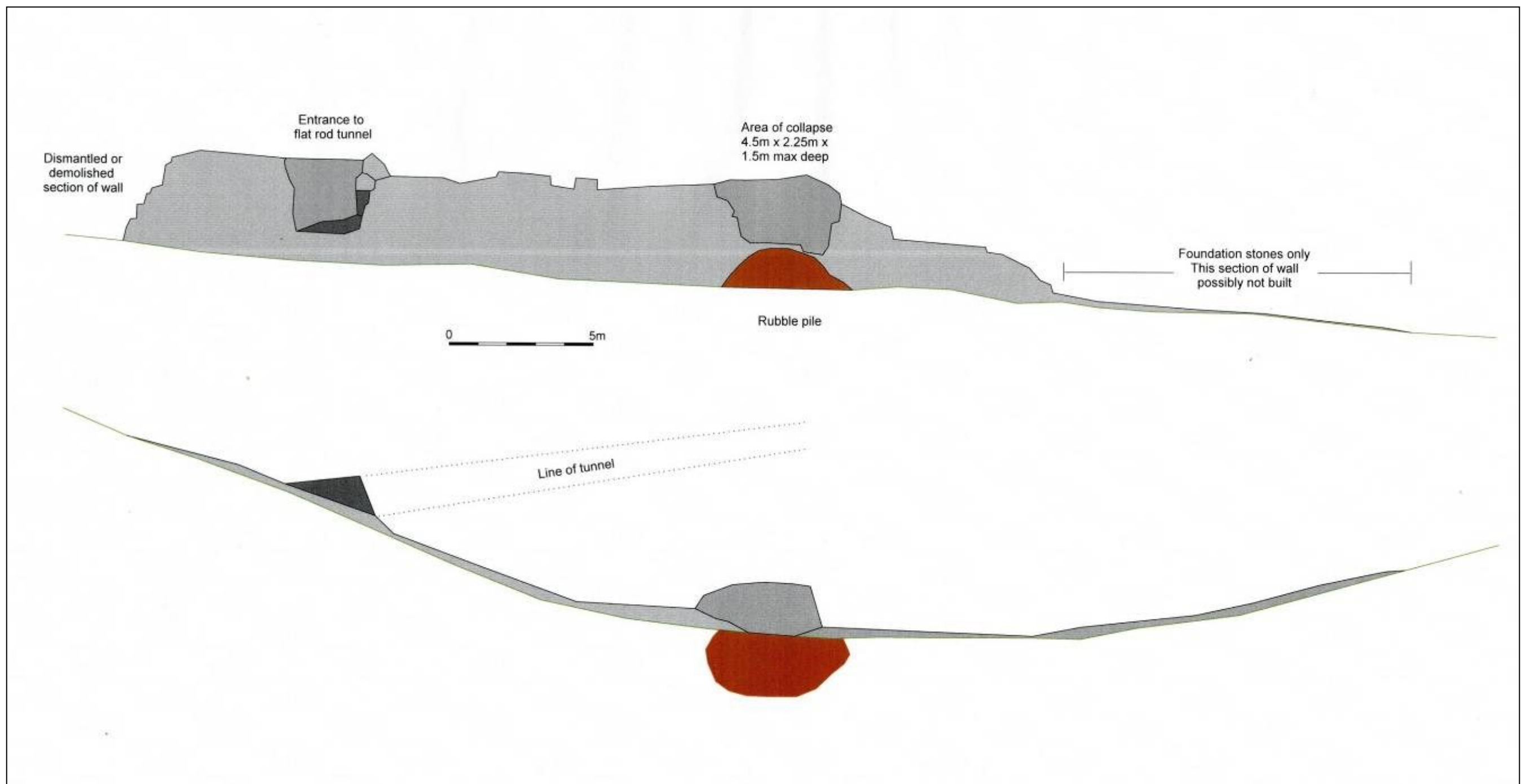


Fig 48. Elevation (top) and plan (bottom) of the Wheal Call dressing floor retaining wall, showing the entrance to and route of the flatrod tunnel (left), the recently collapsed section of facing (centre) and the section which never appears to have been completed, although foundation stones were laid.