

# Lower Molinnis Pan Kiln Chimney, Near Bugle, Treverbyn, Cornwall

NGR SX 0240 5970

Results of historic building recording

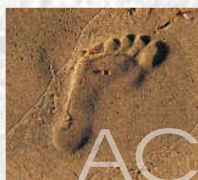
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Prepared by  
Peter Stanier

On behalf of  
Imerys Minerals Ltd

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Date: October 2012



AC archaeology

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# LOWER MOLINNIS PAN KILN CHIMNEY, NEAR BUGLE, TREVERBYN, CORNWALL

NGR SX 0240 5920

## Results of historic building recording

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## Summary

*A pan kiln chimney was examined in September 2012 to provide an archive record prior to its planned demolition. The site owners, Imerys Minerals Ltd, consider that the chimney is in a dangerous state and, being next to a public footpath, should be demolished for safety reasons. The chimney belongs to a pan kiln at Molinnis, constructed by c.1900. The kiln and linhay were demolished at some time before c1970 but the chimney and most of the settling tanks survive at a very overgrown site.*

### 1. INTRODUCTION (Fig. 1; Plate 1)

- 1.1 Historic building recording was undertaken at the Molinnis chimney and its associated structures by AC archaeology on 17 September 2012, on behalf of Imerys Minerals Ltd. The chimney recorded belongs to the Molinnis kiln (NGR SX 0243 5923; Fig. 1) and its location is shown on Fig. 1. The site is wooded, in a shallow, poorly drained valley, 1km east-northeast of the centre of Bugle (Plate 1).
- 1.2 The chimney is considered to be in a state of disrepair and in danger of collapse. Bricks from the top on the north side have already fallen onto the ground next to a public footpath. The recording has therefore been undertaken prior to the chimney's planned demolition for health and safety reasons.
- 1.3 The recording of the chimney was undertaken with reference to Level 2 and Level 3 surveys, as set out in English Heritage's 2006 document *Understanding Historic Buildings: a guide to good recording practices*. Elevations of the chimney and plans of its pan kiln and associated settling tanks are given in Figs 2-4.
- 1.4 The Mollinis pan kiln site was visited in 1990 during the Cornwall Archaeological Unit's survey of the China clay district, and listed as site no. 20107. At that date the condition and survival of the chimney stack and tank were rated as poor and site value was considered to be of local importance. Recording by ground photography was recommended in case of threat to the site (Herring and Smith 1991, Appendix 6.8).
- 1.5 The Cornwall Historic Environment Record (HER no: 20107) describes the site as 'a small kiln which has been partly demolished and which is now heavily overgrown. Settling tanks at the rear of the kiln survive, as does the granite and brick chimney stack.' No designated status is recorded.

### 2. HISTORICAL BACKGROUND: MOLINNIS MOOR CLAY WORKS (Figs 2-4)

- 2.1 Very little is known about the history of this small pan kiln and chimney site. There are no published records concerning Molinnis, even in the most authoritative account of the clay industry (Barton 1964). A one-line reference to the 'Molinnis Mica Works' being taken over by English China Clays Ltd in 1941 may possibly be this site (Hudson 164).
- 2.2 The best evidence for the development of the site has come from Ordnance Survey (OS) mapping. No industrial activity at Lower Molinnis Moor is shown on the OS 25-inch map of 1881. However, by the time of the 1907 map revision, the Molinnis Moor China Clay Works had been established with pits and settling pools (centred at SX 0235 5910). There was no excavated pit or waste tips and it therefore appears that the Works was established to recover china clay lost into the streams entering the

moor from the large clay pits of the Bugle area (Fig. 2). Although this was a commercial enterprise, it also alleviated, but did not stop, the pollution of the river which ran white down through the Luxulyan valley to the sea at Par.

- 2.3 A short distance northeast of the Molinnis Moor works, in an area previously depicted as low lying and marshy, the 1907 map depicts a pan kiln and linhay (store) aligned east-northeast to west-southwest. There is clearly a furnace room at the east end, while the linhay sharing the same roof as the pan kiln is shown along the north side where there is access for road vehicles from the Lower Molinnis lane. There was a detached chimney at the west end and three settling tanks (marked as 'clay pits') on the south side (Fig. 3).
- 2.4 The relatively low quantities of clay recovered explain why this was a very small pan kiln served by road throughout its life. In contrast, in 1907 there were at least eight large pan kilns within a mile radius of Molinnis, each of which had the competitive advantage of being served by a siding from the Par-Newquay railway.
- 2.5 The OS 6-inch map of 1938 shows the pan kiln and linhay as still being roofed, but they had become disused by 1963 when much had been demolished, leaving a portion of the kiln and linhay at the west end. Sometime after 1938 the settling tanks had been altered, with one enlarged and a fourth tank added.
- 2.6 The 1971 map shows that the buildings had been totally demolished, although two parallel lines mark the outline of just the pan kiln (Fig.4). Today, even this cannot be discerned. The kiln and linhay were probably insubstantial and are unusual because the topography of this low-lying site dictated they were built at the same level.

### **3. THE WORKING OF PAN KILNS**

- 3.1 Although the Molinnis site differs in small ways from the 'typical' pan kiln arrangement, this section lays out the principles involved.
- 3.2 The pan kiln or 'dry' is a building unique to the china clay industry. Although now long since superseded by more modern methods of clay drying, many of these distinct long buildings with their tall chimney stacks at the end are still scattered around the St Austell China clay district, abandoned and ruinous, or in some cases converted to some other purpose.
- 3.3 The first pan kilns were built in 1845 and, despite the added cost of fuel (1 ton of coal was required to dry 10 tons of clay), they were an instant success compared to the old air-drying method which was difficult in the damp Cornish climate. This led to the building of many others during the next 50 years, at first close to the china clay pits. By the late nineteenth century earthenware pipelines were laid to carry refined clay slurry to kilns which could be erected further away, at sites more convenient for transporting the finished product, particularly by rail. The increasing number of pan kilns enabled a dramatic expansion of the industry.
- 3.4 The ideal site for a pan kiln was on a slope so that the processes could take place with the aid of gravity. The main elements are: the settling tanks, the pan kiln and the linhay (store), with facilities for loading into road or rail wagons alongside. Upslope at the rear, was a row of stone-lined settling tanks, which were open to the air. Here the refined clay slurry piped from the pit was allowed to settle to a thick creamy consistency, while the clear water was drawn off from the top. When ready, a hatch in the wall of the adjacent kiln was opened and the clay was dug out and shovelled

by hand onto a small tipping truck running on temporary rails laid into the tank. The truck was pushed through the hatch onto a travelling bridge (or traverser) which ran on rails up and down the length of the kiln, so the clay could be distributed and spread evenly on the floor wherever required. The pan kiln floor was of porous clay tiles, heated from beneath by parallel flues that ran for the full length of the building from the furnace room at one end to the other where they converged at a tall chimney stack which stood just outside. The porous clay tiles allowed the heat of the gases in the flues to draw the moisture out of the clay. It is said that a feature of an operating pan kiln was a white 'smoke' emerging from the chimney stack.

- 3.5** The clay dried quickly at the furnace end (usually taking a day), while it might take over three days at the stack end. This was partly overcome and evened out by using thicker tiles (125mm or 5ins) at the furnace end and tiles half that thickness at the far end. The clay was spread more thickly at the furnace end too. The clay on the kiln floor was scored into cubes which facilitated the drying while also helping the workers who shovelled out the dried clay. The workmen's length of throw restricted the width of the pan kiln to about 4.5m, hence the kilns took on their characteristic long and narrow plan. The long building incorporated the kiln and linhay under a single roof. The ridge was over the kiln and therefore very long timber rafters were required on the side sloping over the linhay. The roof itself was usually slated with a vented ridge along the whole length.
- 3.6** The cost and speed of clay drying were improved by the mid-twentieth century by the introduction of filter presses which took out most of the water from the thickened clay slurry before it entered the pan kiln. The clay from these presses was carried into the kiln on a different type of tipping truck than those previously used for emptying the tanks. However, they were still pushed onto the travelling bridge, and the clay was distributed over the kiln floor in the same way as before.

#### **4. THE MOLINNIS CHIMNEY (Figs 3-5; Plates 1-7; Appendix 1)**

- 4.1** The round chimney stack (Fig. 5 and Plates 1-6) stands to a height of approx.14m, including a 10cm-wide plinth around the base which has a diameter of 2.9m (9ft 6ins). Construction is in the traditional manner using granite rubble stone for most of the stack, tapering towards the top 3.05m (10ft) which is finished in coursed bricks. The condition of the chimney is poor. The original lime mortar has weathered although there are places low down that have been re-pointed with cement at some time.
- 4.2** The brick top is in the poorest condition, especially on the north side where fallen bricks have left a hole; trees prevented this from being viewed or photographed successfully. There are 41 brick courses, with a widening formed by three capping courses near the top. Bricks fallen onto the ground are tapered and typical of the type specially made for building stacks of a small diameter. Unfortunately they are not impressed with a maker's name but their firebrick-like texture suggests they came from a local manufacturer in the St Austell clay district (Plate 7).
- 4.3** Five iron bands of wrought iron strapping survive high up, the middle three of which have come loose and slipped down the stack. Each band is in two sections, with flanged ends bolted together and tightened on opposite sides of the stack (Plates 2 and 6).
- 4.4** The chimney flue opening survives just above the level of the base plinth, its lintel c. 1.6m above ground level (Plate 4). The stonework is good, although it is partly

collapsed inside. In front, a 1m-long hole probably had a removable cover to gain access to the flue and chimney. The main flue has stone side walls and stone capstones or lintels (Plate 5). As in the chimney, there is much evidence of soot showing it was well-used in its time. A long mound containing the flue can be identified at a slight angle and sloping gently down towards the site of the (now demolished) west end of the pan kiln, a distance of c. 17m from the chimney. The chimney is in the correct place on the 1971 map but, interestingly, the 1907 map shows one in a different position, nearer the kiln but out of line. If this is not a mistake, it is evidence that the chimney had to be rebuilt for some reason. The map also shows an unexplained chimney-sized feature near the west end of the kiln (see Figs 3 and 4).

## **5. CONTEXT: THE MOLINNIS PAN KILN AND SETTLING TANKS (Fig. 3; Plates 8 and 9)**

**5.1** The 1907 map (Fig. 3) indicates the main building containing the pan kiln and linhay (store) was 51m long and 6m wide at the west end, with a wider section of 7m at the east end. This is small in comparison with some of the more usual type of pan kilns, recorded as ranging from 72m to 108m long (e.g. Stanier 2010; 2011). The map also shows a furnace room attached at the east end of the kiln, measuring c. 5m by 5m.

**5.2** Today, the maturity of the trees growing over much of the site show the pan kiln, linhay and furnace room were completely demolished several decades ago. There is no obvious evidence of any structure in the undergrowth, nor any exposed rubble which might contain traces of pan kiln flues or characteristic floor tiles. It is suggested that the whole building was not substantial, and in any case the north side of the linhay was open, for loading wagons.

**5.3** The settling tanks are fewer, squarer and smaller than the long types more usually associated with pan kilns. The tanks also differ in their layout, being off-set from the pan kiln. When the works was established there were three tanks, called for the purpose of this report, Nos. 1 to 3. From east to west, Tank No.1 measured 12m by 16m, Tanks No.2 and No.3 were smaller and almost square, each being 12m by 11m (Plate 8). By the final phase, sometime between 1938 and 1963, Tank No.2 had been lengthened to 24m long and Tank No.4 had been added in the space in the corner between tanks No.2 and No.3, with the same dimensions as the latter (Plate 9).

**5.4** The layout of the four settling tanks is still recognisable, although several sections of wall have been demolished. Sample measurements show the very overgrown walls are between 1.2m and 2m wide and up to c. 1.4m high. Much of the main tank wall, shared by the pan kiln, remains, despite some demolition. There is one surviving opening from the largest tank into the pan kiln. It is 1.25m wide but no longer contains the hatch boards once held in timber guide frames.

## **6. COMMENTS**

**6.1** The site is overgrown with ash, alder and willow trees and a ground cover including brambles and ferns, all of which hindered recording and photography.

**6.2** The whole site is small and in the absence of a clay pit it is concluded that the Molinnis Moor China Clay Works was collecting material discharged into the water courses by clay works higher upstream. This explains the presence of pools, etc

shown on the 1907 map. The pan kiln and tanks must be part of this, and could explain the square shape of the settling tanks (the 'Clay Pits' on the 1907 OS map).

- 6.3** The site is all on the level, unlike the preferred arrangement which was to build on a slope so that clay could be shovelled downwards, first from the kiln into the linhay (store) and then into wagons waiting alongside. Perhaps this consideration was of less importance if the quantities of clay handled were small.

## **7. ACKNOWLEDGEMENTS**

- 7.1** The recording was commissioned by John Vine on behalf of Imerys Minerals Ltd. The site recording was carried out by Peter Stanier and Elisabeth Patkai and the illustrations in this report were prepared by Elisabeth Patkai.

## **8. SOURCES**

Barton, R. M., 1966, *A History of the Cornish China-Clay Industry*.

Herring, P. and Smith, J.R., 1991, *The archaeology of the St. Austell china-clay area: An archaeological and historical assessment*.

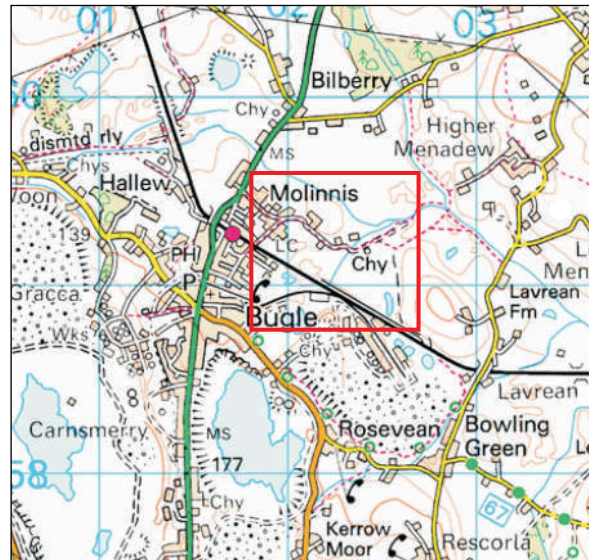
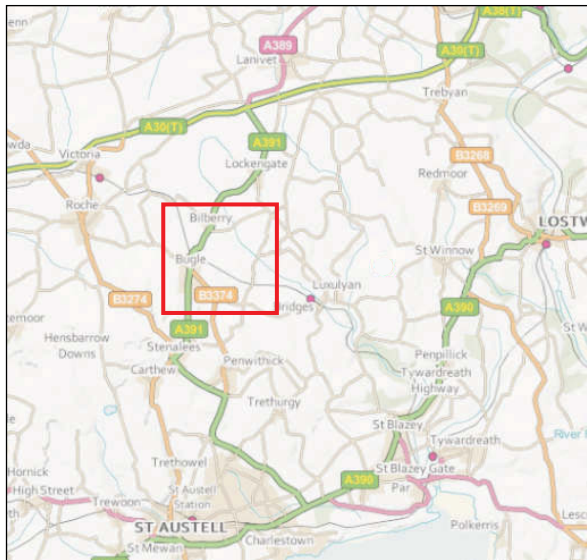
Hudson, K., 1969, *The History of English China Clays*.

Ordnance Survey 25-inch map, first edition 1881, second edition 1907, and revision of 1971

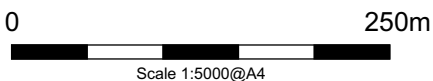
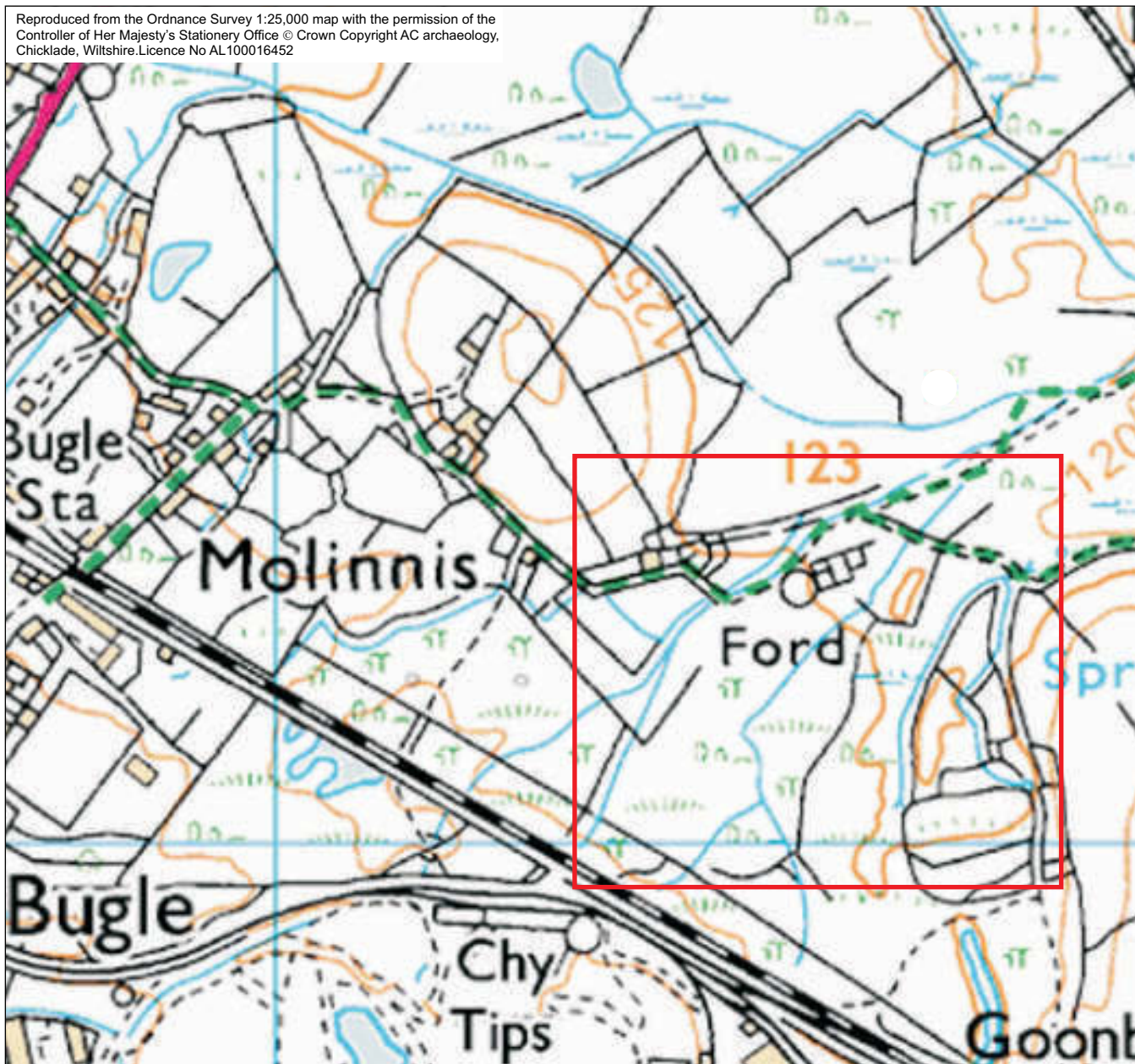
Ordnance Survey 6-inch maps, revisions of 1938 and 1963

Stanier, P., 2010, *Two Pan Kiln Chimneys at Par Moor Road, Par, Cornwall, Results of historic building recording and assessment*, AC archaeology Document No. ACD221/2/0

Stanier, P., 2011, *Four Pan Kiln Chimneys at Burngallow (x2), Drinnick & Lower Ninestones, near St Austell, Cornwall, Results of historic building recording and assessment*, AC archaeology Document No. ACD266/2/0.



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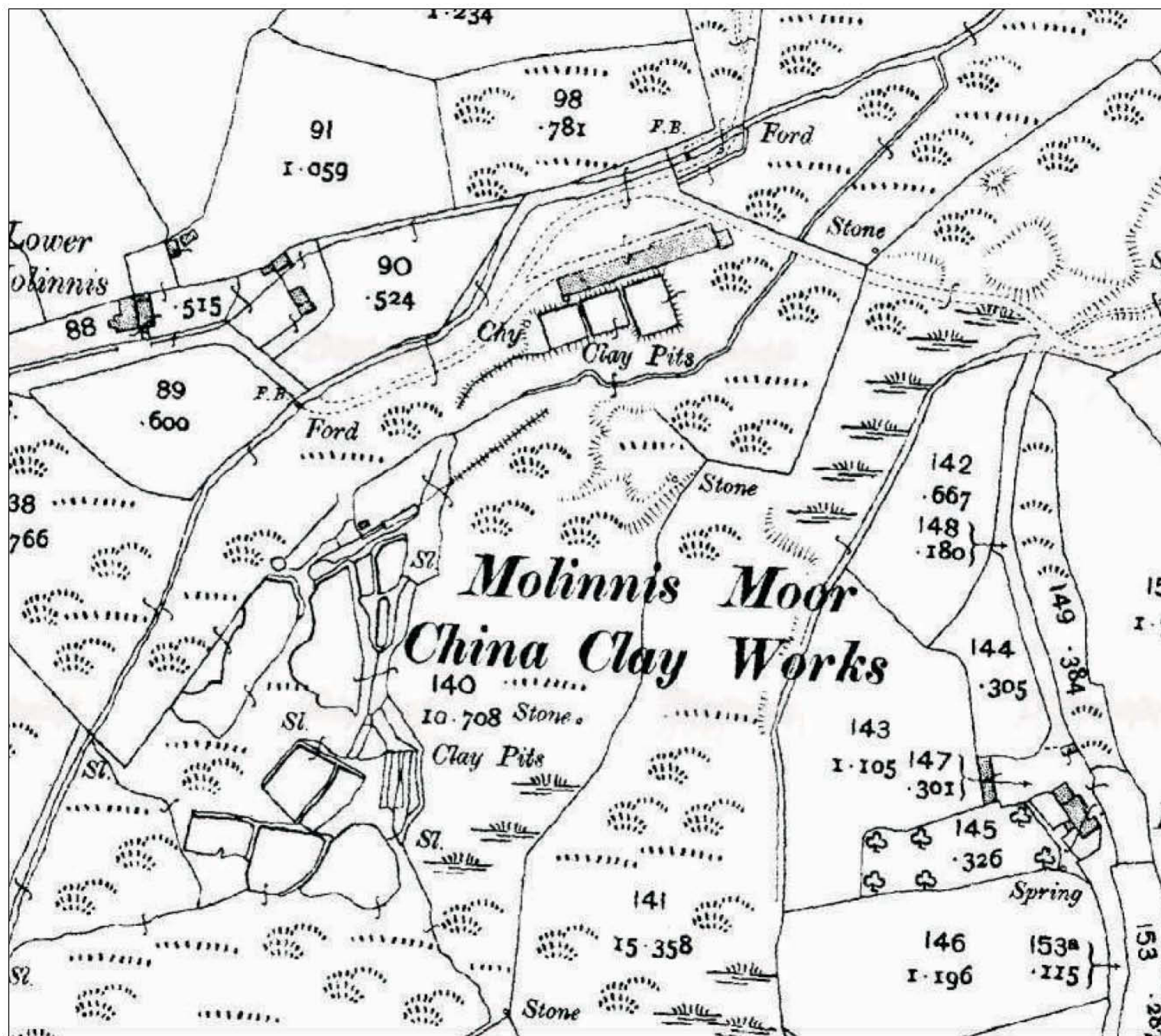
PROJECT

Molinnis Chimney, Cornwall

TITLE

Fig. 1: Site location





PROJECT  
Molinnis Chimney, Cornwall

TITLE  
Fig. 2: The Molinnis Moor China Clay Works c.1900. Extract from Ordnance Survey 25-inch map, 1907

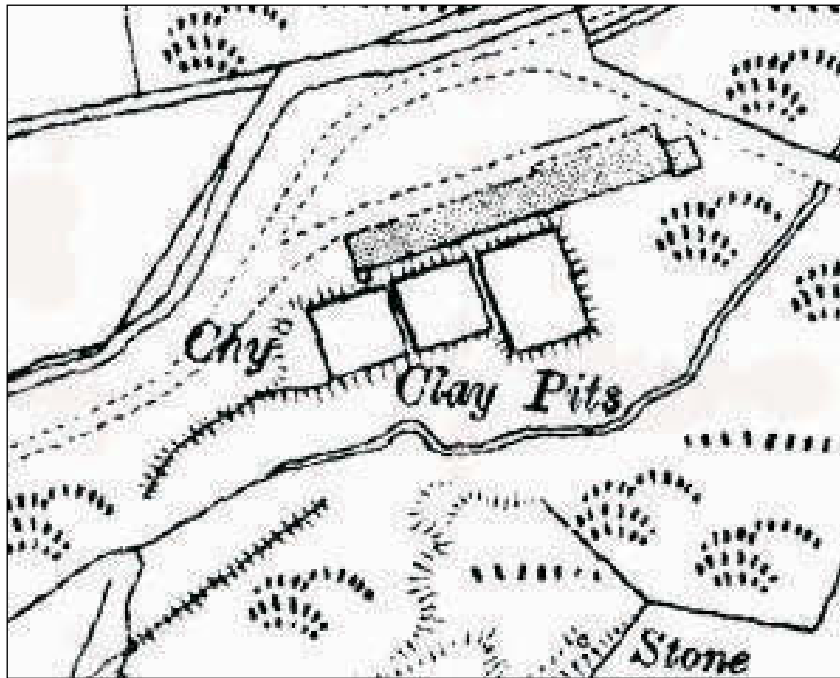


Fig. 3: The Molinnis chimney, pan kiln, linhay and settling tanks c.1900. Note the different chimney position compared with Fig. 4. Extract from Ordnance Survey 25-inch map, 1907

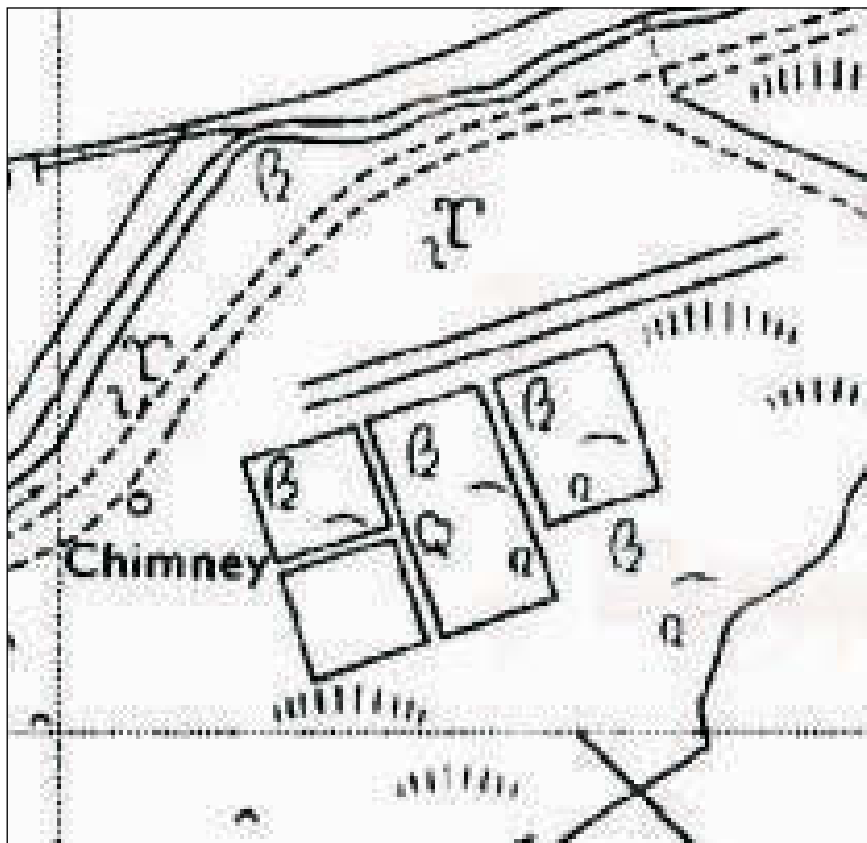


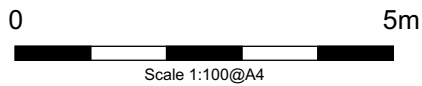
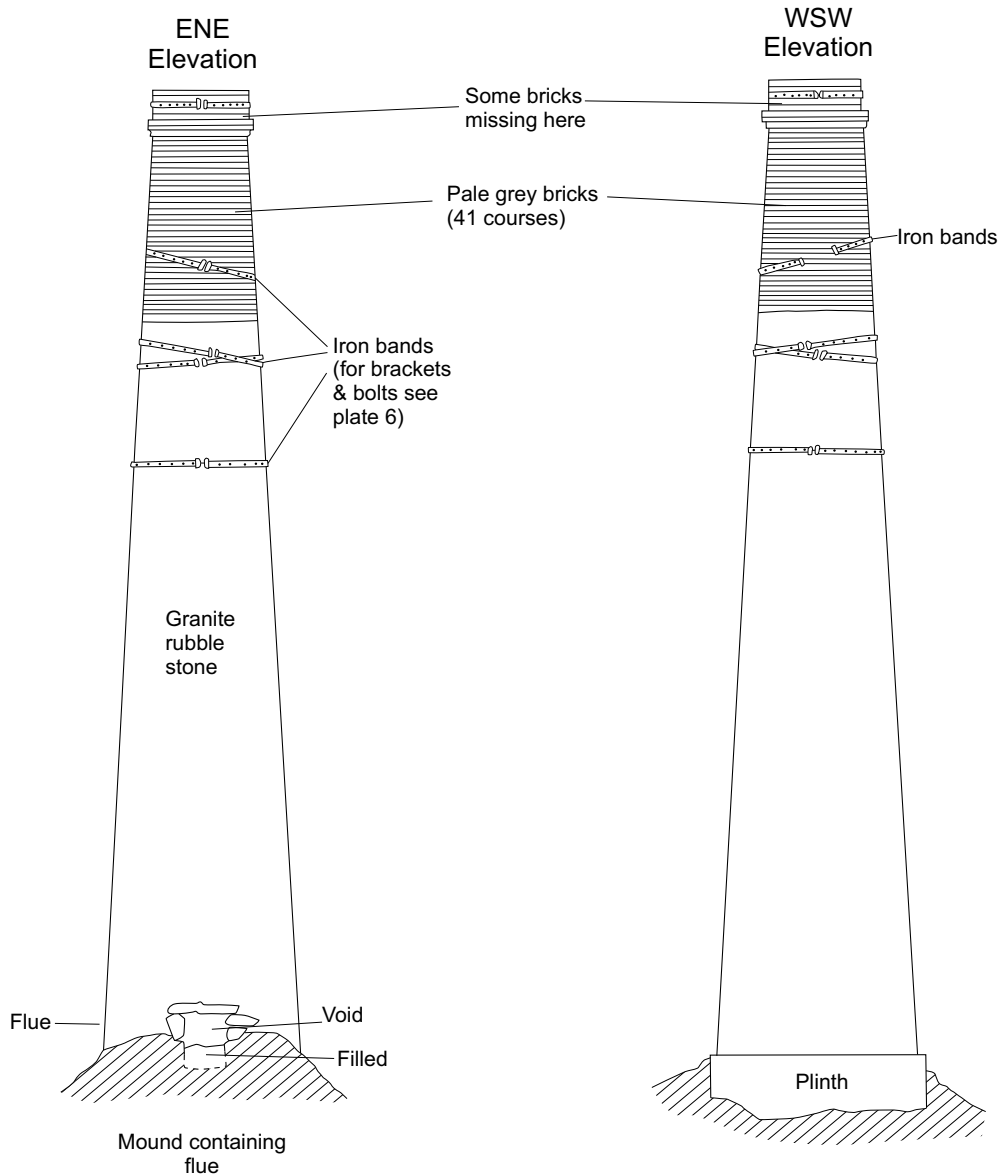
Fig. 4: . Extract from Ordnance Survey 1:2500 map, 1971, showing altered settling tanks and outline of demolished pan kiln c.1970

PROJECT

Molinnis Chimney, Cornwall

TITLE

Figs. 3 and 4



PROJECT

Molinnis Chimney, Cornwall

TITLE

Fig. 5: Molinnis chimney, east-northeast and west-northwest elevations



Plate 1: Molinnis chimney rising above woodland, indicating the hidden nature of this industrial site, view from west-southwest



Plate 2: Molinnis chimney top brick courses and iron bands, view from west-southwest



Plate 3: Molinnis chimney base showing the plinth foundation, view from northwest. Scale 2m



Plate 4: Molinnis chimney base with opening for flue, view from east-northeast. Scales 0.20m and 2m



Plate 5 : Molinnis chimney flue interior, showing the stone capstones or lintels, view from west-southwest. The width of the soot-encrusted flue passage is 0.55m



Plate 6: Molinnis chimney top, looking up from east-northeast, showing the poor state of the brickwork and the slipping iron bands.



Plate 7: Examples of fallen chimney stack bricks, specially designed with a taper. Scale 0.20m



Plate 8: Settling tank No.3, showing the curved northwest corner, with the chimney stack beyond, view from east-northeast. Scale 2m



Plate 9: Settling tank No.4, flooded and overgrown, view from NW. This dates from an enlargement of the site sometime in the mid-twentieth century.

# Appendix 1

Digital Photographic Register

## Digital Photographic Register

Site Code: ACD566

Archive No	Description	Scale	View from	Photo by	Date
1	Molinnis chimney in rural setting, view		W	PS	17/09/2012
2	Molinnis chimney in rural setting, view		W	PS	17/09/2012
3	Molinnis chimney in rural setting, view		W	PS	17/09/2012
4	Molinnis chimney approach from track		WSW	PS	17/09/2012
5	Molinnis chimney brick top		WSW	PS	17/09/2012
6	Molinnis chimney brick top		WSW	PS	17/09/2012
7	Molinnis chimney brick top & iron bands		ENE	PS	17/09/2012
8	Molinnis chimney brick top & iron bands		ENE	PS	17/09/2012
9	Molinnis chimney base and plinth	2m	NW	PS	17/09/2012
10	Molinnis chimney, fallen tapered bricks	20cm	-	PS	17/09/2012
11	Molinnis chimney, flue at base	20cm	ENE	PS	17/09/2012
12	Molinnis chimney, flue at base	20cm	ENE	PS	17/09/2012
13	Molinnis chimney, flue at base	20cm	ENE	PS	17/09/2012
14	Molinnis chimney, flue at base, with part of stack	2m & 20cm	ENE	PS	17/09/2012
15	Molinnis chimney, flue inside stack		ENE	PS	17/09/2012
16	Molinnis chimney, flue passage interior		WSW	PS	17/09/2012
17	Molinnis settling tank 3 NW corner towards chimney stack	2m	ENE	PS	17/09/2012
18	Molinnis settling tank 3 N wall & NW corner	2m	S	PS	17/09/2012
19	Molinnis settling tank 4, flooded & overgrown		NW	PS	17/09/2012

### Devon Office

AC archaeology Ltd  
Unit 4, Halthaies Workshops  
Bradninch  
Nr Exeter  
Devon  
EX5 4LQ

Telephone/Fax: 01392 882410

### Wiltshire Office

AC archaeology Ltd  
Manor Farm Stables  
Chicklade  
Hindon  
Nr Salisbury  
Wiltshire  
SP3 5SU

Telephone: 01747 820581  
Fax: 01747 820440

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