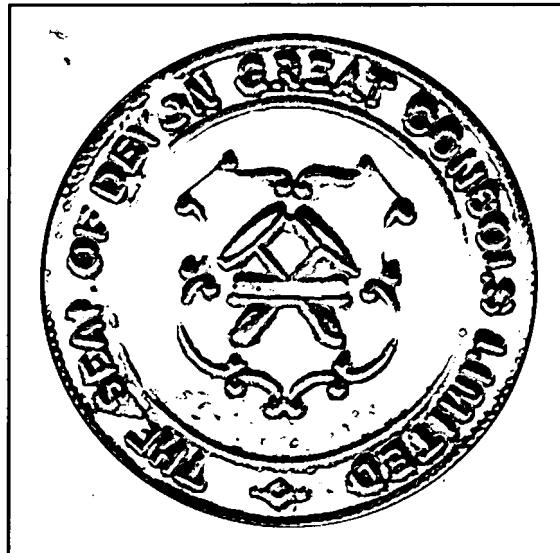


Report No: 2002R069

Devon Great Consols

Archaeological Assessment



CORNWALL ARCHAEOLOGICAL UNIT
CORNWALL COUNTY COUNCIL

Devon Great Consols Mine

Archaeological Assessment

Colin Buck

2002

Report No: 2002R069

CORNWALL ARCHAEOLOGICAL UNIT
Historic Environment Service, Planning Transportation and Estates,
Cornwall County Council
Kennall Building, Old County Hall, Station Road, Truro, Cornwall, TR1 3AY
tel (01872) 323603 fax (01872) 323811 E-mail cbuck@cornwall.gov.uk

Acknowledgements

This study was commissioned by West Devon Borough Council and the Tamar Countryside Service (co-ordinated by Peter Sainsbury of the Cornwall County Council Environmental Programmes Section).

Many thanks are due to John Goodridge for invaluable advice and for editing the historical background sections of the report. Also Richard Gould (of F. Sherrell Ltd), for helping provide some archive information.

Within Cornwall Archaeological Unit the excellent quality of the reproduced images and GIS data are due to Ainsley Cocks and Bryn Tapper. Thanks are also due to Adam Sharpe for editing this report.

The author is grateful to all landowners involved for allowing access.

Archive copyright acknowledgements

All colour archive map images (and seals) that have been reproduced within this report are, 'By kind permission of the Marquess of Tavistock and the Trustees of the Bedford Estates'. This acknowledgement has not been reproduced elsewhere in the report.

All black/white archive photographic images that have been reproduced within this report are, 'By kind permission of the Royal Institute of Cornwall (Photographic Archive'. This acknowledgement has not been reproduced elsewhere in the report.

'A mine of mines' (a quote by Peter Watson, a mining director of Devon Great Consols in 1880)

Front Cover illustration

The seal of Devon Great Consols Mine.

Rear Cover illustration

The seal of the Duke of Bedford.

© Cornwall County Council 2002

No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the prior permission of the publisher.

Contents

Summary.....	v
1 Introduction	1
1.1 Project background.....	1
2 Aims.....	2
3 Methods.....	2
3.1 Desk top assessment	2
3.2 Fieldwork	3
4 Background	4
4.1 Location and setting	4
4.2 Statutory Designations	5
4.3 Geology and Lodes.....	5
4.4 Historical Background.....	6
4.4.1 Historic landscape background (pre 1844)	6
4.4.2 Historical background for Devon Great Consolidated Mine	9
5 Management Recommendations	18
5.1 General Recommendations	18
5.1.1 Archaeological management plan:	18
5.1.2 Shaft Treatment.....	18
5.1.3 Building consolidation	18
5.1.4 Possible further work.....	19
5.2 Individual structures or site components.....	19
5.3 Safety works to shafts and other mine openings.....	19
5.3.1 Background	19
5.3.2 CAU policy in relation to safety works to mine openings	20
5.3.3 Shaft grading	21
5.3.4 Historic Environment preferred options for shaft treatment	21
5.4 Archaeological Potential Below Ground.....	23
5.5 Further Archaeological Work: Evaluation and Mitigation.....	23
5.6 Statement of Likely COSHH Hazards.....	23
6 Summary Management Tables	24
6.1 Summary Management Table of archaeological sites	24
6.2 Masonry Structures Requiring Treatment	37

7	Site Inventory	40
8	Table of Sites	239
9	References	253
9.1	Primary sources	253
9.2	Publications	253
10	Project Archive	254
11	Appendix	255
11.1	1866 Arsenic works lease	255
11.2	1868/9 Report on Mines	256
11.3	Working woodland management recommendations	257
11.4	Devon County Archaeological Service archaeological assessment project brief..	259
12	Glossary of mining terms	266

Abbreviations

CAU	Cornwall Archaeological Unit
CCC	Cornwall County Council
CRO	Cornwall Record Office
DCAS	Devon County Archaeological Service
DCC	Devon County Council
DGC	Devon Great Consolidated Mine
DRO	Devon Record Office
EDM	Electronic Data Measurement (Reflectorless Theodolite)
EH	English Heritage
GIS	Geographical Information System
GPS	Ground Positioning Satellite (receiver)
HE	Historic Environment
NGR	National Grid Reference
NMP	National Mapping Programme
NMR	National Monuments Record
OD	Ordnance Datum
OS	Ordnance Survey
RIC	Royal Institute of Cornwall
SAM	Scheduled Ancient Monument
SMR	Devon Sites and Monuments Record
SWRDA	South West England Rural Development Agency
TVCS	Tamar Valley Countryside Service
WDBC	West Devon Borough Council
WHS	World Heritage Site

List of Figures

- 1 A photograph of the 1922 arsenic condenser (Ordish 1962)
- 2 A recent photograph of the 1922 arsenic condenser (Buck 2002)
- 3 Devon Great Consols project area map (and inset location)
- 4 Symons mine sett/lodes map of the Tavistock District (1848)
- 5 Post-medieval landscape character map
- 6 Tavistock parish (Index Map) Tithe Map (1843)
- 7 Devon Great Consols Co. Lease Map (1857)
- 8 Tavistock (Div. 1) Lodes/shafts map (1867)
- 9 Ordnance Survey map of the study area (1884)
- 10 Longitudinal section on Main Lode -Devon Great Consols (undated)
- 11 Ordnance Survey map of the study area (1904)
- 12 Site Inventory Map (Overview)
- 13 Wheal Maria excerpt maps (1867/1884)
- 14 Wheal Fanny excerpt maps (1867/1884)
- 15 Wheal Anna Maria (North) excerpt maps (1867/1884)
- 16 Wheal Anna Maria (South) excerpt maps (1867/1884)
- 17 Devon Great Consols Co. Arsenic Lease Map (1866)
- 18 Devon Great Consols Co. Arsenic Lease Map (1893)
- 19 A photograph of an Oxland Calciner (c 1890)
- 20 A photograph of an Arsenic Grinder (c 1890)
- 21 Wheal Josiah excerpt maps (1867/1884)
- 22 Wheal Emma excerpt maps (1867/1884)
- 23 A photograph of Wheal Emma (c1890)
- 24 A photograph of the Flat rod tower (Buck 2002)
- 25 A photograph of the Flat rod tower (Buck 2002)
- 26 South Fanny excerpt maps (1867/1884)
- 27 A photograph of Precipitation works (Ordish 1962)
- 28 A photograph of Precipitation works (CAU 2002)
- 29 A photograph of Precipitation processing works (Ordish 1962)
- 30 A photograph of Precipitation processing works (CAU 2002)
- 31 A photograph of the large sands dump tunnel (Buck 2002)
- 32 A photograph of the large sands dump tunnel (Buck 2002)
- 33 A photograph of the Ball mill (Buck 2002)
- 34 General view of the lower slimes/settling dump (CAU 2002)
- 35 Wh.Watson/Blanchdown excerpt maps (1867/1884)
- Site Plans at back of report**
- 36 An RAF aerial view of Devon Great Consols Mine (1947)
- 37 NMP Aerial Photograph rectification of Devon Great Consols
- 38 Site Inventory map (folded into the rear cover)

Summary

This project constitutes the first stage in a land reclamation project at Devon Great Consols and Bedford United Mines on the Devon bank of the River Tamar that is likely to result in recommendations for contamination reduction, shaft treatment, buildings consolidation, landscaping, planting, access and interpretation. The provision of safe public access around parts of these important archaeological industrial mine sites using existing tracks and disused railway lines provides an important focus for the project developers, who also hope to link up these sites with Morwellham Quay.

The general archaeological impact of the proposals to the archaeological features described in this report is likely to be relatively low key, though there may be some potential for disturbance of, damage to or exposure of previously unrecorded features in some areas of the site as a result of the works which may take place in later phases of the project.

Remediation and safety works to shafts, adits and general consolidation schemes recommended in this report will be discussed with the County Archaeologist, who will advise on appropriate mitigation measures to tackle the effects of the next phase of land reclamation and archaeological management works (that are intended to counter environmental contamination and to increase public access to the site).

The archaeological sites described in this report are located across the entire mine sett (but densely concentrated at the following sites), all of which are integral components of Devon Great Consolidated Mine:

- Wheal Maria
- Wheal Fanny
- Wheal Anna Maria (Upper dressing floor)
- Wheal Anna Maria (Lower dressing floor and Arsenic refinery)
- Wheal Josiah
- Wheal Emma
- Wheal Thomas/Watson's Mine
- Wheal Frementor
- 1925 Arsenic Works

These sites will form the core of the north-eastern section of the Tamar Valley component of the proposed Cornish Mining World Heritage Site. Specific and general site management recommendations made in this report will be referred to and incorporated into the World Heritage Site Management Plan for the mine. This will not only be used in the short term during the next phase of land reclamation works, but will also form the basis of the longer term general management plan for archaeological features which should be adhered to during the working operations of the site by Tavistock Woodlands.

It should be noted that due to the massive size of the site (474ha in area, 3km east to west and 3.5km north-south), and the complexity of archaeological features within the project area (as specified in drawing 36A83/LPI), the original project area has subsequently been divided into two separate reports; this report covers **Devon Great Consols Sett**, whilst immediately to the south, the second report (Buck 2003 Bedford Mines), includes the following mine setts: Bedford United, South Bedford and part of Wheal Russell Mines.



Figure 1 1922 Arsenic condensing chamber (H. Ordish 1962)



Figure 2 1922 Arsenic condensing chamber (C. Buck CAU 2002)

1 Introduction

1.1 Project background

In the summer of 2001 Cornwall Archaeological Unit (CAU) were commissioned by Peter Sainsbury, Environmental Projects Manager of Cornwall County Council (acting for West Devon Borough Council (WDBC) and the Tamar Valley Countryside Service - TVCS), to undertake an archaeological assessment of a number of historic mining sites at Devon Great Consols and Bedford United Mines.

The archaeological assessment project brief was provided by Devon County Archaeological Service (DCAS) *'Archaeological Assessment and Management Survey of Devon Great Consols Mine, Bedford United Mine, Devon Great United Mine and Environs, West Devon'* (Feb. 2001), using draft guidelines provided by CAU and English Heritage (EH) - see Appendix 11.4.

The information provided by this survey will be used to inform land reclamation and management proposals that are being prepared by Cornwall County Council - CCC (Environmental Programmes Section). The Rural Development Agency and the Heritage Lottery Fund will primarily fund this work with matching funding from European Objective 2 grants.

It is anticipated that the land reclamation programme will address the following:

- The protection and consolidation of important archaeological remains and their settings.
- Health and safety aspects of the site relating to public access and environmental pollution.
- Identification and safeguarding of important ecological areas.
- Provision of low-key public amenity use where appropriate, incorporating limited public access.
- Facilitating support for existing appropriate site uses, such as forestry.
- Interpretation of the site to the public, including on-site and written materials.
- Linking the site into the local economic, social, tourism and recreational contexts.

In terms of the management of archaeological features, due to the general absence of standing structures, engineering works are likely to be kept to a minimum, but in view of the fact that these sites will form part of the Tamar Valley component of the proposed Cornish Mining World Heritage Site, particular attention was paid to the best mitigation of any such works.

It is unknown at this stage however, what might be the scope of proposals to mitigate the effect of possible environmental contamination both to the site or affecting the River Tamar. This archaeological report will guide the project developers and the County Archaeologist to mitigate the effect of any large-scale environmental schemes on the substantial archaeological resource present within this site: the largest and most productive copper mine in Europe in the 19th Century.

2 Aims

The main objectives of this report are to:

- Undertake historical and cartographic research and field survey to a level sufficient to provide West Devon Borough Council and the Devon County Archaeologist with the accurate location of archaeological features within the project area.
- Produce a record at an appropriate level of detail of those structures, sites etc which are likely to be adversely affected by such works.
- Produce a report outlining the findings of the assessment survey and to provide West Devon Borough Council with six copies of the same.

This, in turn, will provide Cornwall County Council and West Devon Borough Council with information to:

- Understand the development history of the project area within its local, regional and national context.
- Provide an assessment of the nature, extent and quality of survival of historic and archaeological features within the project area.
- Provide short and long-term management recommendations for the site and its components, including any requirement for further evaluative survey, excavation or information gathering, statutory or other forms of protection.
- Provide guidance on the means by which the effects of undertaking the provision of increased public access and other necessary shaft/adit safety works and building consolidation can most appropriately be mitigated.
- Provide archaeological field and archive data for inclusion in the Devon County Sites and Monuments Register.

3 Methods

3.1 Desk top assessment

During the desktop 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 known to have existed on it.

The main sources consulted are summarised as follows (refer to Section 9.0):

- Historical documents, maps, plans and other published material held by the Devon Records Office (Exeter), principally the Earl of Bedford's Collection
- Historical documents, maps, plans and other published material held by the West County Local Studies Library (Exeter)
- Abandoned Mine Plans held by the Devon Records Office (Exeter)
- Photographs (RIC-Photographic archive)
- Devon SMR
- Devon Historic Landscape Project (English Heritage and DCC Environment Directorate project)
- WDBC listed buildings database
- WDBC mine shaft database

- Published histories (see Section 9.2)
- Historical documents, maps, plans and other published material held by the Cornwall County Records Office
- Information on mining operations held by organisations such as the Trevithick Society, the Tamar Journal of the Friends of Morwellham and local special interest groups (Tom Greeves), as identified through consultation with the Tamar Valley AONB service
- Reference to Web sites that specialise in Industrial Archaeology of the Tamar Valley
- Records and reports held by Frederick Sherrell Ltd. (Tavistock)
- English Heritage assessment of industrial sites (MPP), now superseded by recent Scheduling of part of the site
- Aerial photographs (1947) held by the NMR, rectified to the OS landline (see Fig 37) (recent DCAS aerial photographs were not consulted due to extensive wood cover).
- Statutory and other planning designations for the site

Documentary research and fieldwork have been slanted towards the industrial development of the project area, with the majority of site management recommendations being applied to industrial sites. Nevertheless, sufficient background research has been undertaken to be able to summarise the pre-industrial history of the landscape and to produce a historic landscape character map of the project area (see Fig 5).

3.2 Fieldwork

- Detailed maps for use in the field were produced from the Ordnance Survey Landline Digital Mapping and amalgamated with information derived from historic maps (including the 1843 Tithe Apportionment Survey and the 1st and 2nd edition 1:2500 Ordnance Survey maps) and other documentary sources. A finely detailed map of the entire project area (dated 1867) was digitally photographed and enhanced to produce colour mapping of the mine. These images were also used as part of the fieldwork map base during the field survey component of the project.
- Field recording followed established formats and was based on a mixture of photography (both digital and colour slide), annotated sketch recording and tape-recorded notes.
- A hand-held GPS receiver was also used and an NGR recorded for each site. These NGR positions were later recorded on the Cornwall County Council GIS (see Site Inventory map Fig 38).
- As part of Cornwall County Council the project officer followed the County Council's 'Statement of Safety Policy' and the Planning, Transportation and Estate's 'Statement of Safety Policy'. A CAU H&S Risk Assessment Record was filled out for this project and risks identified as being associated with the fieldwork stages of the project and on-site safety measures were followed as outlined in the project brief.
- A single project officer undertook the fieldwork.

4 Background

4.1 Location and setting

The deep, steep sided valley of the River Tamar cuts through a rolling, cultivated landscape, flanked to the west by the distinctive granite ridge of Hingston Down and to the east by the granite uplands of Dartmoor. It is on or near these upland sites that not only prehistoric occupation has been found, but also the first signs of industrial archaeology can be interpreted in the landscape, in the shape of Neolithic axe factories.

The Tamar Valley is considered to be one of the most attractive areas in the south-west. The lower and broader part of the valley from Cotehele southwards (and from the junction of the River Tavy with the Tamar eastwards) has wide expanses of reed bed and mud flats, which attract a variety of wading birds. Upriver from Calstock the meandering valley narrows and the Devon side is particularly scenic with its steep and rocky wooded outcrops opposite Gunnislake; further north at Bishop's Rock, the river meanders through Tavistock Woodlands.

Devon Great Consols (NGR SX 425 735) lies on the east bank of the River Tamar within the parish of Tavistock Hamlets. It is located above the tidal limit approximately 4.5km upstream from Morwellham and 6km from Tavistock. The mine forms an extensive and irregular-shaped site, with Devon Great Consols in the north and the Bedford Mines in the south of the project area. The core area of mining activity measures approximately 3km east-west and 3.5km north-south, although the survey area is larger (see Fig 3). The site occupies the eastern valley side of the Tamar and is crossed by a number of small west and south-west flowing tributary streams. Ground levels vary from approximately 130-150m AOD on the high ground to the east, to approximately 0-20m AOD in the Tamar Valley in the west.

The Earl of Bradford privately owns most of the site and much of the area is utilised for commercial forestry (Tavistock Woodlands). Its heavily wooded environment hides extensive evidence of past mining activity.

The earliest archaeological evidence for mining appears to date from the 18th century, which is corroborated by documentary sources, but most of its industrial archaeology relates to the period 1844 to 1978. The landscape is characterised by numerous old mine shafts and adits, large and small spoil heaps, quarries, sites of mine buildings (many of which have been razed to the ground – including all engine houses etc), together with other earthworks and transport infrastructure associated with its past role as Europe's largest copper and arsenic mine.

Perhaps inevitably, the former industrial activity within the valley has left a legacy of contamination. From a management perspective this has created the need for a delicate balance between preserving the unique historical, geological, and ecological (Mogford 2002) make-up of the valley, whilst ensuring that high amounts of contamination do not threaten its ecosystems.

This report essentially focuses (and brings into a higher prominence), the important historical heritage that can still be found a century after the mine company folded. Although there are contamination issues (the large sand and slimes tip being the most visible site), they now have to be considered and mitigated within the context of not only

preserving what was the largest and most productive copper mine in Europe, but a site which has been included in Cornwall's Bid for World Heritage Site Status.

4.2 Statutory Designations

The 1920's Arsenic refinery buildings within Devon Great Consols Mine has been recommended for 'New scheduling as proposed at Step 3' (English Heritage Step 4 Report 1998) by English Heritage's **Industrial Monuments Protection Programme** (due to the quality of its Arsenic processing remains). Additional information presented with the Step III Industrial MPP recommendations stated, *'The site is one of the best-preserved arsenic mines and processing works nationally'* (Cranstone 1994, Site No. DV1 - Arsenic). Accordingly, the arsenic refinery site was scheduled by an English Heritage Field Officer (SM 15559). The area covered by the scheduling is shown in outline on the Site Inventory map (Fig. 38). The undertaking of any land reclamation works within the site boundaries will need to be subject to Scheduled Monument Consent by the Department of Culture, Media and Sport (via English Heritage).

Listed building designations already exist for a number of buildings within the mine. All of these were formerly mine related housing and administration buildings, and all have been used since the demise of the mine at the turn of the century for domestic occupation. All of these Grade II Listed Buildings are listed at the end of the Site Inventory section of this report.

County and District Planning constraints for this site include designation as an Area of Outstanding Natural Beauty (AONB), one of only 32 sites in the country, which supersedes the previous designation of Special Area of Great Landscape Value (SAGLV). A mine waste tip (see Fig 38 for location), has a statutory designation of SSSI (Special Site of Scientific Interest), for excellent examples of arsenopyrite, siderite and francolite (SX 431735). *'These carbon-rich 'gangue' minerals are typical of veins within the calcareous Upper Devonian rocks but are rarely associated with mineralization elsewhere in south west England'*.

Devon Great Consols Mine is part of a select list of sites in Devon that have been recommended for Cornwall's bid for World Heritage Site status. There are no recommendations in this report for additional statutory designations to be made.

4.3 Geology and Lodes

The published geological map of the area (Geological Survey Sheet 337 (Tavistock), 1994) indicates that the site is underlain by the Kate Brook Slate of Upper Devonian geological age. The map shows two areas of intrusive igneous rocks within the site. In the south-east, a dyke of porphyry (Elvan) outcrops in the upper valley side, whilst the Gunnislake granite intrusion extends across the River Tamar and into the lower slopes of Blanchdown Woods in the north-west part of the site. The geological map also shows significant areas of superficial soil deposits, comprising head soils to the east of Blanchdown Wood and alluvium mantling the bedrock in the valley of the River Tamar (Sherrell 2000, 4).

'The most important mineral area is a belt of country 12 miles long from east to west, and 4 miles broad, extending from the edge of the Dartmoor granite, westwards across the Gunnislake and Kit Hill granites. The lodes of tin and copper which nearly all course about east and west, have yielded also large quantities of mispickel and pyrite...The district has been more prolific in sulphide ores than in tin, and large yields of copper with much pyrite and

mispickel have been obtained from nearly all the mines on the east of the Gunnislake granite from Devon Great Consols southward to Gawton Mine.. (Dines 1956, 623).

'Main Lode, the largest sulphide lode in the west of England, has been proved for nearly 2.5 miles and has been stoped almost without a break for nearly two miles. From its western end where it is heaved 125 fms. to the right by the Great Cross course which trends N. 30° W. from the town of Gunnislake, the lode courses nearly due east for about a mile, and then changes to about E. 12° N.; the underlie varies from 10° to 25° S. Situated along the strike, from west to east, the original mines, later amalgamated to form Devon Great Consols, are Wheal Maria (west of the cross course), Wheal Fanny (immediately east of the cross course), Wheal Anna Maria, Wheal Josiah (in which the strike changes from east to E. 12° N), and Wheal Emma, while South Wheal Fanny and Watson's Mine are on lodes that lie to the south' (op cit, 655).

Wheal Maria at the western end of the Devon Great Consols sett, contains New North Lode, Capel Tor lode, Main Lode and South Lode.

Wheal Fanny, situated east of the Great Cross course, exploited Main Lode ... and Worbridge's Lode which going westward, forms a southerly branch of Main Lode about 70 fms. E. of the cross course.

Wheal Anna Maria ... courses a few degrees north of east and underlies 25° S. down to the 80-fm. Level and 10° S. below. 'At 350 fms. E. of the cross course, South Lode of the Anna Maria and Josiah sections, also underlying south, branches off from Main Lode and rejoins it again 300 fms. farther east... Stopping is extensive, about 70% of the ground between the 60-fm and the 154-fm. Levels having been removed.

Wheal Josiah contains four lodes, Main, Middle, South and New South. New South Lode of the Josiah and Emma sections lies about 100 fms. S. of Main Lode, is parallel with the eastern part of the latter and underlies 18° S.

Wheal Emma, the most easterly section of Devon Great Consols, contains four lodes known as North, Main, South and New South.

South Wheal Fanny lies about half a mile south of the Main Lode ... and has been developed from Engine Shaft.

Watson's Mine worked an east-west lode about a third of a mile south of the eastern end of the Devon Great Consols Main Lode (op cit, 656-660).

Wheal Frementor, on about the same run as Wheal Thomas (later Watson's), but farther west, has been worked only by an adit, in which several lodes, or branches, have been intersected' (Hall 2000, 104 – quoting an 1860 Mining Journal survey of the mine).

'The courses of ore made in this mine have probably never been surpassed by any ever discovered in Europe. At some point the lode was 60 ft. wide, 30 ft. solid ore, producing 17%, and the other 30 ft. a rich ore lode... worth altogether about £1,000 per fm.' (op cit, 99).

4.4 Historical Background

4.4.1 Historic landscape background (pre 1844)

The Devon Sites and Monuments Record appears to show no sites of prehistoric or medieval date within the Devon Consols part of the project area (refer to Section 8 – a list of Devon SMR sites correlated with this report site list). However a general summary of

prehistoric and medieval sites in the Tamar Valley has been given in Buck (1998, 5-6). This has been summarised below:

Neolithic axes have been found at Tavistock, Bere Ferrers, and Buckland Monachorum. At Heathfield (Beacon), between the parishes of Lamerton and Milton Abbot, a Bronze Age barrow cemetery has been located. Earthwork defensive enclosures of probable Iron Age date are found overlooking the Tamar at Furzeleigh (or Dunterton), opposite Cartha Martha Woods on the Cornwall side of the Tamar and there is a similar feature in nearby Dunterue Wood. Other Iron Age enclosures include Ramsdon Camp in Milton Abbot parish, Northcott Wood in Northcott parish, and an earthwork enclosure at Berra Tor in Buckland Monachorum parish (five miles to the south – east).

The Tamar Valley itself is likely to have been occupied in the prehistoric era, both due to its preferred, more fertile, lowland sites, and utilisation of the river as both a means of transport, and also for trade. Later Medieval and post-medieval settlements are likely to have hidden or destroyed much archaeological evidence for prehistoric occupation.

Domesday Book and medieval place-name evidence indicate a typical medieval farming landscape with settlements largely confined to the lower ground and the uplands left as open pasture. Medieval farming settlements are evidenced from documentary sources and from field evidence for strip-based field systems; they appear to have been small co-operative hamlets (of 3-6 farmsteads). Examples on the Devon side of the Tamar are in similar locations to those in Cornwall, as, for example a medieval strip field complex to the south of Dunterton. The farming landscapes on both sides of the Tamar now largely consist of single farms, some of which are the remnants of former medieval hamlets.

Close to the Devon Consols project area, the only probable medieval settlement is that of Hele Farm. Other settlements (Woodovis, Coletown, Rubbytown, Great Torr, Little Torr and Honeys Torr), all appear to be of post-medieval date. There are no medieval church towns within the project area, although Tavistock - the medieval stannary town, would have been this site's social, market and administrative centre.

Mining activity in the Tamar Valley is by no means confined to the post-medieval period. Although tin appears to have been worked in Cornwall and Dartmoor since the Bronze Age, during the 12th century the alluvial gravels of Bodmin Moor, Dartmoor and possibly the Tamar Valley were of major national economic importance. John Goodridge (author of the standard text of Devon Great Consols Mine in 1964), states (*pers comm.*): *'It is quite possible that streamworking occurred in the medieval period at a fairly early date (in the vicinity of the Devon Consols Mine sett). The evidence for this is that Roger Rubi, who gave his name to Rubbytown, was the head of a jury of tanners called together by the new Lord Warden of the Stannaries, himself appointed in 1198, to establish the traditional customs and conventions of the tanners. As such he presumably gave his evidence based on acknowledged experience'*.

At sites to the south of Calstock, documentary evidence from the late 13th century and early 14th century, attest to lead/silver mining in the Bere Alston and Lopwell districts that appear to have continued sporadically for some years. On both sides of the Tamar Valley alluvial and shallow lode working proceeded sporadically until the early 18th century, when there was renewed interest in copper ore resources within this area.

Copper ore was mined by using the traditional method of costean pits/trenches to locate the lode (and through excavation of the valley sides at river level). The back of the lode was followed up the steep sides of the valley by sinking 'shallow' pits, openworks and shafts. Adits were also cut along the lode for access, drainage and to remove the ore and waste rock (at several levels from the river to nearly the top of the valley slope).

Through a combination of archaeological field work and the rectification of 1947 aerial photographs (as part of CAU's EH NMP/World Heritage Site NMP Project), many sites in the Devon Great Consols project area have been found that may date from this early 18th century period of ore extraction (Sites 177, 178, 181, 193, 194, 217, 356, 386-388), together with their related adits.

The ore was dressed using water power (the long leat shown on Symons 1848 map - Fig 4 (Site 5), may well be a post-medieval leat supplying water) to power stamping/crushing (or crazing mills). Tom Greeves carried out field surveys here in the 1970's, tracing stamping mills shown on mid 18th Century Bedford Estate Maps (DRO/L1258 Surveys B Tavistock 4 – 1726) and other documentary sources. These sites have been included in the Devon SMR; but most are in the Bedford Consols part of the project study area (see Bedford Mines, Buck 2003). These sites appear to have been connected with the many small copper trials (often no more than single adit tunnels), in that they were unable to finance the building of a complete treatment plant and so sent their produce for processing to nearby (privately run) mills.

There is further documentary evidence for copper mining in the first and last quarters of the 18th century at many sites in the Tamar Valley (Tamar Journal, Patrick A., 1983, Vol. 5, 35-42). Copper ore was exported (mainly from Impham Quay and Morwellham) to Bristol and Swansea smelters (after being dressed, crushed and stamped locally), from 1714 – 1729 and 1785 – 1799 (onwards). John Goodridge (*op cit* 1964), states (*pers comm.*): *'Tin was certainly worked in this area (with a later stamping mill) in the mid 18th century in Fremator (Fremmentor) but also in Blanchdown Wood and Hangingcliff Wood. In the late 18th century the Bedford estate bought the right to work tin within established bounds or setts from their owner's executors. After his death in the last quarter of the century, Mr Henry Warne held more than 50 such setts and seven of them were located on land which was later incorporated into the Devon Great Consols sett of 1844. A second group was purchased in 1790'*

Due to the necessity of concentrating research, fieldwork and the focus of this report on the mining evidence for Devon Great Consols, archive maps prior to the Tithe Map (Fig 6), have not been consulted. However, Devon's Historic Landscape Characterisation project output has been consulted. Figure 5 illustrates the early post medieval character of the site. Medieval woodland can be seen to occupy most of the site (especially along the steep sides of the valley), although in the later post-medieval period large areas are shown to be either rough ground or mining related (mostly occupying previously pasture/cultivated land). A post medieval enclosure has made inroads into the ancient woodland at Blanchdown, although the settlements of Hele Farm and Wheal Maria cottages appear to be sited on arable fields – long cultivated.

The 1843 Tithe (Index) Map (Fig 6) and 1848 Symons Map (Fig 4), shows more detail of the likely late medieval landscape. The Tithe Map in particular shows narrow strips south of the main road in what became Wheal Fanny and Anna Maria. This route appears to have been created to access these sites, which are remnants of strip-based field systems (as

Figure 5. Historic Landscape Character for the Post Medieval period

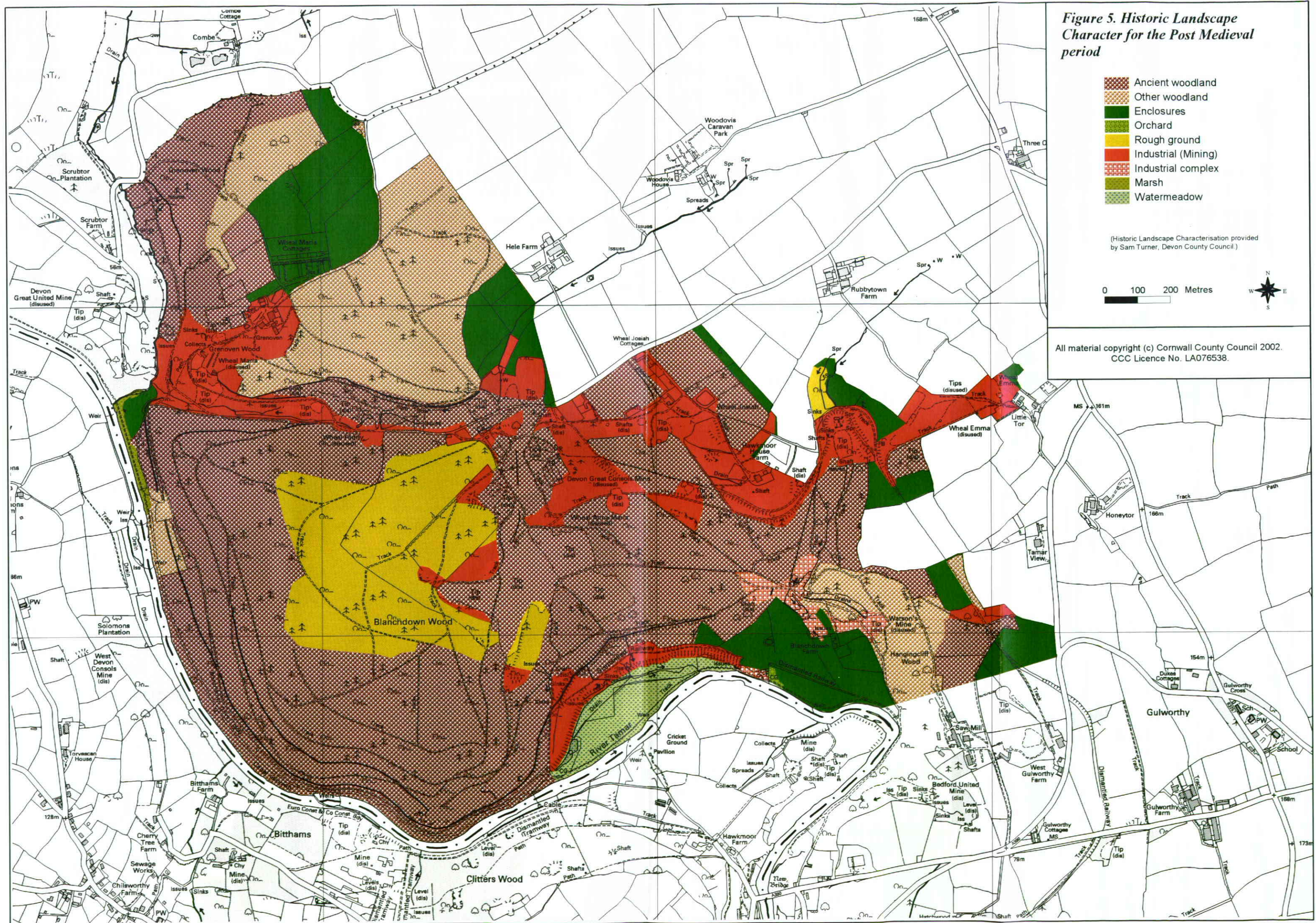
- Ancient woodland
- Other woodland
- Enclosures
- Orchard
- Rough ground
- Industrial (Mining)
- Industrial complex
- Marsh
- Watermeadow

(Historic Landscape Characterisation provided by Sam Turner, Devon County Council)

0 100 200 Metres



All material copyright (c) Cornwall County Council 2002.
CCC Licence No. LA076538.



described above), probably relating to the nearby hamlets to the north of Hele, Woodovis, Coletown (soon to disappear by 1884) and Rubby Town. These fields appear to have been sited across the top of the hill with rough grazing (outfield) to the west. The field boundary marking the latter on the hill slope to the west, north and south is shown on most maps, but field evidence for this has mostly disappeared. An alternative explanation for this boundary line is that it may be a Deer Park Pale (belonging to Hele). Further research on this topic needs to be carried out.

Grenofen Woods, Frementor and Blanchdown Woods, Shillacleave Woods, Rubbytown Woods and Hangingcliff Woods lie adjacent to the slopes of the Tamar Valley. The presence of charcoal burning platforms along the steep sides of Hangingcliff Wood perhaps gives a general indication of the industry that preceded 18th century mining, but a century or more later, the discovery of a massive sulphide lode was to change the nature and character of this pre-dominantly medieval Tamar Valley rural landscape forever.

4.4.2 Historical background for Devon Great Consolidated Mine

(abridged from both primary and secondary sources)

1844: In March (Ladyday), a 21 year lease (signed on 26th July) for mining at **Wheal Maria** (named after the wife of Josiah Hitchins of Tavistock), was secured from the new 7th Duke of Bedford. Mining operations started at Gard's Shaft in August. In November after the shaft had been deepened by a further 4 fathoms (it had previously been worked to a depth of 14 fathoms), the back of Main (copper) Lode was discovered. Within 3 months nearly £16,000 profit from a shaft only 28 fathoms deep (one of the few mines in the south-west whose profitable ore was above adit level) was realised, using only a small water wheel for winding up the ore. The lode at **Wheal Maria** was 47ft wide and produced 60 tons of ore a running fathom. As the lode was followed eastwards it was found to go deeper.

1845: On the 2nd January the mine was renamed **Devonshire Great Consolidated Copper Mining Company**. Morris's Shaft was commenced in February, ore being encountered at 40 fathoms. The first sale of ore took place on 20th February 1845 when over 200 tons were sold for over £2000. At over £10 a ton this was well above the average price of ore and testified to the extraordinary richness of the lode (17% copper as opposed to the average in the south-west of 7.5%).

A 40" pumping engine was built at Morris's Shaft and waterwheels were constructed at **Wheal Maria** for pumping, winding and crushing. The Cross-course was discovered and the heave traced to **Wheal Fanny** (named after Josiah's infant daughter), where shafts were sunk and ore found to be within 3 fathoms of the surface. **Wheal Josiah** (named after Josiah Hitchins) and **Wheal Anna Maria** (named after the Duchess of Bedford), were also developed and the lode followed eastwards. **Wheal Thomas** and **Wheal Frementor** were also worked.

1847: Additional steam engines had been erected at **Wheal Josiah** and at **Wheal Anna Maria**. The massive production of ore from the mine overburdened the local quays – Gawton Quay was enlarged solely for this purpose.

1848: The mine was extended to **Wheal Emma** in the east of the sett. New dressing floors were erected by this date at **Wheal Anna Maria** (upper floors), and a double line self-acting inclined plane built to serve them from **Wheal Josiah** (Hitchins Shaft).

1849: In March a rent of £250.00 per annum was paid to the Duchy of Cornwall to abstract water from the Tamar to power large water wheels. Excavation of the 'Great Leat' (2 miles long and 18 ft wide) was finished within the year. Overcrowding in Tavistock and in the Tamar Valley had become so acute that the Portreeve of Tavistock sponsored a petition to the Duke for the release of suitable sites for additional miner's accommodation. Accordingly, during the next ten years the Duke built approximately 250 cottages at Tavistock, Galworthy, Morwellham and at the mine itself. Writing nearly twenty years later, Gilson Martin (the Bedford Estates manager) stated: *'A return was lately made showing about 100 miners occupied the Duke's cottages. The whole cost of building these cottages was met by the mine'*.

In November the company employed 193 tutworkmen, 181 tributers, 69 trammers/fillers and landers, and 10 labourers - a total of 453 underground. At surface there were 36 smiths, 18 carpenters and sawyers, 7 masons, 12 enginemen, 82 labourers, and 30 at the wheels-a total of 185. Also there were 275 on the dressing floors (37 men, 101 boys and 137 girls): an overall total of 913 (incl. 7 agents and 2 storekeepers).

1850: By February a total of 1,024 people were employed by the company (569 at surface (397 on the dressing floors) and 455 underground). By this date the workings extended nearly 7 miles, the main lode being 25 ft wide, yielding ore at 15 tons per fathom. After dressing the ore, it was taken by cart to Morwellham, New Quay and Gawton Quay to be sold at Truro or Redruth. A total of nearly 90,000 tons of copper ore had been sold (the company had received £300,000, the Duke of Bedford £44,000 in royalties and the shareholders £207,000).

The first massive water wheel (40ft x 12 ft developing 140 hp at 5 strokes per minute lifting 52,000 lbs of water at each stroke), was now working using water to power flat rods (a distance of 780 yards), to pump three shafts at **Wheal Josiah** and **Wheal Anna Maria**. A model of the giant waterwheel appeared at the Great Exhibition of London - **Devon Great Consols** being then hailed as Europe's largest and richest copper mine. At **Wheal Emma** a 40" pumping engine was erected at Thomas's Shaft.

1851: Another pair of waterwheels (fed by the same 'Great Leat') was constructed nearer the River Tamar. One wheel (32ft x 10ft) was connected to Agnes Shaft by 9" square wooden flat rods and another (32 ft x 17 ft) to Plunger Shaft (to pump water up a column of pumps to the **Wheal Josiah** main supply reservoir), from where 12 reservoirs ponds and dressing floors were supplied across **Devon Great Consols**.

In the early 1850's a second main pumping wheel was required as the Josiah and Anna-Maria shafts deepened. This was erected alongside the original and built to the same specification (these were known as Josiah and Anna Maria wheels). This wheel solely worked the **Wheal Anna Maria** shafts (Engine and Field Shafts), while the original wheel worked Hitchins and Richards Shafts at **Wheal Josiah**.

1855: In the previous ten years dividends totalled more than £475,000 (nearly £50 per share per annum), but heavy running expenses were incurred, including large loads of timber imported from Norway and red pine from North America (some 84 ft long and 24in. sq.). The timber was brought up the Tamar on large rafts and then by train from Morwellham to the Saw Mills at **Wheal Josiah**. The main reason for the large baulks of timber was the need to support the enormous Main Lode stope (an unbroken length of two miles, one excavation at the 150 fathom level being 900ft long, 240 ft high and from 6



Figure 6 Index Map of the Tithe Map of Tavistock Parish 1843

(DRO/Tavistock Tithe map)



0 100 200 300 Metres

Outline of study area

Figure 7 1857 Lease Map

(DRO/1258M/SS/MC1/Leases - dated 4/11/1857)

to 50 foot wide). **Thomas's** (later **Watson's**) **Mine** was worked by the company (on New South Lode).

1856: All of the quays near **Devon Great Consols** (Morwellham, New Quay and Gawton) were completely filled again when 3,389 tons of copper ore were offered for sale (the produce of one month - the largest single sampling ever recorded in Cornwall). The company had to stockpile some of its own ore as a result. By this date **Devon Great Consols** was pre-eminent among the West of England copper producers, and its output was still rising.

1857: In March, renewal of the mine sett was granted by the Duke of Bedford (see Fig 7, a copy of the lease map). This included the grant of an extra 21 years and a further extension of the sett (for 924 Fathoms), along the eastern course of Main Lode and furthermore, the company was granted land to build a railway line to Morwellham. However, a fine of £20,000 was imposed by the estate for these grants.

Construction of the railway started in this year and finished in November 1858. The line had a maximum gradient of 1:48 and ran for 4.5 miles, running from **Wheal Anna Maria** ('lower') dressing floors (the 'upper' dressing floor line having already been built the year before), via **Wheal Emma** along the Devon side of the Tamar Valley to a point south of Morwell House (out of the project area). A 22" steam engine (built at the mine's own foundry) was erected at the top of the incline (1:3 gradient and a height differential of 240 ft), with a huge drum upon which a 4" wire rope was wound. The incline was a single line with a crossing loop mid-way, two loaded wagons being lowered down the line to Morwellham Quay (the engine being used to draw the trucks up the incline) - by now the mines main site for sampling and ore export. The mine reduced the cost of transporting copper ore to the quay from 4s 6d per ton by horse and cart to 1s 0d per ton by railway (a monthly saving of £500).

In the year ending 1st March 1857 28,836 tons of ore was sold (worth £158,432), the largest quantity that was produced by the five main mines during their lifetime and by far the greatest annual output ever recorded by any mine in the south-west. In its first twelve years it had sold ore worth over £1,400,000 (or £351,000 more than **Dolcoath's** total output in the 40 years after 1815).

1860: By this date 8 other water wheels were in use on the mines, ranging from a 32 ft x 4 ft to a 50 ft x 4 ft for foundries, the saw mill, stamps, crushers, pumping shafts and whims. By this date seven steam engines were in use: 40" pumping engine at **Wheal Emma** (moved from **Wheal Maria**), 36" and 30" cylinder crusher engines at **Wheal Anna-Maria**; the **Wheal Josiah** winding engine was a 30" and 16" (Sims combined), **Wheal Anna-Maria** (24" horizontal) winding engine, **Wheal Emma** 22" winding engine and the 22" Morwellham incline engine.

1862: In April 1862 the company employed 454 men and 19 boys underground, 240 men on surface, 117 men, 181 boys and 199 girls on the dressing floors, giving a total of 1,210. In this year the company funded the construction of a school on the mine and appointed a headmistress.

1864: A total of 1,250 hands were employed comprising 10 surface agents, 10 underground captains, 450 men and boys underground, 521 in the dressing floors (136 men, 168 boys and 217 girls), with 259 smiths, sawyers, carpenters, enginemen, masons etc.

Soon after this date, a man-engine was installed at **Wheal Josiah** - probably at Richards's Shaft (this was the deepest part of the mine - it took a man an hour to ascend from the 224 fm level). New South Lode was cut in the south of the sett and worked by **Wheal Emma**.

After 20 years of unbroken prosperity (when the majority of rich and productive mines in Cornwall were nearly exhausted of high grade copper ore), the fourth highest dividend of nearly £63,500 (or £62 per share) was declared, when nearly 27,000 tons of ore was sold. Although pay was not very high, working conditions appear to have been good. Three shifts per day of eight hours each were in operation whilst the surface employees worked a 9-10 hour day.

By this date copper precipitation works had been built below the mine's adits to draw off the copper salts present in the mine water, as previously the water had entered the Tamar and nearly killed off the Tamar salmon fisheries. The high grade precipitate obtained fetched £48 a ton, compared with £5 5s per ton for 'common ore'.

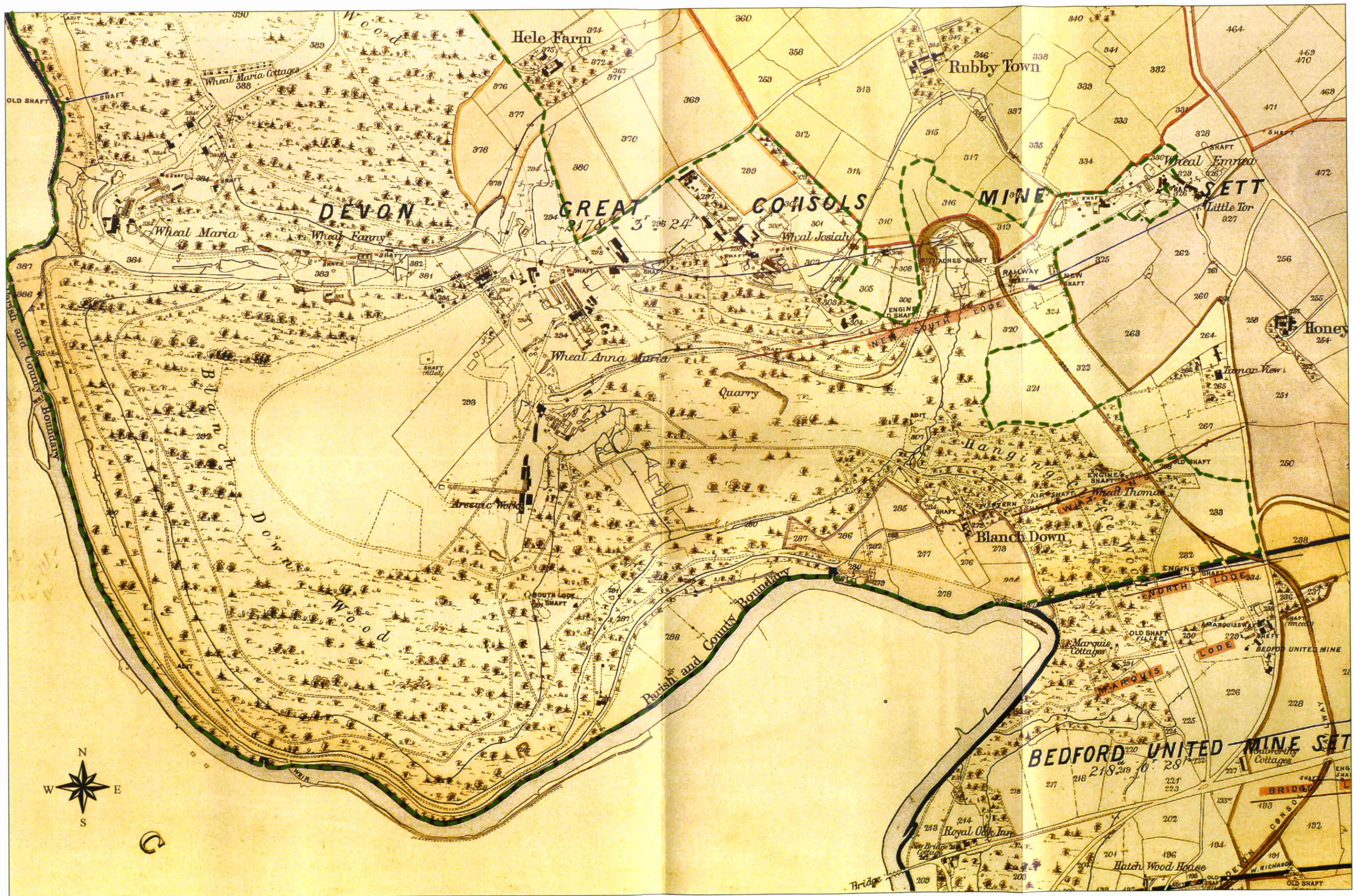
1865: During a meal celebrating the 21st anniversary year of the mine, it was announced that; *'The source of the prosperity of Tavistock is to be found not so much in the mining operations of the locality as in the extraordinary success of one great concern, **Devon Great Consols**'*. It was noted that the mine gave direct and indirect employment to over 6,000 people (not only in Tavistock parish but also Calstock and Stoke Climsland parishes), and that 420,000 tons of ore had been raised and sold. The surface area of the mines sprawled over more than 140 acres. There were 15 shafts in use, the deepest being Richards (**Wheal Josiah**) at 230 fathoms (412m).

1866: Falls in the market price of copper (due to new discoveries in South Australia and North America), meant the dividend was nearly £20,000 lower than two years previously. Also the working levels were getting deeper as the lodes began to peter out; as a result operating costs were rising. However, world arsenic price increases of up to 30% and the massive amount of mispickel that had been left on the sides of the Main Lode copper stopes (up to 6ft thick) and as waste in surface dumps, resulted in **Devon Great Consols** being granted a lease for the erection of an arsenic refinery in 1866 (see Appendix 1 for a transcription of the terms and specifications of the arsenic refinery works as demanded by the Duke of Bedford).

A dispute broke out between the workers and the management over pay at this time over the four/five week month. Due to low rates offered by mine management for working pitches a 'strike' ensued by the underground miners that lasted approximately a month due to other miners from west Cornwall being drafted in. Other strikes occurred in 1878 and 1879.

1867: The problem of dressing the lower grade ores and of trying to improve the mine's finances had been previously attempted. The former problem was solved in this year by further investment in the construction of an arsenic refinery (the decision to do this had been agreed three years previously).

1868: Falling copper ore production at Devon Great Consols and falling world market prices had forced the company to rethink its forward operation strategy. By December of this year the arsenic works were operating and producing 600 tons per annum. Three years later 2,500 tons per year were being produced and by 1891, 3,500 tons per year (see Figs 17 and 18). The arsenic works (in its first phase of development) consisted of 5 calcining



0 100 200 300 400 500 Metres

(DRO/T1258ME14b - 9 chains - 1 inch)

Outline of study area

Figure 8 Shafts/Lodes Plan 1867

furnaces, 3 refinery furnaces and 4,645 ft of flues. An 1868 Report on Mines by the Bedford Estates Office stated, *'I do not see how less damage could have been done either to the landscape or to the surface. The mine is drained and worked by 33 water wheels and 6 steam engines... The water which is pumped from the mine is highly impregnated with sulphurous mundic and copper, the company has had a series of depositing pits constructed so as to free the water as much as possible from poison before entering the Tamar, in fact every precaution is taken to ensure as little injury as possible to the fishing'*.

1869: Arsenic production had been increased to 160 tons per month.

1871: Sales of refined arsenic were making up 20% of the mine receipts. Four years later the company boasted that it was producing half the United Kingdom's arsenic.

1872: Only 16,392 tons of copper ore had been brought to surface compared with 27,000 tons ten years earlier. In terms of national ore production by this date, Devon and Cornwall copper mines were rapidly losing their pre-eminence to the mines of the United States of America and to Australia. Of a total world production of 900,000 tons of copper between 1861 and 1870, the United Kingdom (where **Devon Great Consols** was the chief mine), had produced 142,000 tons. Ten years later this had fallen to only 47,000 tons (out a world production of 1,189,400 tons).

In a re-financing package, **Devon Great Consols** was converted into a Limited Liability Company of 10,240 shares of £1 each and the original joint stock company of 1,024 shares was closed in an attempt to raise capital to seek deep tin lodes (under Main Lode) and maintain prosperity. The mine's lease was renewed with conditions set by the Duke of Bedford to search for deeper tin lodes. Richards Shaft at **Wheal Josiah** was deepened from 144 fathoms below adit (already in barren ground) to 300 fathoms (1800 ft), to hopefully encounter a deeper parallel tin lode (as at **Dolcoath**), as requested by the Duke of Bedford. Unfortunately for the mine adventurers neither tin nor copper was encountered in viable quantities.

1875: Within five years the arsenic works was producing more than half of the United Kingdom's arsenic output, approximately 200 tons a month being sold. However, export contracts were carefully regulated to minimise the effect on the world market price. As copper ore production (and the market price) dwindled to a shadow of its former levels (only 7,481 tons of copper was produced), the mine came to completely depend on the receipts provided by its arsenic refinery. This was reluctantly expanded in later years (see Figs 17 and 18) to cover an area of 8 acres (a quarter of a million cubic feet of arsenic flues fed by 7 calciners, 3 refineries, storage warehouses, a laboratory and large cooperage).

1877: Financial assistance was requested (and refused) from the Duke of Bedford, for the use of compressed air rock drills (probably at Railway Shaft, **Wheal Emma**). Deepening of Richard's Shaft was stopped after no tin whatsoever was encountered after an outlay of £5000.

1878: In May, a two month general strike by all of the surface workers and miners occurred after the management imposed a reduction in the annual total wage of all workers by re-introducing the five week month. Another short-lived strike occurred in the following year.

1879: Renewed attempts at the eastern end of the sett (**Wheal Emma**) were made to find tin and **Watson's Mine** was deepened and pumped by 280 fathoms of flat rods. A second man-engine was installed at approximately this date at Incline Shaft (**Wheal Emma**) to a depth of 190 fms. Only 591 people were now employed on the mine and these had now suffered a 20% reduction in their pay due to the declining copper standard.

Devon Great Consols was now the largest producer of arsenic in the world. Arsenical ores were being removed from **Watson's Mine** (previously this had been left on the sides of the lode in the mid-1850's), using compressed air rock drills (funded by the company).

1880: In the previous 6 months **Devon Great Consols** had realised £15,512 in arsenic sales. New condensers were being built for the arsenic reduction works. Both the copper and arsenic market prices slightly increased (before further and deeper falls a year later), leading to the mine's dividends being temporarily increased.

1881: The winter of this year was exceptionally harsh, the Tamar was frozen, the massive water wheels were encased in ice for weeks, coal supplies could not be brought up the Tamar and arsenic was not exported.

1883: Railway Shaft had been deepened from 205 fms to 260 fms without encountering tin in sufficient quantities. This was the last attempt by the mine to emulate **Dolcoath** by discovering a deeper tin lode.

1884: 50 employees were discharged and the wages of the remaining employees were reduced again as the mine's fortunes continued to spiral downwards (a year later the Duke agreed to forego £1000 of his dues). No dividends had been paid to the shareholders from 1881 to 1886. The numbers employed in the mine had halved to 653 persons (from 1,250 20 years previously), 251 underground and 402 at surface.

By this date 13 shafts were in daily use, with 42 miles of underground workings within which were laid 6 miles of tram roads. At surface there were 2,420 fathoms of flat rods, with eleven water wheels at work fed by over 8 miles of leats and ten steam engines for winding, crushing, pumping, operating compressors and man-engines etc.

1886: The Duke finally agreed to remit all dues until the mine could recommence paying dividends.

1888: 2,100 tons of refined arsenic were produced and the number of employees dropped further to 453 (151 underground, 302 at surface). The strikes that had occurred in the 1860's and 1870's due to low pay led to a shortage of skilled miners, as many had emigrated by this date.

1889: A start was made on dressing and calcining the enormous quantity of material that had previously been discarded (from 1844 to 1864) of halvans and other poor quality ores lying in large surface spoil heaps (estimated to have contained a quarter of a million tons).

The search for tin at **Wheal Emma** was finally abandoned, leaving arsenic production as its only source of income.

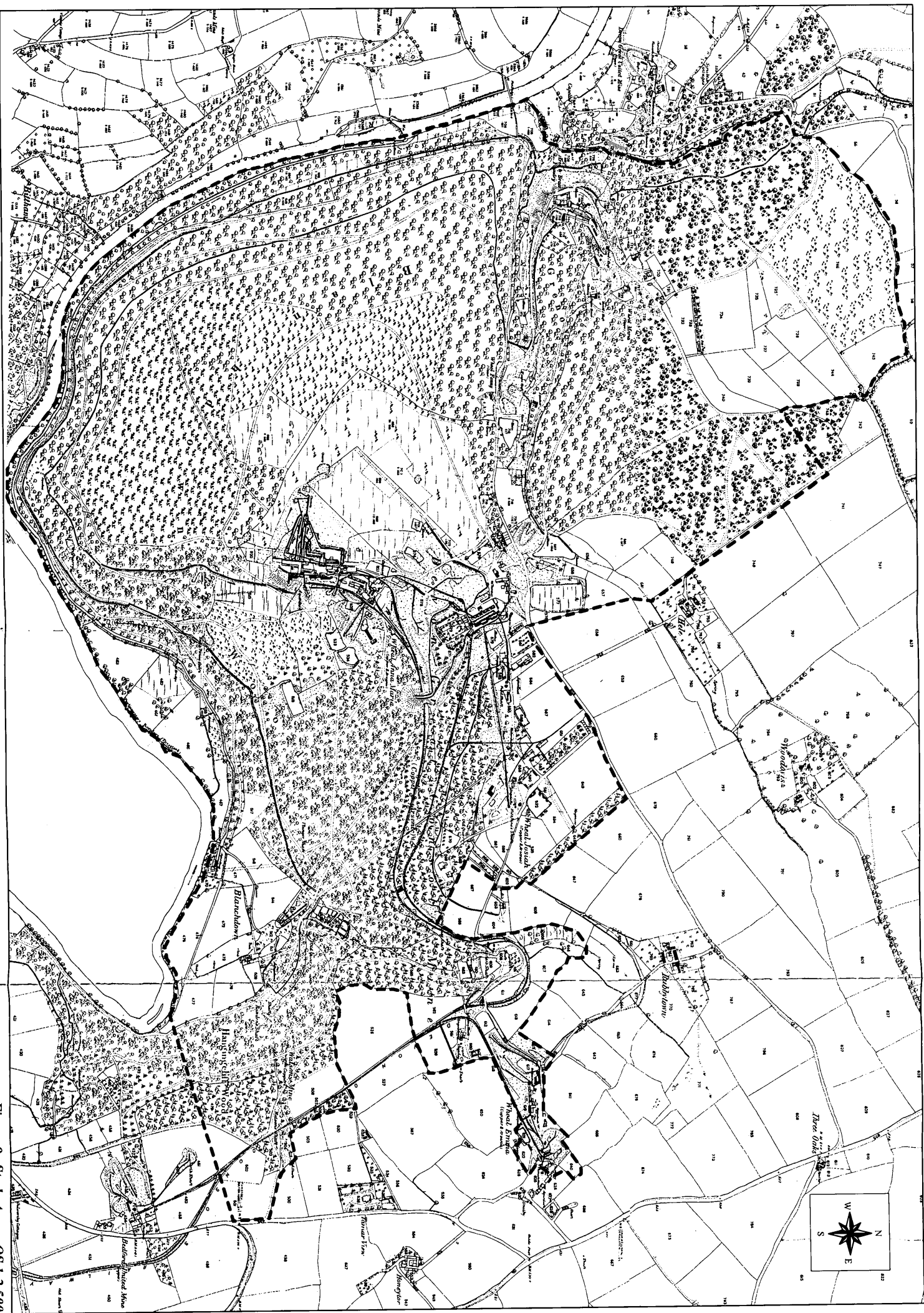
1890: The mine was selling three times the amount of arsenic as copper.

0 100 200 300 400 500 Metres

(© Crown copyright and Landmark Information Group. CCC licence No. LA076539.)

Outline of study area

Figure 9 Study Area - OS 1:2,500 scale plan 1884



1893: A new 7-year lease was successfully negotiated with the Duke of Bedford (for an area smaller by 700 acres that was no longer being worked). Debts were paid off as the arsenic market had a short-lived revival. Consequently, capital was spent in the mine to reverse its fortunes – new track was laid along the railway and the arsenic works was partly rebuilt. The company made a profit of £13,500, helped by higher arsenic prices from 1891 to 1896.

1894: The mine was being worked to only half its depth, the water standing permanently at approximately the 160 fathom level (to keep down the cost of pumping).

1897: All sinking into new ground had ceased as the company focused on removing and calcining arsenical pyrites from the walls of 45 miles of levels.

1898: The company finances tipped from profit to loss during this year as the company borrowed £9000 to cover losses. Copper ore sales realised only £1,202 compared with £17,563 for arsenic.

1899: The mine paid its last dividend – 2s 6d a share.

1900: In December the mine employed 10 agents, 101 miners, 32 labourers and boys underground, 141 labourers and boys at surface, 13 women and girls – a total of 364.

1901: At a meeting in London in June a loss of nearly £3,000 in two years was reported and blamed on the price of copper, steel, coal and coke. The market price of arsenic had slumped to £10 a ton and was proving difficult to sell. The working expenses were £1,500 a month and since 1900 the mine had incurred a loss of £100 a week. Also the Duke of Bedford was not willing to renew the lease to the present company (although he was apparently willing to consider other offers).

In October, the continuing high cost of coal, the ongoing debt to bankers (£10,000 having been borrowed this month), and the downward trend of the arsenic price resulted in the Company board recommending that all work should cease except pumping and the treatment of minerals at surface. The shareholders were unable (or unwilling) to raise further capital (especially as the existing lease only had five years to run and would not be renewed by the Duke) and so they decided a month later to liquidate the company (Mr Peter Watson was nominated as the liquidator). Accordingly, on Saturday 30 November all worked stopped except for pumping, and the company went into voluntary liquidation.

J. Paull (the Bedford Estates manager) in his annual report to the Duke (dated Dec. 31 1901) commented: *'I should state that the downfall of the mine has not been much hastened by any material decrease in the mine output this year ... but the cause to which the company's present position is attributable has been the want of any sale at all for their arsenic till the last month of the year and then an average fall of price of £4.13s.5.75p'*.

The final employment statistic for **Devon Great Consols** on December 31st totalled 148 (mostly labourers at surface and underground no miners being recorded).

1903: Further boardroom wrangles resulted in the abandonment of the mine and auction of the surface materials in May. The railway to Morwellham was lifted and sold for scrap. Almost all the buildings were razed to ground level, with the intention of returning the

mine back to the Duke of Bedford's grouse shooting grounds from which they had originated.

1903 – mid 1960's: Copper precipitation works continued intermittently on a small scale (with the exception of the 1930's when processing was carried out on a large scale).

1906: 27 tons of 5% copper ore and 7 tons of 48% copper precipitate are recorded as being produced.

1914 - 1918: Approximately 20 tons of copper precipitate a year was obtained, earning over £11,000 pa, and in 1918 13 tons of arsenic was produced from the dumps.

1915 - 1921: Underground mining was recommenced at **Wheal Fanny** for mispickel (down to the 30 fathom level) and at **Wheal Frementor** for tin and tungsten (under the auspices of the Duke of Bedford, who was also working **Bedford United** and **Ding Dong**). A 2 mile long narrow-gauge tramway was laid on the **Devon Great Consols** track-bed between **Anna Maria** and **Bedford United** where the stamping and dressing (of tin and tungsten) was carried out (see separate report Buck 2002). A petrol - driven Simplex locomotive hauled the wagons. Arsenic refining was undertaken at the **Coombe** arsenic works at **Harrowbarrow**.

1921 - 1925: A new arsenic refining complex was built in the early years of this period (2 Brunton calciners, 2, refineries, 2 condensers, arsenic grinding mill, a water wheel, and an arsenic chimney). Mundic was still being removed from the upper levels of **Wheal Fanny**. An incline tramway was built from the arsenic works to **Wheal Fanny** using a converted Fordson tractor with a winding drum attached.

1923 - 1924: In 1923 mundic was also taken from the upper levels of **Wheal Maria** and by 'picking over old dumps'.

1925 - 1930: By this date **Wheal Frementor** was the new focus of operations (previously abandoned since 1919,) as work at **Wheal Fanny** and **Maria** had ceased. A new narrow-gauge track bed was laid (along the route of a leat - Site 5), via the new arsenic refineries to connect with the line to **Bedford United**. Arsenical pyrites and tungsten lodes were calcined (the resulting dump was processed during the 1970's). The arsenic complex appears to have ceased operations in mid - 1925, although mining and reworking of dumps continued at **Wheal Frementor**.

1930's - 1940's: The 'higher' copper works produced copper precipitate by passing water through the large dressing floor sands tip at **Anna Maria**, whilst the 'lower' works used a similar technique (with lines of timber launders), to produce precipitate from adit water. In the early years of the 1940's the precipitation works appear to have finally ceased work due to drought.

1939 - 1949: Ochre for paint manufacture was obtained from the mine's main drainage adit at Blanchdown and some ore from the **Wheal Josiah** dumps was sent to the **Prince of Wales Mine** (**Harrowbarrow**) for re-processing. In approximately 1949 some tailings were also processed at **New Consols Mine** (**Luckett**).

DEVON GREAT CONSOLS. LONGITUDINAL SECTION ON THE MAIN LODGE

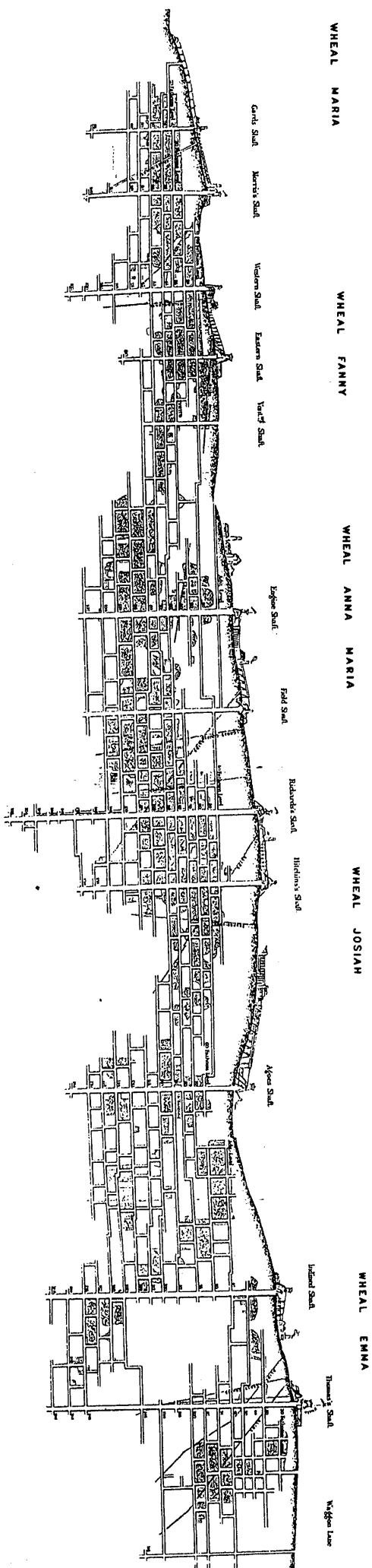
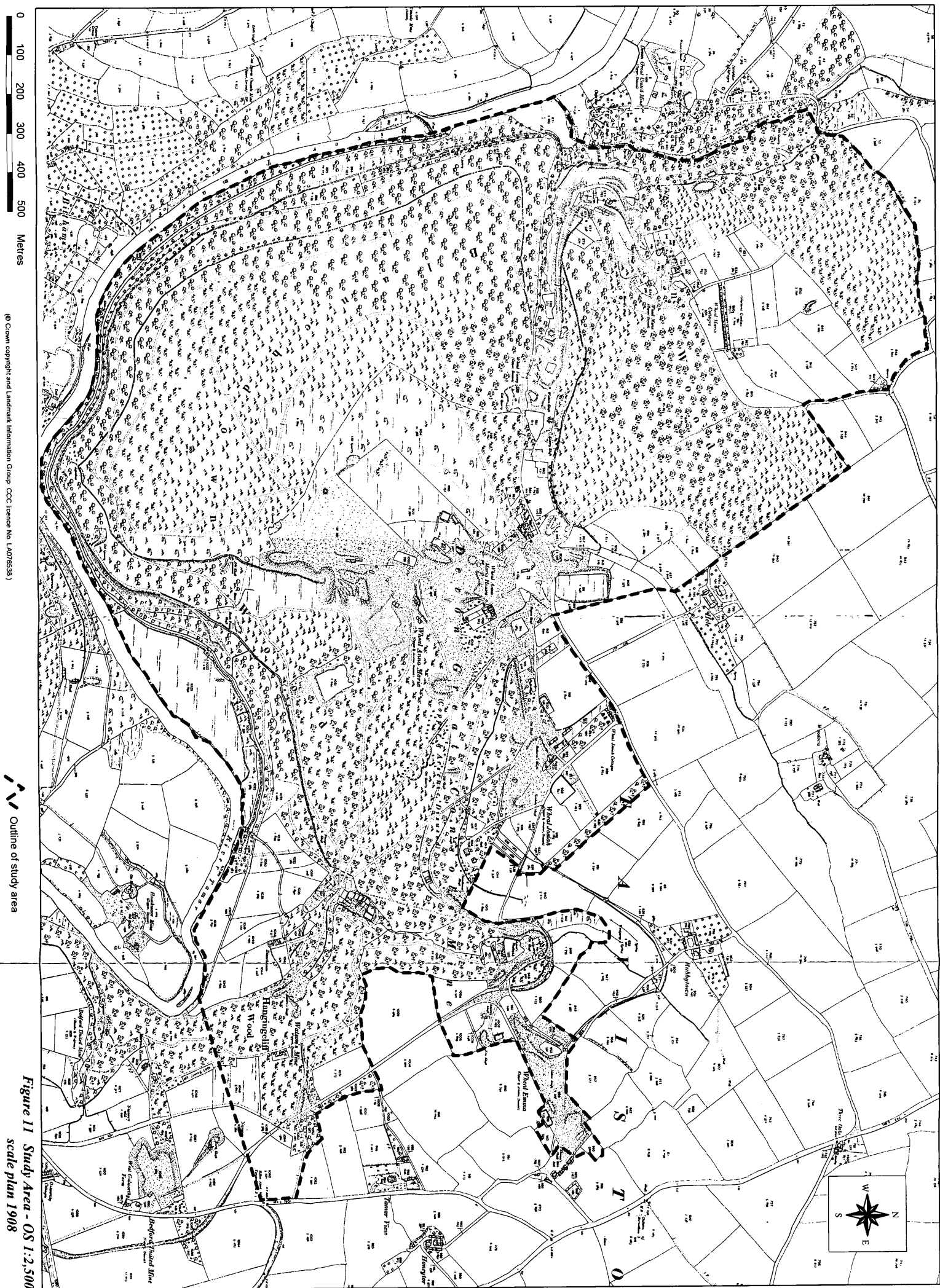


Figure 10 Longitudinal Section
on the Main Lodge
(undated west - east view)

(Abstract of mine plan, MRO R88A, sheet 5 of 6)



1959: The Duke of Bedford sold the land formerly leased by the mine and woodlands to the Earl of Bradford, smaller farm tenements were separately auctioned three years later.

1970 - 1978: A company named 'Redcaves' installed dressing plant to recover tin from the 'white sands' tip below the 1920's arsenic complex (presumably the material originating from Frementor in the mid 1920's). A ball mill, 15 shaking tables, hydrosizers, cyclones and a helical separator were used to produce a low grade tin concentrate (25% metal), at a rate of 10 tons per hour. The company (after many name changes) folded in mid-1979 as the market price of tin plummeted once again (*pers comm.* Charlie Daniel-a former miner here).

After 135 years of near continuous operation, extraction and processing of ore from **Devon Great Consolidated Mine** finally ceased.

Summary

'Devon Great Consols was the last great copper discovery in the West of England and for twenty years from 1845 to 1865 the seemingly inexhaustible deposits overlaid the copper mining world ... (and) was the richest copper mine in Europe, and when its lodes began to fail it went on to produce so much arsenic (half the world's supply), it had to be regulated to avoid swamping the market... It was the only mine in Devon and Cornwall to build and work its own standard guage railway. In its own foundry it maintained and partly constructed many of the steam engines and water wheels used for pumping and crushing ore' (Booker 1974, 143/144).

From 1845 to 1903, sales of copper ore had been 742,400 tons (averaging 6.5%); the greatest total recorded for any mine, not only in Cornwall and Devon, but anywhere in the 'old world'. This had realised £3,473,046 on which dues of £261,587 had been paid. Tin sales had totalled only £170 (despite the large investment looking for it below the copper lode), but 72,279 tons of refined arsenic had realised £625,062 on which dues had been £27,967. In later years the mine's purser (Moses Bawden), estimated that 600,000 tons of mispickel had been calcined.

During the mine's career, a total dividend of £1,225,216 had been disbursed. £658,336 had been spent on the arsenic works, railway and other capital equipment (including houses and schools etc). Approximately 45 miles of shafts/levels and winzes had been sunk, whilst waterwheels (totalling 33 fed by over 8 miles of leats), had been the main power source for 2,420 fathoms (over 4.33km) of flat rods.

'...in South-West England Devon Great Consols had a short life when compared to equally notable mines in the region. It existed for less than 60 years, whereas the renowned Dolcoath had been at work continuously for 103 years... However, the comparison is not entirely in favour of the Cornish mine. Thus, at the peak of its production as a copper mine, in the period 1800-30, Dolcoath raised some 250,000 tons, or less than half as much as Devon Great Consols sent to the ticketings in its most prosperous days, from 1844 to 1874 (580,000 tons).' (Goodridge 1964, 265).

5 Management Recommendations

The recommendations that follow comprise an overall archaeological management strategy for the assessment study area. These have been formulated by considering a combination of documentary, cartographic, and field evidence within the study area. Recommendations for individual structures and features are contained in the Site Inventory; this section provides the context within which those specific recommendations should be read.

5.1 General Recommendations

5.1.1 Archaeological management plan:

- Strategies need to be in place to mitigate archaeological damage during completion of the present forestry cycle (see Appendix III).
- A long-term conservation management plan for the surviving archaeological remains is required (both as a consequence of increased public access and within the working woodland environment).
- The integration of public/commercial management plans into an overall WHS plan is needed.
- Investigation of suitability of Countryside Stewardship schemes are recommended to offset management costs of long-term impact of preserving archaeological features.

5.1.2 Shaft Treatment

- Treatment of shafts must be sympathetic to the archaeology and appearance of the landscape.
- There should be avoidance, where possible, of the use of capping/plugging – this is archaeologically destructive and difficult to reverse.
- The use of protective fencing is more in character with the landscape and is a traditional technique for this site.
- The rebuilding of (existing) protective hedges is a preferred safety option, using local materials and traditional skills – this is an effective, non-destructive, visually attractive and traditional method of protecting shafts.

5.1.3 Building consolidation

- Specifications for all works should be agreed by the Devon County Historic Environment Service (the County Archaeologist and the County Historic Buildings Advisor). These should be in line with the principles of good conservation practise set out in '*A Guide to Conserving Historic Mine Buildings in Cornwall*' (Sharpe, Johnson and Lewis 1996), and English Heritage general principles and guidelines.
- The consolidation of some structures are considered an urgent priority, if further collapse (and loss of the buildings), is to be avoided.
- Sites and structures other than engine houses, chimneys and shafts with less obvious landscape value should be considered for consolidation/enhancement on the basis of their historical importance and condition.
- Detailed buildings survey should be undertaken to provide a record of condition prior to any consolidation and provide information (i.e. dimensions and building type/materials) for consolidation contractors. This would best be undertaken using a reflectorless Total Station Theodolite or EDM (Electronic Distance Measurement), enhanced where necessary by conventional manual survey.

5.1.4 Possible further work

- Detailed 3-dimensional digital survey (EDM) and high quality photographic survey of surviving structures is needed to provide a record of condition, an aid in interpretation and a basis upon which consolidation works can be carried out on those features where structural stability works will permanently affect their current condition.
- Detailed landscape and building survey should be undertaken to understand the relationship between structures and improve interpretation of sites (especially where public access merits detailed accounts or where contamination remediation works will affect archaeological features).
- Archaeological excavation could be used to reveal buried structures and to enhance surviving remains. This has been recommended for some low lying features (e.g. Buddles/Capstan pits/shaft collars/balance bob mounting walls etc).
- Archaeological evaluation excavation may be required in advance of possible contamination remediation works.
- Additional archaeological field survey may need to be carried out if some (previously hidden) parts of the site are cleared.
- Archaeological watching brief recording may be needed during geotechnical works (quarry face stabilisation/railway-flat rod cutting stabilisation/shaft location-fencing safety works/adit grille installation-fencing/waste dump fencing etc).
- It is important to ensure that a dialogue is set up for the continued preservation of archaeological sites in a working woodland environment (perhaps utilising Countryside Stewardship).
- Thought should be given to the improvement of public access: this is an important focus of the overall land reclamation scheme (see Section 1.1). It is hoped that a number of well-routed circular walks would enable visitors to the area to access the majority of mine sites within Devon Great Consols using existing tracks, railway routes and flat rod cutting routes.
- The inclusion of all sites in published material (guidebooks/histories/web sites) is recommended. These should include detailed maps derived from research and surveys.
- The form of any future survey, excavation or analysis should be linked to a research agenda that is being developed with the aim of answering key questions on aspects of historic mining and the associated industrial landscape.

5.2 Individual structures or site components

The treatment of individual buildings, earthworks, and structures is described in the site inventory. Appropriate conservation strategies for shafts and other mining features are detailed below.

5.3 Safety works to shafts and other mine openings

5.3.1 Background

There has been an ongoing dialogue in recent years between the Historic Environment Service of CCC and its clients on the safety treatment of abandoned mine shafts within Cornwall. The permanent capping or plugging of shafts with its attendant landscape engineering works inevitably threatens or damages delicate archaeological sites, whilst the removal of shafts from the landscape through the use of this method also diminishes the visible context for any remaining site components.

The methods used for shaft safety treatment vary. Many early mine workings were simply abandoned on the cessation of work and the gradual collapse of adjacent spoil dumps into mine openings ensured their chokage, especially where timber staging survived at no great distance from surface. Some were partially backfilled during the progress of work to avoid the creation of surface spoil dumps. Deliberate infilling was rare and is very unlikely to work as a long-term stabilisation measure.

During the 18th and mid 19th centuries, stone-faced walls or banks were sometimes constructed around shafts to limit their danger to grazing stock – many of these features stand to this day, though most have become rather tumbled. This form of safety treatment has clearly been used at a number of mines within the project area.

The formalised safe abandonment of shafts is a recent phenomenon, and not one commonly found in Cornwall. In recent years, public safety programmes have been targeted on the Cornish mining landscape, their aims being to permanently remove the hazards posed by mine shafts. The availability of government grants (in the form of the Derelict Land Grants, subsequently the Land Reclamation Fund, now funding for Environmental Programmes) and the use of powerful mechanical excavation plant tended to encourage solutions based on engineering approaches - principally the installation of shaped concrete plugs in shaft throats or the spanning their openings with reinforced concrete rafts. Although there have plainly been considerable public safety benefits from this programme, its costs have been high – not simply in financial terms, but also in the loss of archaeological information concerning the development of the mining industry, especially its early, generally undocumented phases. More recently, the evolution of alternative engineering solutions (ring beams, grouting) or the revival of approaches based on surface barriers (hedges, fences, grilles) has presented a useful and less-damaging variety of alternative methods of tackling such problems.

A mining landscape may contain as many un-located as visible shafts, as well as loosely backfilled outcrop workings (some in excess of 50m depth) that may never have been mapped. Except in the (very rare) cases where mining activity on a site is single phase and well documented, it is practically impossible to eliminate all mining-related hazards on a given site. Works should therefore always be targeted on the most accessible and dangerous sites. This will include shafts, though not exclusively so.

5.3.2 CAU policy in relation to safety works to mine openings

- Mine shafts, outcrop workings, prospecting features, adits, and openworks are important archaeological sites and monuments.
- Shafts often have key mine components located adjacent, near or within their mouths. These components may be buried and invisible at surface today.
- Shaft capping or plugging should only be carried out where there is a direct threat to the safety of the public that cannot be addressed by other means, or where the stability of historic structures is at risk.
- Engineers should always take the known archaeological significance of sites into account when designing shaft safety treatment programmes.
- Non-intrusive methods of excluding the public from mine shafts should be used wherever historically significant sites are involved.
- Planning Policy Guidance Note 16 (PPG 16) should form a model for the involvement of archaeological constraint in the process of land reclamation or shaft safety works.

All measures taken to ensure public safety (fencing, hedging, grilling, or capping) will result

in some measure of disturbance to the shaft head and its surroundings, but plugging, capping and backfilling are obviously the most destructive. In circumstances where plugging or capping are considered to be the only options on the grounds of public safety, particular care must be taken to minimise damage to nearby archaeological features and to ensure an adequate record of features destroyed or damaged during such works is made through the commissioning of an archaeological watching brief during works.

5.3.3 Shaft grading

In order to highlight the relative archaeological significance of shafts and their immediate contexts, they have been graded within this report on the basis of the combination of available documentary information and field evidence.

Grade A shafts

Are of major historic importance and vital to the interpretation of closely associated archaeological remains. Plugging or capping should only take place if there is no feasible alternative, and any such contract must be designed to minimise archaeological damage to both the shaft and surrounding features. Safety works must cause the minimum of disturbance to the existing shaft head. Where material is backfilled over a plug or cap, a hollow reflecting the dimensions of the underlying shaft should be left at surface. Adequate provision should be made for an archaeological watching brief and site recording as part of the safety works contract.

Grade B shafts

Are of historic importance and are likely to contain important archaeological information in and near the shaft head. Plugging or capping should only take place if there is no alternative. Any work must cause the minimum of disturbance to the existing shaft head and adequate provision should be made for an archaeological watching brief and site recording as part of the safety works contract.

Grade C shafts

Are of historic importance but as far as is known do not contain important archaeological information in and near the shaft head. Capping should only take place if there is no alternative. Any work should cause the minimum of disturbance to the existing shaft head and a watching brief should normally be carried out.

A * has been added to the grade of any shaft known to connect with an adit system in order to bring to the attention of clients and their contractors the need to ensure that material is not dislodged into a shaft during engineering works, raising the potential for underground drainage systems to become blocked. It should be noted, however, that the majority of shafts connect in depth with levels, adits or other underground drainage systems, even where this is not documented.

5.3.4 Historic Environment preferred options for shaft treatment

Preliminary

Documentary searches (plans, maps, photographs, etc.) should be carried out to identify the existence of former shafts and other mine openings (this report fulfils most of this requirement). Shaft sites should then be plotted onto modern OS maps. The positions of these shafts should then be identified on the ground, their condition recorded and recommendations made for any further work required to determine their safety treatment.

If shafts are open, they must be assessed for archaeological significance, their potential as bat roosts and any ecological significance, their importance for access, ventilation, drainage, amenity, etc. Subsequent treatment will depend on the intended after-use of the site, project resources and the experience and opinions of the engineering staff who specify the remediation contract. It is recommended that archaeological consultants are involved in the design stage when such works are considered.

Surface barrier methods

Where depths to bedrock are not considerable or the built up material through which a shaft was sunk judged to be stable, surface barrier methods (hedges, walls, fences, etc.) can be used. These need to be sited at distances from the shaft opening, such that should the ground surrounding the opening collapse into the shaft (coning), the safety barrier will remain unaffected. The deeper the fills through which a shaft has been cut, the further away the barrier must be (and hence the longer, more expensive and more intrusive within the landscape the final results).

Slabs, caps, plugs and grilles

In many cases hedges and fences cannot be used and some form of barrier within the shaft will be required. Alternatives include reinforced concrete slabs, reinforced ring beams incorporating grilles and concrete plugs. All can (and should) incorporate access hatches and/or bat access openings where they are installed in an open shaft. Ventilation pipes should be included within any slab or plug. All these approaches will require excavation of the shaft throat to provide adequate seating. For concrete plugs this is normally down to bedrock, the material above being raked back to form a stable, inverted cone shaped slope.

Where shafts are blocked or choked, this is often only in their near-surface sections (it is virtually impossible to backfill a shaft completely). The depth, nature and stability of a choked shaft should be evaluated (preferably by drilling). Choked shafts can be hedged, fenced (treated as if open), plugged or slabbed, or partially excavated and grilled.

Grouting

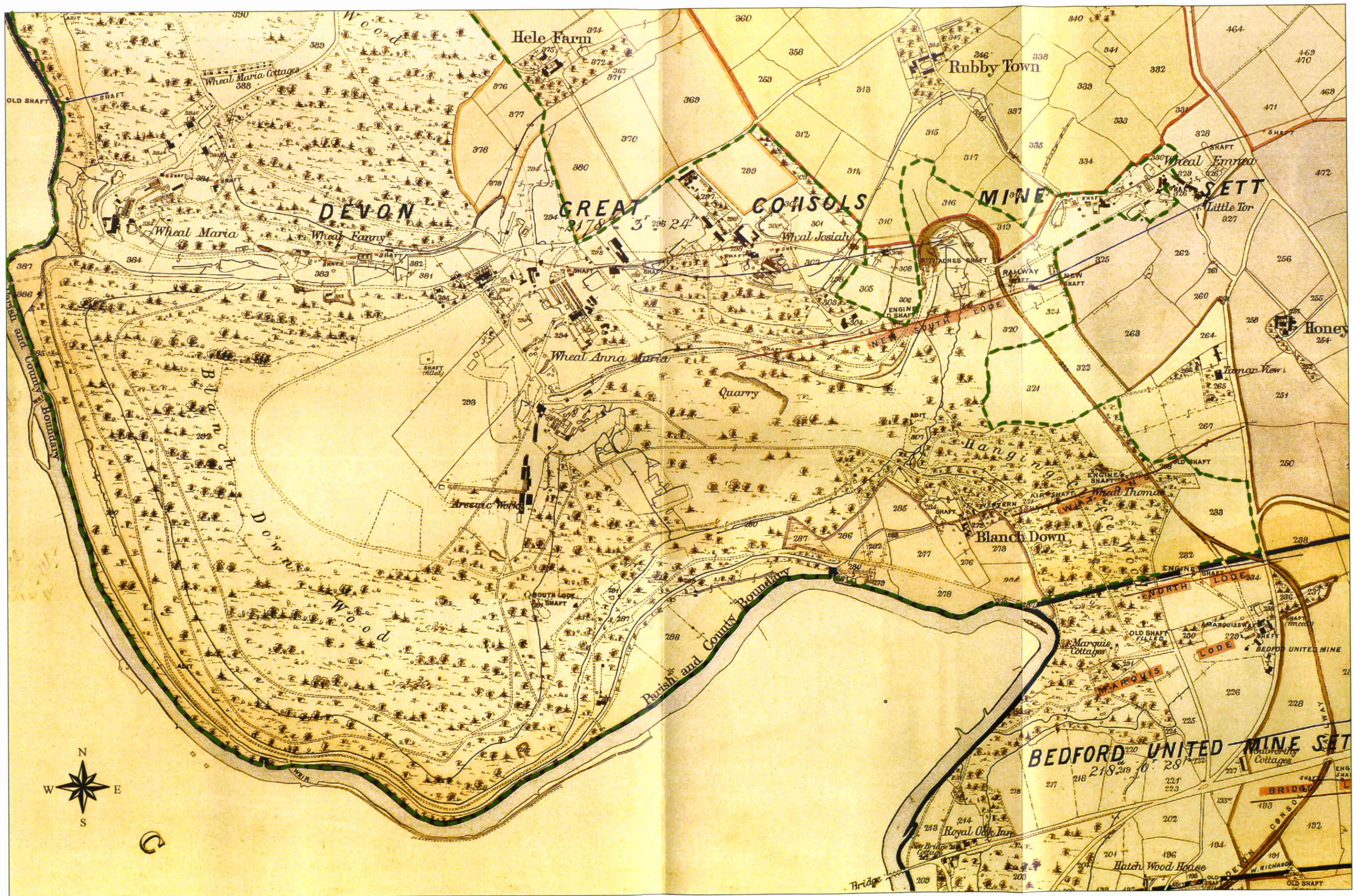
In circumstances where the near-surface archaeology of choked shafts is particularly sensitive, where barrier methods are unfeasible and excavation would cause unacceptable levels of archaeological impact, grouting can secure the shaft to acceptable standards without causing damage to the archaeology of the shaft surroundings. Concrete is pressure injected via numerous drill holes into the shaft fills and immediate surroundings at and just above bedrock, forming a stable mass plug.

Clwyd Caps

These were intended to be installed in a two part form, the basket within the shaft being filled with large rocks and concrete to form a "bung", the cone on top being a marker and a container for additional fill materials. The use of the upper cone alone as a safety cage was never intentioned; these tend to be used as climbing frames over open shafts and are rarely adequately anchored.

Geogrid

The installation of geogrid (or other ground reinforcing material) is useful only where there is the potential for subsidence, when it acts as a safety net. Shafts appearing through subsidence in areas secured by geogrid will subsequently have to be plugged or otherwise made safe. In order to anchor geogrid, large areas of ground have to be excavated to depths of roughly 0.5 to 1.0m from surface, causing extensive damage to archaeological features, layers, spreads, etc. Such trenches are generally not easy to record (LRF watching briefs are often not very productive given that the archaeologist is more of an observer



0 100 200 300 400 500 Metres

(DRO/T1258ME14b - 9 chains - 1 inch)

Outline of study area

Figure 8 Shafts/Lodes Plan 1867

than a participant), and HE does not recommend the use of this material unless adequate provision for recording can be assured.

Shallow Workings

Early shafts are often associated with near-surface mine workings (shallow stopes), as well as a range of features such as adits etc. These in themselves may complicate the treatment of shafts (which were generally sunk on the outcrop of lodes), since they can introduce areas of potential instability adjacent to and between shafts. Collapses of intact shallow stope systems are rare, though the subsidence of backfilled lode back shafts accessing them can occur. Such sites are potential candidates for the use of geogrid. They should not be excavated and collapsed as sometimes happens, given that they are often the earliest mining features on a site, and can be early post-medieval in date.

5.4 Archaeological Potential below Ground

Contingency funding should be made available as part of any proposed works to allow for an appropriate level of archaeological recording to take place if shallow mining features are revealed during the course of the works programme. However detailed consultations with the County Archaeologist should take place at every stage of the project where below ground archaeological features are likely to be affected.

5.5 Further Archaeological Work: Evaluation and Mitigation

As is now normal practice during shaft safety works within Cornwall, provision should be made within the project budget for a suitably qualified archaeologist to be present to survey and record the archaeological features of the site during engineering operations in line with the general and specific recommendations contained within this report. A copy of the archaeological record produced during such a watching brief should be deposited in the Devon Sites and Monuments Record.

The construction of access routes and the engineering works which are likely to be required in the preparation of shafts for safety treatment has the potential to reveal damage or destroy other site components. Watching briefs are therefore recommended during the shaft treatment programme, which should be preceded by an appropriate level of on-site archaeological consultation.

5.6 Statement of likely COSHH Hazards

The southern part of the Tamar Valley area is highly mineralised, and mines in this area were amongst the 19th century's principal producers of tin, copper and arsenic. Residues from the mining activity (especially in Devon Great Consols), have resulted in un-vegetated spoil tips and local soils which are highly contaminated with Arsenic (ranging from 120 to 52,600 µg/g As (Kavanagh et al 1997). However, simultaneous exposure to the environment is also from a number of other elements present in the mining waste at highly elevated levels, including copper, lead, zinc, antimony, molybdenum, tin, selenium and mercury.

A report by Wardell Armstrong in 1990 for the South West Water Gunnislake Intake Pollution Risk Study measured levels of heavy metal contamination at all spoil heaps in Devon Great Consols. Virtually all of the heaps had '*very heavy Arsenic levels of contamination*' (and a few with high levels of tin also). It is recommended that a COSHH assessment is undertaken as part of a Risk assessment prior to any site works being undertaken or access to members of the public is officially permitted.

6 Summary Management Tables

This section of the report summarises the site management recommendations presented in detail in the Site Inventory section below (Section 7.0). This has been divided into two parts, the first table summarises all of the site recommendations for safety works (Section 6.1) and the second (Section 6.2), lists and prioritises consolidation works to masonry structures. Section 8.0 at the rear of the report cross references these sites with Devon's SMR records, and the two geotechnical mining reports referred to in this text.

6.1 Summary Management Table of archaeological sites

Note:

Cornwall Historic Environment Service favours low-key approaches to health and safety treatment of mine shafts and adits. It will not be practicable, economically feasible or desirable to undertake all of the management recommendations outlined in this report, which have been provided to guide works where they are deemed necessary and to advise the landowners of management of archaeological features and health and safety mitigation measures.

It is recommended that where routes are to be formalised across the project area, geotechnical health/safety and risk assessment reports should be commissioned to focus on potentially dangerous mining-related features immediately adjacent to these path routes. Safety treatment to such features should be guided by the recommendations in this report. It will not be necessary to grille all adits, for instance, since many have low entrances, some are drainage culverts and many are in locations where they are very unlikely to pose hazards to the public.

The locations of shafts and adits given in this report should be used as a guide by landowners to inform timber company operatives working these woodlands of the location of archaeological features and surface openings and to minimise the risk of accidents. All treatment to such features should seek to achieve the long term objective of the preservation of the important archaeology of the site.

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
1	Western Shaft	40	8	41811 74342	Assess hazard, fence if necessary
2	Eastern Shaft	40	8	41917 74357	Assess hazard, fence if necessary
3	Unnamed Shaft	41	8	41732 74312	Assess hazard, fence if necessary
4	Lode back pits	41	38	41574 74461 41710 74436	Assess hazard
5	Leat	42	8	41479 74385	Remove cut and growing trees, site to be retained and left undisturbed
5/1	Leat tunnel/spoil heap			43599 73017	Assess structural stability, consolidate
5/2	Leat tunnel under track			41594 74080	Assess structural stability
5/3	Leat tunnel and aqueduct			43355 73154 43437 73111	Assess structural stability, consolidate
6	Adit	44	38	41571 74308	Assess hazard, fence/grille if necessary
7	Streamworks	44	38	41446 74352 41500 74215	Site to be retained, undisturbed
8	Adit Shaft	45	13	41603 74082	Assess hazard, fence if necessary
9	Working area/platform	45	13	41601 74087	Site to be retained, undisturbed

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
10	Enclosure	46	13	41541 74101	Remove cut and growing trees
10/1	Site of mine building			41550 74088	Site to be retained, undisturbed
11	Bridge	46	13	41533 74077	Consolidate
12	(Old) Engine Shaft	47	13	41520 74072	Assess hazard, fence if necessary
13	Adit	47	13	41542 74066	Assess hazard, fence/grille if necessary
14	Adit	47	13	41544 74045	Assess hazard, fence/grille if necessary
15	Pair of leats	48	13	41562 74066 41566 73966	Remove cut and growing trees, site to be retained and left undisturbed
16	Adit/culvert	48	13	41544 73892	Assess hazard, fence/grille if necessary
17	Mine building	49	13	41602 73919	Consolidate
18	Wh. Maria wheelpit	49	13	41629 73919	None
18/1	Reservoir pond			41642 73905	None
19	Quarry	50	13	41603 73967	None
20	Drain portal	50	13	41653 73882	Assess hazard, fence/grille if necessary
21	Upper leat	51	13	41632 73885 41599 73829	Remove cut and growing trees, site to be retained and left undisturbed
22	Lower leat	51	13	41620 73892 41588 73829	Remove cut and growing trees, site to be retained and left undisturbed
23	Drainage portal	51	13	41600 73829	Assess hazard, fence/grille if necessary
24	Drainage portal	52	13	41621 73757	Assess hazard, fence/grille if necessary
25	Reservoir pond	52	13	41569 73808 41572 73882	Remove cut and growing trees, site to be retained and left undisturbed
26	Collapsed shallow adit	53	13	41528 73810	Assess hazard, fence/grille if necessary
27	Settling tank pond	53	13	41534 73894	Remove cut and growing trees, site to be retained and left undisturbed
28	Mine building	53	13	41582 73808	Assess structural stability, consolidate
29	Mine spoil finger dump	54	13	41672 73903	Site to be retained, undisturbed
30	Castle Shaft	54	13	41670 73887	None (shaft plugged recently)
31	Pond	55	13	41776 73941	None
32	Mine building	55	13	41752 73909	Site to be retained, undisturbed
33	Outhouse building	55	13	41716 73966	None (privately owned)
34	Reservoir	56	13	41866 74037	Remove cut and growing trees, site to be retained and left undisturbed
35	Wagon House	56	13	41866 73988	None (privately owned)
36	Site of house	56	13	41852 73957	None (site built over)
37	Morris's Shaft	57	13	41877 73883	Assess hazard, fence if necessary
38	Lode back pit	57	13	41894 73889	Assess hazard, fence if necessary
38/1	Lode back pit			41914 73889	Assess hazard, fence if necessary
39	Engine house	58	13	41873 73871	Site to be retained, undisturbed
39/1	Boiler house/chimney			41876 73857	Site to be retained, undisturbed
40	Quarry/tramroad head	59	13	41848 73855	Assess stability, scale/fence
41	Costean/lode back pits	59	13	42114 73899 42241 73863	Site to be retained, undisturbed
42	Shaft	59	13	42216 73869	Assess hazard, fence if necessary
43	Water culvert portal	60	13	41838 73894	Assess hazard, fence/grille if necessary
44	Shaft/lode back pit	60	13	41803 73860	Assess hazard, repair shaft hedge
45	Dressing floor building	61	13	41785 73880	Site to be retained, undisturbed
46	Small ponds	61	13	41760 73862	Site to be retained, undisturbed
47	Signalling platform	62	13	41753 73794	Site to be retained, undisturbed

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
48	Powder Magazine	62	13	41762 73804	Site to be retained, undisturbed
49	Buddles (southern)	62	13	41735 73858	Site to be retained, undisturbed
49/1	Buddles (northern)			41752 73880	Consolidate
50	Wh Maria settling tanks	63	13	41742 73890	None
51	Gard's Shaft	64	13	41769 73903	Assess hazard, fence if necessary
52	Dressing floor buildings	64	13	41689 73876	Site to be retained, undisturbed
52/1	Dressing floor building			41711 73878	Site to be retained, undisturbed
53	Dressing floor wall	64	13	41696 73886 41730 73898	Site to be retained, undisturbed
54	Reservoir/settling pond	65	13	41681 73861 41656 73806	Remove cut and growing trees
54/1	Reservoir/settling pond			41683 73852	Remove cut and growing trees
54/2	Reservoir/settling pond			41676 73837	Remove cut and growing trees
54/3	Reservoir/settling pond			41667 73818	Remove cut and growing trees
55	House (sluice operator)	65	13	41676 73798	Survey, consolidate
55/1	Outbuilding			41694 73788	Consolidate
56	Leat	66	13	41689 73778 42017 73709	Remove cut and growing trees, site to be retained and left undisturbed
57	Foundry reservoir pond	67	13	41677 73780	Remove cut and growing trees
58	Lower Foundry reservoir pond (north)	67	13	41648 73825	Site to be retained, undisturbed
58/1	Lower Foundry reservoir pond (south)			41647 73827	Site to be retained, undisturbed
59	Foundry House	68	13	41647 73852	None
60	Foundry Wheelpit	68	13	41640 73807	Assess structural stability, fence
61	Foundry	69	13	41623 73794	None
61/1	Foundry Water tunnel			41646 73769	Assess structural stability, consolidate
62	Foundry waste/slag tip	70	13	41634 73735	None
63	Quarry	70	13	41693 73758	Assess stability, scale/fence
64	Retaining wall	71	14	41805 73722 41952 73726	None
65	Leat	71	14	42017 73771 41794 73724	Remove cut and growing trees, site to be retained and left undisturbed
65/1	Leat			42020 73755 41819 73727	Remove cut and growing trees, site to be retained and left undisturbed
66	Settling tanks	71	14	41913 73729 41939 73730	Remove cut and growing trees, site to be retained and left undisturbed
67	Copper precipitation trenches	72	14	41953 73748 41955 73733	Remove cut and growing trees, site to be retained and left undisturbed
68	Shaft	72	14	41970 73732	Assess hazard, fence if necessary
69	Shaft	73	14	41964 73748	Assess hazard, fence if necessary
70	Site of openwork	73	14	41969 73730 41993 73721	None
71	Leat	73	14	42598 73105 42004 73701	Remove cut and growing trees
71/1	1925 Tramline from Fremontor to works			42370 72495 42571 73306	None
72	Wh Fanny buddles	74	14	42046 73703	Clear vegetation, consolidate
73	Buildings and grinder	75	14	42070 73702	Site to be retained, undisturbed

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
74	Adit	75	14	42012 73738	Assess hazard, fence/grille if necessary
75	Shaft	76	14	42017 73771	Assess hazard, fence if necessary
76	Western (Engine) Shaft	76	14	42120 73691	Assess hazard, fence if necessary
77	Finger dump spoil heap	76	14	42108 73671	Site to be retained, undisturbed
78	Western Shaft/capstan	77	14	42117 73716	Assess hazard, fence if necessary
79	Waterwheel winder	77	14	42143 73722	Remove cut and growing trees, site to be retained and left undisturbed
80	Ore Floor	78	14	42154 73701 42170 73700	Site to be retained, undisturbed
81	Site of dressing floor buildings	78	14	42126 73688 42183 73681	Site to be retained, undisturbed
82	Three settling ponds	78	14	42211 73691	Remove cut and growing trees, site to be retained and left undisturbed
83	Eastern Shaft/capstan	79	14	42238 73695	Assess hazard, fence if necessary
84	Launder/tramroad	79	14	42281 73685	Site to be retained, undisturbed
85	Adit and site of wheelpit	80	14	42277 73691	Assess hazard, fence/grille if necessary
86	Site of house/office	80	14	42253 73706	Site to be retained, undisturbed
87	(Air) Shaft	81	14	42264 73704	Assess hazard, fence if necessary
88	Leat	81	13	42502 73766	Remove cut and growing trees, site to be retained and left undisturbed
88/1	Leat			41866 74037 41904 73852 41738 73864	Remove cut and growing trees, site to be retained and left undisturbed
89	Reservoir pond	82	14	42268 73657	Ensure water outlets are cleared
90	Leat	82	14	42305 73647 42241 73672	Remove cut and growing trees, site to be retained and left undisturbed
91	Small settling pond	82	14	42224 73674	Clear vegetation, consolidate
91/1	Leat channels			42082 73722 42219 73676	Clear vegetation, consolidate
92	Large reservoir pond	83	14	42198 73657	Ensure water outlets are cleared
93	Flooded area	83	14	42175 73653 42276 73651	None
94	Large reservoir	84	14	41880 73690 41943 73692	Ensure water outlets are cleared
95	Leat	84	14	41560 73726	None
95/1	Leat tunnel			42165 73631	Assess structural stability, consolidate
96	Footbridge/Quarry	85	9	41397 73669	None
97	Site of building	85	11	41461 73644	Site to be retained, undisturbed
98	Timber summer house	85	11	41486 73442	None (privately owned)
99	Adit	86	38	41497 73398	Assess hazard, fence/grille if necessary
100	'Great Leat'	86	9	41486 73383 43245 72914 41489 73365	Remove cut and growing trees, site to be retained and left undisturbed Assess structural stability, consolidate
100/1	River Tamar sluice gate			41922 72551	Assess structural stability, consolidate
100/2	Sluice gate			41935 72553	Consolidate
100/3	Building			42674 72585	Ensure water outlets are cleared
100/4	Tunnel			42854 72868	Site to be retained, undisturbed
100/5	'Lower' Copper works			42948 72917	
100/6	Leat bridge			43116 72443	Assess structural stability, consolidate
100/7	Site of sluice gates			43347 72992	None

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
101	Site of weir	89	9	41451 73382	None
102	Adit portal	89	38	41470 73507	Assess hazard, fence/grille if necessary
103	Costean pits	89	38	41548 73358 41612 73207	Assess hazard, fence if necessary
104	Timber maturing ponds	90	8	41529 73280 41609 73055	Remove cut and growing trees, site to be retained and left undisturbed
105	Site of reservoir	90	9	41680 73698	Site to be retained, undisturbed
106	Rubbytown leat	91	14	42372 73597 43598 73590	Remove cut and growing trees, site to be retained and left undisturbed
106/1	Leat tunnel and aqueduct			42875 73433	Assess structural stability, consolidate
106/2	Leat railway crossover			43198 73376	Site to be retained, undisturbed
107	Quarry	92	14	42145 73600	Assess stability, scale/fence
108	House	93	14	42127 73608	Consolidate
109	Walled Garden	93	14	42325 73673	None
110	Site of mine buildings	94	14	42402 73628 42424 73638	Site to be retained, undisturbed
111	Incline Railway tunnel	94	14	42382 73621	Assess structural stability, consolidate
112	Spoil tip	95	15	42477 73699	Assess stability, scale/fence
112/1	Leat/railway tunnel			42493 73714	Assess stability, scale/fence
113	Reservoir pond	95	15	42502 73766	Ensure water outlets are cleared
113/1	Adit			42527 73711	Assess hazard, fence/grille if necessary
114	Shaft	96	15	42538 73697	Assess hazard, fence/grille if necessary
115	Adit Shaft	96	15	42553 73684	Assess hazard, fence if necessary
116	Ventilating Shaft	97	14	42367 73719	Assess hazard, fence if necessary
117	Site of Jigger House	97	15	42539 73732	Site to be retained, undisturbed
117/1	Waste settling tanks			42567 73738	Site to be retained, undisturbed
118	Reservoir	98	15	42636 73766	Remove growing trees
119	1925 Incline railway line	98	14	42602 73348 42266 73703	None
119/1	Incline railway cutting			42454 73568 42419 73587	Site to be retained, undisturbed
120	Site of building	99	14	42379 73564	Site to be retained, undisturbed
121	Blackwell's Shaft	99	15	42336 73419	Assess hazard, fence if necessary
122	Shaft/Lode back pit	100	15	42322 73419	Assess hazard, fence if necessary
123	Reservoir	100	15	42453 73442	Remove cut and growing trees
124	Reservoir	100	15	42446 73417	Remove cut and growing trees
125	Adit portal	101	9	42441 73398	Assess hazard, fence/grille if necessary
126	Spoil dump	101	9	42543 73392	None
127	Leat	101	8	42462 73411 42502 73237	Remove cut and growing trees, site to be retained and left undisturbed
128	Site of reservoir	102	15	42517 73409	Site to be retained, undisturbed
129	Site of spoil heap	102	15	42519 73456	None
130	Leat aqueduct	102	15	42438 73438 42570 73583	Site to be retained, undisturbed
131	1920's Arsenic chimney	103	15	42580 73557	Consolidate/install lightning conductor
132	Arsenic flue	104	15	42585 73456	Consolidate
132/1	Waterfall chamber			42580 73557	Consolidate
133	Site of leats	105	15	42663 73539	Remove cut and growing trees, site to

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
133/1	Shallow waste water leat			42572 73584 42574 73576	be retained and left undisturbed None
134	Settling/reservoir ponds	105	15	42614 73573	Site to be retained, undisturbed
135	Wh AM Engine Hse etc	106	15	42586 73615 42587 73649	Site to be retained, undisturbed
135/1	Site of Chimneys			42556 73648	Site to be retained, undisturbed
136	Shaft/building/wheelpit	106	15	42546 73632	Assess hazard, fence if necessary
137	House	107	15	42613 73660	Remove cut and growing trees, site to be retained and left undisturbed
138	Site of Railway siding	107	15	42635 73525	Site to be retained, undisturbed
138/1	Railway to dressing floor			42663 73539 42588 73302	Site to be retained, undisturbed
138/2	Railway to Site 169			42672 73554 42621 73448	Site to be retained, undisturbed
138/3	Railway to waste dump			42595 73405 42715 73417	Site to be retained, undisturbed
139	Settling tanks/buildings	109	15	42585 73447	Site to be retained, undisturbed
140	Wh. Anna Maria 'upper' dressing floor buildings	109	15	42669 73588	Site to be retained, undisturbed
141	Anna Maria Engine Shaft	110	15	42672 73642	Assess hazard, fence if necessary
142	Coal yard and building	111	15	42641 73615	Remove cut and growing trees, site to be retained and left undisturbed
143	Shaft	111	15	42683 73654	Assess hazard, fence if necessary
144	Pair of Houses	112	15	42717 73660	Consolidate and re-roof
145	Site of Foundry	112	15	42788 73685	Site to be retained, undisturbed
146	Reservoir pond	112	15	42925 73676	Remove growing trees
146/1	Site of aqueduct			42899 73673 42803 73678	None
147	Possible Shaft	113	15	42945 73741	Assess hazard, fence if necessary
148	Richard's Engine Shaft, Capstan	113	15	43025 73655 43025 73663	None (shaft slabbed by owner) None
149	Old Shaft	114	15	42965 73639	Assess hazard, fence if necessary
149/1	Old Shaft			42953 73662	
150	Wh. Josiah Railway lines	115	15	42625 73656 43495 73548	Remove cut and growing trees, sites to be retained, undisturbed
150/1	Incline railway			42697 73583 43147 73644	Site to be retained, undisturbed
150/2	Saw mill line			42934 73809 43001 73488	Site to be retained, undisturbed
150/3	Field Shaft winder line			42789 73628 42832 73539	Site to be retained, undisturbed
151	Reservoir pond	117	15	42875 73643	Remove growing trees
152	Leat	117	15	42909 73635 42848 73612	Remove cut and growing trees, site to be retained and left undisturbed
153	Field Shaft/Capstan	117	15	42848 73640	Assess hazard, fence if necessary
154	AM Engine/Boiler Hse	118	15	42776 73629	Site to be retained, undisturbed
154/1	Detached Chimney			42797 73630	Site to be retained, undisturbed
155	Reservoir pond	118	15	42728 73612	Remove growing trees
156	Office/railway building	119	15	42713 73570	Clear fly-tipping, consolidate

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
157	Site of office/house	119	15	42724 73571	Site to be retained, undisturbed
157/1	Site of mine building			42716 73551	Site to be retained, undisturbed
158	Site of Wh.Maria stables	120	15	42178 73629 42210 73629	Site to be retained, undisturbed
159	(Wh. Anna Maria) Engine	120	15	42680 73635	Remove cut and growing trees
159/1	Shaft flat rod cutting			43432 73053	
159/2	Leat bridge			42928 73444	Consolidate
	Track bridge			43312 73150	Consolidate
160	Leat	121	15	42734 73578 42761 73554	Remove cut and growing trees, site to be retained and left undisturbed
161	Site of mine building	122	15	42780 73579	Site to be retained, undisturbed
162	Leat	122	15	42797 73595	Remove cut and growing trees, site to be retained and left undisturbed
162/1	Leat			43425 73614 43203 73467 42902 73440	Remove cut and growing trees, site to be retained and left undisturbed
163	Adit portal	123	15	42934 73585	Assess hazard, fence/grille if necessary
163/1	Leat/settling tank			42826 73587	Site to be retained, undisturbed
164	Site of Mine building	123	15	42880 73519	Site to be retained, undisturbed
165	Hedge/field remnant	123	15	42874 73519 42856 73507	Site to be retained, undisturbed
166	'Upper' waste rock railway line	124	15	42636 73531 42881 73406	Remove growing trees
166/1	'Lower' railway line			42641 73499 42881 73406	Remove growing trees
167	Mine building	125	15	42756 73505	Survey, consolidate
167/1	Outbuilding			42753 73493	Consolidate
168	Wh. Anna Maria dressing floor reservoir	125	15	42552 73313	Remove cut and growing trees
169	Reservoir/settling pond	126	15	42583 73357	Site to be retained, undisturbed
170	Launder/tramline supports	126	15	42619 73432 42599 73409	Site to be retained, undisturbed
171	Adit portal	126	15	42618 73435	Assess hazard, fence/grille if necessary
172	Quarry	127		41521 73471	None (privately used for car park)
173	Stone quarry pits	127	15	42697 73452	None
174	Site of Mine buildings	127	15	42711 73470	Site to be retained, undisturbed
175	Site of Mine building	128	15	42566 73617	Site to be retained, undisturbed
176	Large Mine spoil dump	128	15	42874 73405	Assess hazard, fence if necessary
177	Prospecting pits	128	15	41586 73506 41807 73503	Assess hazard, fence if necessary
178	Lode back pits	129	38	41624 73403 41845 73396	Assess hazard, fence if necessary
179	Adit portal	129	38	41722 73177	Assess hazard, fence/grille if necessary
180	Devon Consols Railway	130	15	42557 73261 44081 72888	Assess variable hazards
180/1	Lower arsenic refinery line			42832 73421	Assess variable hazards
180/2	Mine waste dump tunnel			42586 73130	
180/3	Agnes cutting			42875 73429	Assess structural stability, consolidate
	Wh. Emma Bridge			43543 73687 43652 73575	Assess stability, scale/fence

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
180/4				43651 73578	Survey, consolidate
181	Lode back pits	132	38	41781 73171 42097 73194	Assess hazard, fence if necessary
182	Adit	133	38	42232 72549	Assess hazard, fence/grille if necessary
183	House/mine offices	133	16	42660 73335	Survey, consolidate
184	Wagon/Engine shed	134	16	42708 73349	Site to be retained, undisturbed
185	Hedge/Leat aqueduct	134	16	42703 73316	Site to be retained, undisturbed
186	Leat remnant	134	16	42703 73311 42738 73323	Remove cut and growing trees
187	Site of Wh. Anna Maria 'Lower' dressing floor	135	16	42689 73277	Site to be retained, undisturbed
188	Twin Buddles plinth	136	16	42638 73301	Clear vegetation, consolidate
188/1	Twin Buddles plinth			42649 73286	Clear vegetation, consolidate
189	Waterwheel pit	136	16	42646 73297	Site to be retained, undisturbed
190	Reservoir pond	137	16	42645 73246	Site to be retained, undisturbed
191	Walled yard	137	16	42619 73283	Site to be retained, undisturbed
192	Timber ore bin	138	16	42633 73266	Site to be retained, undisturbed
192/1	Iron water tank			42624 73225	Site to be retained, undisturbed
193	Lode back pits	138	38	42307 72645 42284 72793	Assess hazard, fence if necessary
194	Prospecting pits	139	38	42378 72695 42506 72711	Assess hazard, fence if necessary
195	Arsenic condenser	139	16	42568 73295	Survey, consolidate
196	Arsenic flues	140	16	42569 73276	Consolidate
197	Reverbatory furnace	141	16	42572 73258	Site to be retained, undisturbed
198	Brunton Calciner (No 1)	141	16	42574 73266	Survey, consolidate
199	Brunton Calciner (No 2)	142	16	42580 73280	Survey, consolidate
200	Arsenic refiner bed	142	16	42585 73288	Consolidate
201	Arsenic grinding mill	143	16	42591 73299	Consolidate
202	Copper Crusher Engine/boiler house	144	16	42602 73305	Consolidate
203	Copper crusher plinth	144	16	42593 73313	Consolidate
204	Shaft kiln furnace	145	16	42601 73317	Survey, consolidate
205	Site of Waterwheel	145	16	42611 73297	Site to be retained, undisturbed
206	Site of house/office	146	16	42605 73267	Site to be retained, undisturbed
207	Mine building	146	16	42582 73261	Site to be retained, undisturbed
207/1	Two mine buildings			42592 73256	Site to be retained, undisturbed
208	Small reservoir tank	147	16	42533 73252	Remove growing trees
209	Small reservoir tank	147	16	42505 73264	Remove growing trees
210	C19th Arsenic refinery	147	16	4250 7312	Site to be retained, undisturbed
211	C19th Arsenic Chimney	151	16	42368 73139	Site to be retained, undisturbed
211/1	C19th Waterfall chamber			42379 73107	Site to be retained, undisturbed
212	Reservoir ponds	152	16	42351 73137 42350 73127	Remove growing trees
213	Adit Shaft	152	16	42386 73104	Assess hazard, fence if necessary
213/1	Adit Portal and lobby			42398 73095 42432 73080	Assess hazard, fence/grille if necessary
214	Quarry	153	16	42303 73178	Assess stability, scale/fence
215	Large spoil heap	153	16	4256 7302	Assess variable hazards

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
216	Small Quarry	154	16	42552 72904	Assess stability, scale/fence
217	Lode back/Costean pits	154	38	42537 72866 42451 72866	Assess hazard, fence if necessary
218	Quarry	154	16	42467 72983	Assess stability, scale/fence
219	Aqueduct/Wheelpit	155	16	42598 73105	Locate/ Ensure water outlet is cleared
220	South Lode Shaft	155	26	42546 72864	Assess hazard, fence if necessary/ consolidate
221	South Fanny flat rod cutting Embankment from cutting	156	26	42554 72864 42578 72867 42578 72867 42615 72868	Site to be retained, undisturbed Site to be retained, undisturbed
222	Shallow Adit and lobby	156	26	42649 72873	Assess hazard, fence/grille if necessary
223	Possible Shaft	157	26	42648 72890	Assess hazard, fence if necessary
224	Site of mine building	157	26	42643 72857	Site to be retained, undisturbed
225	Tramway/water pipe	157	26	42606 72997 42614 72903	Remove cut and growing trees
225/1	Leat			42661 72944 42661 72891	Remove cut and growing trees, site to be retained and left undisturbed
226	South Fanny Shaft	158	26	42720 72866	Assess hazard, fence if necessary
227	Site of Mine building	158	15	43016 73777	Site to be retained, undisturbed
228	Josiah Powder magazine	158	21	43207 73806	Consolidate
229	Reservoir pond	159	21	43142 73718	Remove growing trees
230	Mine buildings/yard	159	21	43077 73695	Site to be retained, undisturbed
230/1	Devon Consols School			43059 73687	Site to be retained, undisturbed
231	House, buildings/yard	160	15	43035 73713	None (privately owned)
232	Site of Saw Mill	160	15	42995 73730	Site to be retained, undisturbed
232/1	Site of timber store			43020 73693	Site to be retained, undisturbed
233	Hitchins Engine Shaft	161	21	43154 73659	Assess hazard, fence if necessary
234	Hitchins Engine house	162	21	43093 73653	Site to be retained, undisturbed
235	Localised surface collapse	162	21	43070 73653	Assess stability, fence if necessary
236	Site of Leat	163	21	43420 73823 43089 73621	Site to be retained, undisturbed
237	Wh.Josiah (Richard Shft) flat rod cutting	163	21	43025 73655 43439 73067	Remove growing trees/vegetation
237/1	Flat rod bridge			43170 73451	Consolidate
237/2	Flat rod bridge			43324 73226	Consolidate
238	Leat	164	21	43247 73553 42973 73689	Remove cut and growing trees, site to be retained and left undisturbed
239	Josiah buddles	165	21	43092 73592	Clear vegetation, consolidate
239/1	Buddles			43103 73613	Clear vegetation, consolidate
239/2	Buddles			43106 73634	Clear vegetation, consolidate
240	Josiah dressing floor reservoir ponds (upper)	166	21	43145 73633	Remove growing trees
240/1	Pond			43162 73627	Remove growing trees
240/2	Pond			43176 73605	Remove growing trees
241	Wh.Josiah dressing floor reservoir ponds (lower)	166	21	43144 73600	Remove growing trees
241/1	Pond			43130 73584	Remove growing trees
241/2	Pond			43077 73624	Remove growing trees

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
241/3	Pond			43175 73568	Remove growing trees
242	Josiah mine buildings	167	21	43115 73594	Site to be retained, undisturbed
243	Quarry	167	21	43165 73536	Assess stability, scale/fence
244	Pheasant/fowl structure	168	21	43255 73539	None (privately owned)
245	Reservoir pond	168	21	43286 73585	Remove growing trees
245/1	Pond			43303 73577	Remove growing trees
246	Reservoir pond	169	21	43342 73639	Remove growing trees
247	Site of Wheelpit	169	21	43403 73625	Site to be retained, undisturbed
248	Site of House/office	169	21	43476 73569	Site to be retained, undisturbed
249	Agnes's Shaft ponds	170	22	435 735	Remove growing trees
249/1	Pond			43539 73657	Remove growing trees
249/2	Pond			43552 73592	Remove growing trees
249/3	Pond			43561 73542	Remove growing trees
249/4	Pond			43564 73524	Remove growing trees
250	Track drain portal	171	22	43559 73680	None
251	Adit portal	171	22	43569 73660	Assess hazard, fence/grille if necessary
252	Adit Shaft	171	22	43590 73640	Assess hazard, fence if necessary
253	Shaft/water culvert	172	22	43537 73626	Assess hazard, fence if necessary
254	Adit portal	172	22	43553 73633	Assess hazard, fence/grille if necessary
255	Possible adit lobby	173	22	43569 73627	Assess hazard, fence if necessary
256	Dressing floor	173	22	43530 73627	None
257	Adit portal	173	22	43515 73587	Assess hazard, fence/grille if necessary
258	Agnes's (new) Shaft	174	22	43508 73585	Assess hazard, fence if necessary/ consolidate
259	Site of mine buildings	175	22	43500 73585	Site to be retained, undisturbed
260	Agnes's (Old) Shaft	175	22	43513 73631	Assess hazard, fence if necessary
260/1	Mine building			43517 73637	
261	Small Quarry	175	21	43486 73538	Site to be retained, undisturbed
262	Mine building	176	22	43487 73481	Clear vegetation, consolidate
263	Counthouse Shaft	176	21	43418 73463	Assess hazard, fence if necessary
264	Spoil finger dumps etc,	177	21	43400 73434	None
265	Agnes Shaft flat rod cutting	177	35	43318 72874 43506 73585	Remove growing trees
266	Small Quarry	178	9	43414 73398	Assess stability, scale/fence
267	Quarry/building	178	9	43370 73367	Site to be retained, undisturbed
268	Costean/Lode back pits	179	38	43290 73368 43290 73299	Assess hazard, fence if necessary
269	Track to 'Hawkmoor' house	179	21	43144 73451 43272 73468	None (privately owned)
270	Path Shaft/capstan	179	21	43289 73430	Consolidate/ but privately owned
270/1	Working area			43237 73415	None
271	Tramway	180	21	43282 73427 43237 73415	Remove growing trees
272	Agnes's dressing area	180	22	43599 73524	None
272/1	Stone lined opening			43595 73549	Assess hazard, fence if necessary
273	Railway Shaft/capstan	181	22	43676 73530	Assess hazard, fence if necessary
274	Railway Shaft dump	181	22	43622 73551	None
275	Mine track and plinth	182	22	43647 73550	Site to be retained, undisturbed
276	Masonry tramway bridge	182	22	43658 73532	Site to be retained, undisturbed

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
276/1	Waste heap tramway			43610 73565 43662 73531	None
277	New Shaft raised track	183	22	43705 73463 43794 73499	Site to be retained, undisturbed
278	New Shaft/capstan	183	22	43791 73516	Assess hazard, fence if necessary
279	Shaft spoil mound	184	22	43773 73509	None
279/1	Boiler house chimney			43751 73514	Consolidate
280	New Shaft engine house	184	22	43735 73518	Consolidate
281	Site of reservoir pond	185	22	43775 73550	Site to be retained, undisturbed
282	Leat	185	22	43618 73485 43597 73354	Remove cut and growing trees, site to be retained and left undisturbed
283	Possible Shaft	186	22	43592 73509	Assess hazard, fence if necessary
284	Flat rod tower	186	22	43567 73508	Consolidate
285	Reservoir pond	187	22	44174 73742	Remove growing trees
286	Shaft	187	22	44162 73797	Assess hazard, fence if necessary
287	Smithy	187	22	44150 73676	None (privately owned)
288	Building	188	22	44132 73648	None (privately owned)
289	Mine offices	188	22	44114 73721	None (privately owned)
290	Carpenter's Shop	189	22	44123 73712	None (privately owned)
291	Miner's Dry	189	22	44096 73734	None (privately owned)
292	Site of Thomas's Shaft	189	22	44060 73717	Assess hazard, fence if necessary
293	Thomas's Engine house	190	22	44058 73727	None (privately owned)
294	Emma Incline railway	191	22	43699 73461 44038 73716	Site to be retained, undisturbed
294/1	Masonry bridge base			44006 73699	Consolidate
295	Plane steam winder	191	22	44046 73711	Site to be retained, undisturbed
296	Site of mine buildings	192	22	44031 73728	Site to be retained, undisturbed
296/1	Site of mine building			44015 73687	Site to be retained, undisturbed
297	Reservoir pond	192	22	43985 73672	Remove growing trees
298	Powder magazine	192	22	43957 73667	Clear vegetation, consolidate
299	Powder magazine	193	22	44001 73650	Clear vegetation, consolidate
300	Site of tramways	193	22	44020 73722 43938 73677	Site to be retained, undisturbed
301	Pond	194	22	44032 73759	Remove growing trees
302	Dressing floor ponds	194	22	43954 73726	Site to be retained, undisturbed
303	Incline Shaft boiler hse	194	22	43923 73694	Site to be retained, undisturbed
303/1	Chimney			43938 73695	Site to be retained, undisturbed
304	Incline Shaft Engine hse	195	22	43912 73698	Consolidate
305	Incline Shaft	196	22	43868 73700	Assess hazard, fence if necessary
305/1	Capstan			43876 73678	Consolidate
306	Mine building	196	22	43854 73687	Site to be retained, undisturbed
307	Mine waste tramways	197	22	43868 73699 43784 73622	Site to be retained, undisturbed
307/1	Bridge			43846 73686	Site to be retained, undisturbed
308	Pond	197	22	43809 73683	Site to be retained, undisturbed
309	Reservoir pond leat aqueduct	198	22	43850 73688 43817 73626	Site to be retained, undisturbed
310	Site of mine buildings	198	22	43842 73709	Site to be retained, undisturbed
311	Site of pond	198	22	43783 73710	Site to be retained, undisturbed

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
312	Adit portal collapse and lobby	199	35	43502 73185 43463 73139	Assess hazard, fence/grille if necessary
313	Quarry	199	35	43481 73130	Assess structural stability, consolidate
314	Leat	199	35	43568 73506 43619 73048 43501 73273 43434 73221	Remove cut and growing trees, site to be retained and left undisturbed Remove cut and growing trees, site to be retained and left undisturbed
314/1	Leat				
315	Adit portal (Fremontor)	200	38	42449 72455	Assess hazard, fence/grille if necessary
316	Blanchdown Ochre Wrks	200	35	43434 73188	Assess variable hazards
317	Blanchdown Adit	202	35	43416 73202	Assess hazard, fence/grille if necessary
318	'Great' twin waterwheels	202	35	434 730 43442 73063 43432 73053	Assess variable hazards
318/1	Josiah wheel				
318/2	Anna Maria wheel				
319	Shaft	203	35	43475 73008	Locate/assess hazard, fence
320	Plunger Shaft and pumps	204	8	43289 73111	Assess hazard, fence if necessary
321	Quarry railway line	204	8	42512 72518	Assess variable hazards
322	Large twin waterwheels	205	8	433 728 43319 72876 43305 72882	Assess variable hazards
322/1	Agnes wheel				
322/2	Plunger wheel				
323	Adit portal	206	38	43239 72906	Assess hazard, fence/grille if necessary
324	Site of building	206	9	43183 72955	Site to be retained, undisturbed
325	South Fanny waterwheel	207	26	42921 72860 42921 72860 43122 72883	Site to be retained, undisturbed Site to be retained, undisturbed
325/1	Tail race				
326	'Lower' Copper works	207	11	42975 72897 42930 72878 42904 72872 42857 72864 42952 72913	Site to be retained, undisturbed Consolidate Consolidate Site to be retained, undisturbed
326/1	Building				
326/2	Kiln/furnace				
326/3	Railway sidings				
327	Adit	209	38	42906 72897	Assess hazard, fence/grille if necessary
328	Adit/Shaft	209	38	42943 72917	Assess hazard, fence/grille if necessary
329	(South Fanny) Adit	209	26	42852 72866	Assess hazard, fence/grille if necessary
330	Blanchdown Drive	210	9	41538 73764 43679 72777	Assess variable hazards
331	Large ponds in grassland	210	38	42749 72661	None
332	Leat	211	26	42684 72642 42732 72855	Remove cut and growing trees, site to be retained and left undisturbed
333	Granite quarry waste tip	211	26	42759 72812	Assess stability, scale/fence
334	Shaft/lode back pits	211	38	42779 72853	Assess hazard, fence if necessary
335	Shaft/lode back pit	212	38	42779 72860	Assess hazard, fence if necessary
336	Copper precipitation trenches	212	38	42831 72913 42993 72978	Site to be retained, undisturbed
337	Flooded feature	212	38	43012 72955	Assess hazard, fence if necessary
338	Env. Agency cabin	213	38	42626 72527	None
339	Site of mine buildings	213	26	42680 72626	Site to be retained, undisturbed
340	Three reservoir ponds	214	38	42702 72686 42716 72731	Remove growing trees
341	Deep Adit Shaft	214	38	42562 72507 42565 72500	Assess hazard, fence if necessary Assess hazard, fence/grille if necessary
341/1	Deep Adit outflow				

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
342	Adit portal	215	38	42548 72530	Assess hazard, fence/grille if necessary
343	Granite quarry	215	26	42498 72532	Assess stability, scale/fence
344	Shaft	216	38	42518 72511	Assess hazard, fence if necessary
345	Site of quarry building	216	26	42634 72665	Site to be retained, undisturbed
346	Small canal quarry pits	216	38	42402 72423 42152 72513	Site to be retained, undisturbed
347	Adit Shaft	217	38	41713 72800	Assess hazard, fence if necessary
348	Collapsed adit portal	217	38	41673 72775	Assess hazard, fence/grille if necessary
349	Shaft, building and spoil	217	38	41666 72774	Assess hazard, fence if necessary
350	Adit	218	38	42484 72487	Assess hazard, fence/grille if necessary
351	Adit	218	38	42445 72469	Assess hazard, fence/grille if necessary
351/1	Gunnis			42440 72479	Assess hazard, fence/grille if necessary
352	Wh.Fremontor Gunnis	219	38	42341 72490	Assess hazard, fence/grille if necessary
353	Wh.Fremontor Shafts	220	38	42358 72481	Assess hazard, fence if necessary
354	Wh.Fremontor (1925) dressing floor	220	38	42361 72484	Site to be retained, undisturbed
355	Quarry	221	9	42580 72783	Assess stability, scale/fence
356	Shaft	221	38	42546 72600	Assess hazard, fence if necessary
356/1	Prospecting pits			42570 72602 42532 72600	Assess hazard, fence if necessary
357	Large sands tip	222	37	42737 73244	Site to be retained, undisturbed
357/1	Sites of two earlier ponds		16	42737 73205 42773 73240	None
358	Water tunnel (west)	223	38	42739 73188	Assess hazard, fence/grille if necessary
359	Water tunnel (east)	223	38	42781 73207	Assess hazard, fence/grille if necessary
360	Site of 'Higher' copper precipitation works	224	38	42728 73161	Site to be retained, undisturbed
361	1970's reprocessing mill	224	38	42684 73177	Site to be retained
362	1940's mine building	225	38	42752 73107	Site to be retained, undisturbed
362/1	1940's building			42771 73083	Site to be retained, undisturbed
363	Large tailings pond	226	37	42816 73135	Site to be retained, undisturbed
363/1	Site of earlier pond		16	42874 73089	None
364	Leats (west)	227	16	42845 73051 42874 72993	Remove cut and growing trees, site to be retained and left undisturbed
364/1	Leat (east)		16	42898 73058 42910 73019	Remove cut and growing trees, site to be retained and left undisturbed
364/2	Drainage pipe			42932 73023	None (privately owned)
365	Precipitation tank	227	38	42867 72979	Site to be retained, undisturbed
366	Quarry	228	38	43117 73315 43028 73377	Assess stability, scale/fence
367	Ventilation shaft/capstan	228	8	43101 73415	Assess hazard, fence if necessary
368	Small Quarry	229	9	43223 73387	Assess stability, scale/fence
369	Parallel leats	229	38	43213 73144 43083 73162	Remove growing trees
370	Wh.Thomas waterwheel	229	35	43599 73017	Site to be retained, undisturbed
371	Old Shaft	230	35	43608 73094	Consolidate
371/1	Masonry structure			43609 73094	
372	Masonry structure	231	35	43604 73092	Consolidate
373	Site of mine buildings	231	35	43646 73045	Site to be retained, undisturbed

Site	Site Name	Page	Fig	NGR (SX)	Archaeological recommendations
374	Adit	231	35	43699 73031	Assess hazard, fence/grille if necessary
375	Whim/Air Shaft/capstan	232	35	43719 73032	Assess hazard, fence if necessary
376	Wh. Thomas Flat rod cutting	232	35	43721 73036	Site to be retained, undisturbed
376/1	Flat rod cutting			43900 73049 43868 73063 43741 73073	Site to be retained, undisturbed
377	Bawden's Shaft/capstan	233	35	43651 73009	Assess hazard, fence if necessary
378	Shaft and Capstan	233	35	43638 73019	Assess hazard, fence if necessary
379	Site of adit	234	35	43622 73020	Assess hazard, fence/grille if necessary
380	Eastern Engine Shaft	234	35	44034 73077	Assess hazard, fence if necessary
381	Prospecting pits	235	35	44000 73065	Assess hazard, fence if necessary
382	Site of mine building	235	35	43929 73145	Site to be retained, undisturbed
382/1	Site of mine building			43952 73086	Site to be retained, undisturbed
383	Watson's Engine Shaft	235	35	43911 73048	Assess hazard, fence if necessary
384	Charcoal burning pltfms	236	38	43724 72867	Site to be retained, undisturbed
385	Plunger (Engine) Shaft	236	38	43289 73110	Site to be retained, undisturbed
385/1	flat rod cutting Site of pipe from Plunger Shaft to Wh. Josiah			43303 72876 43290 73113 43209 73545	None
386	Lode back pits	237	37	42148 72902 42255 72945	Assess hazard, fence if necessary
387	Prospecting pits	237	37	42235 72879 42313 72913	Assess hazard, fence if necessary
388	Prospecting pits	238	37	42186 73047 42297 73054	Assess hazard, fence if necessary
389 - 395	Listed Buildings (all Grade II)				None (follow Listed Building regulations)

6.2 Masonry Structures Requiring Treatment

A number of structures (not including shafts and adits), identified during the survey will require urgent attention (both large and small). A small proportion of the sites detailed below will need to have EDM surveys and most will require archaeological watching briefs if full consolidation and repointing works are to be carried out. However, it is recognised that some of the (few) standing buildings on the mine may not merit full consolidation (given the pressure of funds for works elsewhere on the mine), although the proximity of planned public access to some of these sites will determine the degree of consolidation that is undertaken. **Limited works** means lintel replacement/wall 'capping' and small areas of repointing where absolutely necessary for structural reasons to preserve the building for at least another generation. **Structural priority** relates to an assessment of the long term preservation of the feature. 1 = urgent need for works (i.e. structural components failing), whilst 3 = less urgent needs for works. **Visibility (public access)** relates to proximity of features to existing permitted/adjacent public access. **H/S priority** relates to an (archaeological) assessment of risk (for public and adjacent owners) in terms of stability/steep drops/possible contaminated ground etc.

Site No.	Site name	Action	Limited works	Struct. priority	Visibility (public access)	H/S priority (access)	Overall priority
55	Wh. Maria House/outbuilding	EDM, Survey, consolidation, repointing		1	L		L
60	Wh. Maria Foundry wheelpit	Consolidation and some repointing		2	L		M
61	Wh. Maria Foundry wall	Consolidation and some repointing		3	M		L
61/1	Tunnel portal	Consolidation and some repointing		1	H		H
72	Wh. Maria buddles	Consolidation and repointing		3	H		M
83	Eastern Shaft tunnel/capstan	Survey and consolidation		1	H		H
95/1	Leat bridge tunnel	Consolidation		3	H		M
108	Quarry House/outbuilding	Survey, consolidation, repointing		3	M		L
131	1922 Arsenic Chimney	Repointing to the top		3	H		H
132	1922 Arsenic flue and chamber	Veg. clearance, consolidation and some repointing		3	H		H
144	Pair of cottages	EDM, Re-roof, consolidation, some repointing		3	H		H
156	Office/railway building	EDM, Clearance, consolidation, some repointing		2	L		M
159/1	Small Leat/track Bridge	Consolidation, some repointing		2	H		M
159/2	Small Track Bridge	Consolidation, some repointing		2	H		M
167	Mine building	Consolidation and repointing		1	L		M
180/2	Mine waste bridge	Partial rebuild, consolidation and repointing		1	L		L
180/4	Wheal Emma bridge	Partial rebuild, consolidation and repointing		1	H		H
183	Pair of cottages/offices	EDM, Consolidation and some repointing		2	M		M
188	Wh. Fanny buddles	Clearance and consolidation		3	H		M
195	Arsenic condenser	EDM, Partial rebuilding, consolidation and repointing		1	H		H
196	Flues to condenser	Consolidation, capping and some repointing		1	H		H

Site No.	Site name	Action	Limited works	Struct. priority	Visibility (public access)	H/S priority (access)	Overall priority
198	Brunton Calciner (No. 1)	Wall capping, consolidation and some repointing		1	H		H
199	Brunton Calciner (No. 2)	Wall capping, consolidation and some repointing		1	H		H
200	Arsenic Refiner bed	Consolidation		3	H		H
201	Arsenic Grinding mill	Consolidation		1	H		H
202	Engine and boiler house plinth	Consolidation		3	H		M
203	Copper crusher plinth	Consolidation		3	H		M
204	Arsenic Shaft kiln	Consolidation and repointing		2	H		H
220	S. Fanny Shaft walls	Consolidation		2	L		L
228	Wh. Josiah Powder Magazine	Consolidation and some repointing		2	L		L
237/1	Flat rod bridge	Consolidation and some repointing		2	H		H
237/2	Flat rod bridge	Consolidation and some repointing		2	H		H
258	Agnes Shaft structures	Clearance, consolidation and some repointing		3	H		H
262	Building	Consolidation and some repointing		3	H		M
270	Path Shaft collar wall	Consolidation and some repointing		3	L		L
280	New Shaft Engine/boiler house	Consolidation and some repointing		1	L		M
284	Flat Rod tower	Consolidation and some repointing		1	M		H
298	Wh. Emma Powder Magazine	Consolidation and some repointing		3	H		H
299	Wh. Emma Powder Magazine	Consolidation and some repointing		3	L		L
304	Incline Shaft Whim Engine Hs	Consolidation		3	H		H
326/1	Precipitation works building	EDM, Consolidation and repointing		2	L		L
326/2	Precipitation works kiln	Repointing		3	L		L
371	Old Shaft masonry structure	EDM, Consolidation and some repointing		1	L		L
372	Masonry structure	Consolidation and some repointing		2	L		L

7 Site Inventory

Notes:

- Refer to Figure 38, the Site Inventory map (in a plastic sleeve at the rear of the report) when locating these sites.
- All identified structures and sites are located by a 10-figure grid reference. In most instances these relate to a point at the centre of the feature/structure. If the site feature covers a large area the word (centered) is used after the NGR number in the header description. Linear features (leats and railway lines), are given NGR at either end.
- The table of sites in Section 8, cross-references these sites with the risk assessment and geotechnical mine report produced by F. Sherrell, West Devon Borough Council's mine shaft survey, and Devon's Sites and Monuments Records.
- Given the large size of the project area and the high number of archaeological features, management recommendations for each site have taken into account a combination of the proximity of public access (and consequently the need for a higher safety factor) and the short/long term preservation of archaeological features in a working woodland environment (see management recommendations for the preservation of sites in woodland – Appendix III).
- There will not be sufficient funding to treat every site and for this reason access routes to every site have not been given.

Site 1 Western Shaft SX 41811 74342

Grade C

Background

The 1867 lode map (Fig 8) shows the location of this shaft and its lode (named New North Lode). Sherrell's geotechnical report (Devon Great Consols Report No 1915, October 2000), concurs with this but additionally gives the lode trend as 090° with a 60°N dip. Dines (1956, 656) states '*the lode underlies nearly 30° N and the shafts are sunk north of the outcrop*'. The documented underground workings are described as an adit driven 240 fathoms (440m) into the hill. This shaft is not shown on the 1884 OS map.

Survey

The shaft is presumed to be a feature located 6.0m north of the nearby field boundary fence. It has been partially excavated by badgers but measures 1.5m in diameter and depth. The shaft is sited on the southern edge of impenetrable vegetation in low conifer woodland (5-8m high). The shaft was not found during the mine surface reconnaissance and desk study (Sherrell 2000, *ibid*).

Recommendation

Although the shaft is not located near any track, it would be advisable to confirm that this feature is a shaft (by close cartographic analysis of the 1867 lode/shaft map), and to fence it if it subsequently is proved to be a shaft.

Site 2 Eastern Shaft SX 41917 74357

Grade B

Background

The 1867 lode map (Fig 8) shows the location of this shaft and describes it as 'filled'. It is on the same lode described above. The shaft's spoil heap is shown on the 1884 OS map. '*Eastern Shaft passes through the lode a little above the 54 fm level (below surface) and is connected to Adit Level (28fms) by a crosscut south*' (Dines 1956, 656).

Survey

A vertical granite marker post (measuring 0.75m high and 0.25m wide) marks the shaft location. It is located in the east of a finger dump that measures approximately 3.5m in height above ground level on its western (downslope) side and is approximately 16.0m in length. There is no ground depression around the shaft marker. Mature woodland has grown over the site that is now separated from the newly planted conifer woodland to the north. A relatively well preserved example of a horsewhim platform or capstan appears to be represented by a flattened circular part of the spoil mound 2.5m above ground level and 6.0m in diameter. The centre of the feature is approximately 10.0m from the centre of the shaft on its southern side.

Recommendations

Although the shaft is not located near any track but in a field, given the use of the site by grazing stock, it is advisable to fence the shaft.

Site 3 Unnamed Shaft SX41732 74312

Grade C

Background

The 1867 lode map (Fig 8) shows the location of this shaft and describes it as '*filled*'. It is on the same lode described in Site 1 above. The shaft is not shown on the 1884 OS map.

Survey

The shaft seems to be represented by a depression measuring 4.0 x 4.0m with an encircling bank 0.6m high. There is a possible horsewhim platform located 7.0m to the north-west with a bank on its eastern side measuring 0.65m in height. The platform is eroded on its western side but measures approximately 7.0m in width. 5.0m to the west of the horsewhim platform is a spoil tip measuring 6.0m in length oriented north to south and approximately 2.0m in height. The shaft is located in a mature conifer plantation.

Recommendations

The shaft is located near a track. It is therefore advisable to confirm that this feature is a shaft (by close cartographic analysis of the 1867 lode/shaft map), and to fence it if it subsequently is proved to be the shaft.

Site 4 Lode back pits SX 41574 74461 to 41710 74436

Background

The site inventory plan (Fig 38), shows an area of ground covered by a dense alignment of lode back pits and shallow openworks. The orientation of the alignment (corresponding to the general lode outcrops given by Sherrell 2000, Report 1915), suggests that this was another lode that outcropped at surface.

Survey

The woodland to the north of the shafts (Sites 1-3) above is characterised by two different types of conifer woodland. The area immediately north of Sites 1 and 2 have dense undergrowth around young conifer trees which measure approximately 5-8m in height. Ground survey was not possible due to site constraints. The area of woodland to the north of an east - west woodland track is characterised by mature conifer woodland with deep layers of dead branches on the ground. This part of the woodland contained costean pits and, near an access track, a line of deeper lode back pits mirroring (to the south), the

outcrop course of New North Lode. The smaller pits have elliptical shaped spoil heaps located downslope (west) of each depression measuring approximately 0.9m in height and 3-4.0m in length. The deeper pits measure approximately 1.0m to 1.5m in depth and are approximately 3-4.0m in diameter across the pit throat. The larger lode back pits have slightly higher spoil heaps and deeper throats (to a maximum depth of approximately 2.0m).

Recommendations

If the forest track south of this site is to be accessed by members of the public, it may be prudent to enclose the lode back pits by a fence, or alternatively to erect a fence along the track. The lode back pits should be fenced to restrict access by heavy woodland maintenance vehicles for their long term site preservation.

Site 5 Leat SX 41479 74385 (Scrubtor) to SX 43599 73017 (Site 370)

**5/1 Leat tunnel under track/spoil heap SX 41592 74090 to
SX 41596 74076**

5/2 Leat tunnel under track SX 43355 73154

5/3 Leat tunnel and aqueduct SX 43437 73111

Background

Symons 1848 map (Fig 4) shows this leat going from Scrubtor to a water wheel at a point east of Wheal Maria (copper) Grinder and Dressing Floors (Site 61). The 1857 Lease map for Devon Great Consols (Fig 7) shows a single leat running from north of Scrubtor down to (and west of) Wheal Maria, west of Frementor Woods around the hill (via the Blanchdown ponds), to feed a water wheel sited near Blanchdown Farm (a length of 5 miles). The water wheel (Site 370) powered flat rods that pumped a shaft (Site 383) at Wheal Thomas (later Watson's) Mine. Within the next ten years this leat had been adapted and slightly altered to meet the changing needs of the mine. Certainly the route west of Wheal Maria Foundry and north of Blanchdown Farm was altered to respect the mines changing priorities for power and water management.

Survey

The leat has been identified at various points along its route, particularly where cartographic evidence suggests it had been changed or adapted throughout the different phases of the mine.

At SX 41527 74330 the leat measures 0.9m across its base, 1.8m across its top, its downslope bank measuring approximately 0.9m in height. The leat has been destroyed in places by forestry tracks but has survived best within the woodland.

At Site 5/1: SX 41590 74139 the 1884 map labels a footbridge where a track from the south-east goes over the leat. The bridge is constructed of stone with an arched stone roof that appears to have been built through/under Adit Shaft spoil heap (Site No. 8). The arched tunnel measures 0.8m in width and 0.6m in height (to the rubble floor). The leat tunnel should emerge on the southern side of the spoil heap at SX 41954 74088, but substantial collapse of rubble from the spoil mound has obscured its opening.

To the south at SX 41595 74059 the leat's west bank has been removed by use of its route as a machine access track, presumably for woodland maintenance. From cartographic

evidence it appears the leat was utilised after 1857 to power or help to power the Wheal Maria water wheel.

At a point immediately south of Site No 25, the leat measures 1.8m across its base and approximately 4.0m across the top of its banks, its lower bank being 0.7m above the ground level to its west. At a point east of South Fanny Shaft (SX 42739 72866), the leat is full of water, flowing in a northerly direction and measures 1.75m in width.

At Site 5/2: the leat goes under a mine track west of the Blanchdown ponds as shown on both the 1867 and 1884 maps. The leat measures 0.8m in width and 0.7m in depth. The small tunnel under the road is blocked up at its west end (obscuring the tunnel face). However the route of the leat on the other side of the track is not certain (nor is its continuation past the Agnes Shaft flat rod cutting).

At SX 43344 73120 (west of Site 5/2 above), the leat crosses the flat rod cutting (Site 159/2). The leat measures 1.0m in width internally and from 0.5m to 1.0m in height below ground level. The leat banks appear to have been built over the flat rod cutting (although the flat rod itself will have either gone under or over the leat).

At Site 5/3: the leat goes under a track running along the eastern side of Blanchdown processing works that has been bridged over the course of the leat. The leat measures approximately 1.2m in width and 1.5m. The tunnel opening (at its east face) measures 2.8m in width and is 2.9m high (from the head of the stone arch). The tunnel is blocked at a distance of 8.0m from the entrance. The west face of the tunnel is not visible as leaves obscure it, rubble and a partial collapse. 4.0m west of the tunnel is a later leat aqueduct that crosses (from north to south) the earlier route of the leat (after cutting through a spoil heap north of this location). This is shown on the OS 1884 map (see Figs 9 and 35), and appears to represent an example of the mine's changing priorities in terms of water (and power) management. The aqueduct is built of stone and earth and measures 1.2m in height, 0.4m in width and 0.3m in depth.

At a point east of South Fanny Shaft (Site 226) the leat appears to have been cut at SX 42766 72895. This appears to be a junction with a later leat shown on the 1954 Third Edition OS map. This short section of leat is not shown on earlier archive maps but may be related to the 1920-1930 copper precipitation works to the south (Site 326).

At SX 43493 73122 (south of Quarry Site 313), the leat measures 1.8m in width, the downslope bank being 1.0m in height. The upslope bank varies considerably in height depending on the nature of the topography (it can be up to 5.0m in height), and the bank has been built with a stone retaining wall where necessary. Some of the small adjacent quarries are likely to have been opened for this reason.

During a field visit at SX 41686 72902 (where the leat is cut by Blanchdown drive), part of the leat has been destroyed by a very recent forestry track.

Recommendations

It is recommended that the creation of new forestry tracks should take into account the location of archaeological features described in this report. If there is a conflict with archaeological features, the County Archaeologist should be consulted. It is further recommended that the practice of infilling pits and leats with cut branches (obscuring their site and depth), should cease. Where leats are close to tracks that are to be used by

members of the public, trees and vegetation could be removed to enable such features to be visible.

Site 6 Adit SX 41571 74308

Background

The 1867 shaft/lode map (Fig 8) shows this site and labels the adit. It is not shown on later OS maps. It drains New North Lode (described above) and from related evidence of the nearby spoil heap, appears to have been used to remove waste from the working levels on the lode (though may simply be the spoil from cutting the adit).

Survey

The adit is open, has water issuing from it, and is located on the edge of an open area of ground that has recently had its woodland cover removed. The long adit lobby has ingrown with dense brambles that prevented close inspection of the adit portal, though this measures approximately 2.4m in depth from the surrounding ground level and 1.7m in width. The adit lobby measures approximately 14.0m in length reducing to 1.0m in height at its end.

To the south-west of the adit is a large finger dump of mine spoil measuring 2.5m in height and approximately 10.0m in width and 7.0m in length with the top slightly flattened. Possibly related to the adit working is an area of ground to the west of the trackway that has been excavated into the slight hillslope to create what may have been a working/processing area.

Recommendations

The adit portal and lobby are visible from the track and need to be cleared of vegetation. It is recommended that the adit lobby and portal are assessed for structural stability and an adit grille installed to prevent public access. As the adit is issuing water, it may be prudent to conduct an assessment of water flow at times of high rainfall and its effect on the nearby track.

Site 7 Streamworks SX 41446 74352 to SX 41500 74215

Background

Adjacent to the stream are shallow channels, pits and spoil dumps. These are characteristic remnants of stream-working activity (finding and processing alluvial tin deposits in and adjacent to streams), that preceded post-medieval attempts to find and work surface outcrops of tin and copper. Although this stream-working activity may have occurred in the medieval period, it is likely here that the site was re-investigated in the 18th century at a time when documentary evidence (*Pers comm.* Tom Greeves) indicates this general area of the Tamar Valley sited water wheel powered tin stamping mills (refer to the historical background section).

Survey

Running parallel to the stream marking the western boundary of the project area are a pair of leats. In the same area (between the north - south oriented track and the stream are some lode back pits. The channels and pits vary in size but many of the pits are flooded as are some of the associated leats and waterways.

Recommendations

Although this site is adjacent to a track that may well be used by members of the public, there are no archaeological recommendations apart from the preservation of these indicative landscape features.

Site 8 Adit Shaft SX 41603 74082

Background

The 1867 lode map (Fig 8) and Fig 13 (the 1867 and 1884 maps), show the location of this shaft and its lode (named Capel Tor Lode). Sherrells geotechnical report on Devon Great Consols (Report No 1915, October 2000, (Table 1, 2), concurs with this but additionally gives the lode trend as 080° with a 68°N dip. The documented underground workings are described as being '*worked only on the west side of the Great Crosscourse to 200m depth at Adit*'. Dines (1956, 656) states '*Capel Tor Lode ... Underlying 22° N, and coursing nearly due east, this lode has been worked only on the west side of the Great Crosscourse The Adit Shaft sunk near the adit mouth, is 40fms. Deep has levels at 12fm. and 32fms*'. This shaft is not shown on the 1884 OS map.

Survey

The shaft is choked, its deepest point being 2.3m below ground level on its west side where intact shaft timber lining is evident. The shaft measures 1.7m in width and 3.7m in length and probably still retains its timber lining around all of its sides below ground level. The top of the timber lining is at a depth of approximately 1.3m below ground level. The shaft is not fenced although there is a granite shaft marker in its centre (measuring 0.75m above ground level). Trees growing around the edges of the shaft need to be removed.

At a distance of 6.0m north of the shaft there is a depression measuring approximately 1.5m below ground level and an area of 4.8m x 4.8m. This may be another shaft (possibly a separate footway access). West of both features is a flat rounded area of ground on a bed of mine spoil (2.4m above ground level), that appears to be a horsewhim platform. Part of a bank exists on its northern side measuring 0.5m in height and 3.0m in length. The spoil dump measures approximately 7.0m in height above a trackway (to the south), that may well pre-date the formation of the spoil heap. A stone revetment wall has been built measuring 1.2 to 2.0m in height to retain the spoil from blocking the track, although this has collapsed in places.

Recommendations

To retain the stable sides of the shaft it is recommended that the trees growing in close proximity should be removed. Given its relatively close proximity to a nearby forest track it is recommended that the shaft(s) are fenced. If the track running through this site is to be accessed by members of the public, the structural stability and safety of the spoil heap retaining wall needs to be assessed.

Site 9 Working area/building platform SX 41601 74087

Background

A wide dotted area is shown around the shaft on the 1867 maps (Figs 8 and 13), within which this feature may have been located. It is not shown on the 1884 or later maps. The site appears to be either a working/ore store area or a large building platform.

Survey

An area of ground has been excavated into the west-facing slope and a 1.2m high dry stone retaining wall (at its highest point), constructed measuring approximately 10m in length (north - south) and 6m in width. There are smaller remnants of the north and south walls but no remnants of the west wall.

Recommendations

If members of the public have access to this site it would be prudent to carry out an inspection of the structural stability of the retaining wall and to repair/consolidate if appropriate.

Site 10 Enclosure SX 41541 74101 (centered)
10/1 Site of mine building SX 41550 74088

Background

The 1867 map shows a small roofed mine building associated with an enclosed area. The 1884 OS map shows the 'yard' boundary but not the building. This may have been a yard for ore either brought out from the shaft or a nearby adit.

Survey

Site survey found evidence for a low bank/wall following the 1884 map outline measuring 0.3m in height, the bank being 0.4m in width. There is no extant evidence of the building, although its site can be located on the ground. West of the building site is an excavation near the river measuring 1.5m in depth and 6.0m in width and 9.0m in length (north - south).

Recommendations

None.

Site 11 Bridge SX 41533 74077

Background

This bridge provided access over the stream to Old Engine Shaft and via a track to a Quarry shown on the 1884 OS map.

Survey

At a distance of approximately 30.0m from the track there is a stone-built, round-arched bridge providing access over the stream to a shaft, nearby quarry and Devon Great United Mine beyond, as shown on the 1884 OS map. The bridge opening measures approximately 3.0m in width and height above river level with a length of approximately 7.0m and 4.0m in width. Both faces of the bridge have partially collapsed and will need rebuilding if members of the public are to be permitted access.

Recommendations

The outer sections of the bridge need to be rebuilt and the remainder of the bridge consolidated. It is possible that this route over the stream could be re-opened as access to Devon Great United Mine or other routes.

Site 12 (Old) Engine Shaft SX 41520 7407

Grade C

Background

This shaft is labelled as Old Shaft on the 1867 shaft/lodes map (Fig 8), although it is not shown on the earlier 1848 Symons mine map (Fig 4). Dines (1956, 656) states '*Engine Shaft is sunk vertically to Adit Level (11fms.) and on the underlie to the 54fm. Level following the footwall side of the lode*'. Levels have been cut to the east and west sides of the shaft down to the 47fm. level, with stoping between the 24 and 36fm. levels for a length of 15fms. This feature is out of the project area.

Survey

A 0.75m high granite stone marker denotes the site of the shaft in the centre of a shallow depression approximately 7.0m west of the riverbank. There is no fence and no visible sign of collapse around the shaft site.

Recommendations

If members of the public are permitted access over the bridge then the shaft should be fenced at an appropriate distance from its edges.

Site 13 Adit SX 41542 74066

Background

This adit is not shown on maps used within this report, but was located on site by the Sherrell survey from site information provided by a previous West Devon Borough Council Geotechnical survey (see addendum Table 1 at the rear of this report). The adit drained workings from Capel Tor Lode to the east.

Survey

The adit portal is open, issuing water and has intact timber supports as far as the eye can see. The timbers measure 0.7m in length at a height of 1.0m above water level. The adit measures 1.0m in width and 2.3m in height above water level. Ground level above the head of the portal measures 2.0m in height although it has collapsed leaving a small rubble mound over the entrance, but with the water percolating through.

Recommendations

It is recommended that members of the public should be protected from falling into the short adit lobby and entering the open adit, by fencing around the top and sides of the adit lobby (under archaeological supervision).

Site 14 Adit SX 41544 74045

Background

Refer to Site 13 above.

Survey

The roof of the adit portal has collapsed leaving an opening with similar measurements to Site 13 (1.0m in width and 2.5m in depth). The adit lobby measures 3.0m in length and 2.5m in height with standing water at ground level in front of the portal. A leat runs from the end of this adit lobby parallel to the course of the stream, southwards. However, at a location of SX 41543 74030 (5.0m south of the adit portal), there is a water filled stone

sided tunnel running underneath the course of the leat (the roof of which has collapsed). This measures 0.4m in width and depth. The surface outlet of the tunnel was not found, but the leat (taking water from both adits), runs parallel with the river for some distance and joins it at SX 41547 73964.

Recommendations

Although this adit is not as visible as the previous site, it may well be prudent to undertake the same approach of fencing. Also a small horizontal surface grille might be required over the small open section of water tunnel.

Site 15 Pair of Leats SX 41562 74066 to SX 41566 73966

Background

These leats are not shown on any mine map viewed during research for this report. It is quite likely that they may predate the mid C19th and may relate to the possible streamworks shown as Site 7 above. Given the documentary references to mid 18th century Stamping Mills found in the Tamar Valley by Tom Greeves (as shown in the Devon SMR), this site may be a surface remnant of a leat to these sites.

Survey

A pair of parallel leats, measuring 4.0m in width (with a central bank of spoil from both leats). Both leats measure approximately 0.9m in width across their bases and 2.2m across the tops of their banks. The leats run parallel to the track and river in dense conifer woodland.

Recommendations

It is recommended that during any tree cutting or pruning the temptation to fill in or cover up the leats should be avoided. Access for general woodland maintenance should take note of the location and extent of the feature.

Site 16 Adit/culvert SX 41544 73892

Background

The 1867 map (Fig 13), appears to show an outflow of water from a contaminant settling tank (Site 27) down to the stream tributary. However this feature, although in a similar location, may well be of later date and possibly functioned as a shallow water culvert, taking water from either a pond or adit outflow from the Wheal Maria foundry area.

Survey

The adit outflow is located at a distance of less than 5.0m from the track, although there have been other collapses upslope from this point to the track. The shallow culvert measures only 0.3m in depth and 0.4m in width and is timber lined with horizontally laid planks. The outflow point has been fenced with barbed wire that has partially collapsed where the ground has slightly subsided. The route of the shallow adit can be traced as the ground above (approximately 0.3m) has collapsed and subsided in places. At the location where the adit goes under the track, the surface reduces in height to a depth of 0.1m for a width of 0.3m.

Recommendations

This feature will need to be fenced along its course from the track edge to the possible portal end. This is preferable than excavating the feature to create a smooth banked route. The culvert and portal end will need to be surveyed to ensure that it will not collapse in the immediate future. It is however further recommended that the culvert route under the road is excavated, recorded by a suitably qualified archaeologist, replaced by a stone drain and the track resurfaced.

Site 17 Mine building SX 41602 73919

Background

This building (possibly originally circular) is only shown on the 1884 OS map (See Figs 9 and 13) and its function is by no means certain. It may be a small mine magazine although this is shown as Site 46 on Symons 1848 map (Fig 4). There are a several examples of circular mine magazines in Cornwall. Alternatively there are a number of leats shown south and east of this feature (Leat No 5 goes underground nearby as shown on the 1867 map) and 'Sluices' are labelled at this location on the 1880 map. This building may have been a small building from which the sluices were manually operated, to provide a constant flow of water to the wheelpit below (which either wound, or pumped water from Gard's Shaft - Site No 18).

Survey

Sited north-west and upslope of a large depression in the ground (previously the site of the wheelpit), are the remnants of a curving section of wall which measures 4.0m in length and 2.0m in height (0.47m thick). The surviving wall appears to be part of the building's western side. There is another small section of wall 4.0m to the north-west that measures 0.6m in height and has a length of 2.8m.

Recommendations

The building needs to be consolidated and repointed to preserve it for the future. Work should be specified and supervised by a qualified and experienced archaeologist.

Site 18 Site of Wheal Maria Wheelpit SX 41629 73919

18/1 Reservoir Pond SX 41642 73905 (centered)

Background

The water wheel pit and building are first shown on Symons 1848 map (Fig 4) and mentioned by Bennett (1982, 19) as being nearly ready for erection in 1846 for hauling. It was first powered by a leat from the north (Leat Site 5) but also later from the east (from reservoir pond Site 34). Water from these leats fed a reservoir pond located south-east of the wheelpit. From the angle of the water wheel it appears to have been constructed to power flat rods to wind ore from and pump, Gard's Shaft (Site 51). Hall (2000, 99 and 106-7), gives the size of the water wheel as being 50ft by 4ft breast '*pumping at Wheal Maria and Wheal Fanny, works 10" and 8" lifts in Gard's Shaft to the depth of 135 fathoms*'.

Survey

The reservoir pond shown south-east of the wheelpit on the 1867 and 1880 maps has been expanded to include the site of the wheelpit. It now measures approximately 20m in diameter and is full of water, mud and silt. Water now enters the site from the east side via

a small waterfall and exits on the west side. The sides are approximately 5.0m below ground level and are relatively steep.

Recommendations

If public access to the area is permitted the sides of the depression may need to be fenced.

Site 19 Quarry SX 41603 73967

Background

This small quarry is not shown on the maps used as reference for this report. There are a number of small quarries around Devon Great Consols Mine; most of them appear to have been used to supply stone for buildings or the walls of leats etc.

Survey

This is a small killas quarry set into the west bank of the leat running south (Site No 5) to Wheal Maria wheelpit. The quarry measures approximately 12.0m from north - south and 5.0m from east - west. At its highest point, the rear face of the quarry measures approximately 5.0m in height.

Recommendations

None

Site 20 Drain Portal SX 41653 73882

Background

The adit functioned as an outflow for water either from the Wheal Maria dressing floors or the later use of the site as Weal Maria Foundry. Sites, 54 and 57 all contained water for the Foundry. This tunnel may well have functioned as an outflow from these reservoir tanks. The short leat fed by the portal can be seen on the 1867 map (Fig 13), and is labelled on the 1884 OS map (Fig 13) as 'Sluice'.

Survey

This adit is set within a near vertical retaining wall built along the downslope (west) side of the road running around the outside of Wheal Maria Foundry (Site No 61). The adit measures 0.75m in depth and 0.7m in width. It is open and the portal stonework appears to be in good condition. It is not very accessible as it is sited approximately 2.0m above ground level. There is a 6.0m long leat that measures approximately 1.0m in depth near the portal that leads into another leat running parallel to the vertical retaining wall around the side of the hill. This leat (Site No 21 below) used to feed into the large reservoir pond near the wheelpit (Site No. 18).

Recommendations

This open adit probably will not need to be secured due to its inaccessibility, unless the track running nearby is to be used by members of the public.

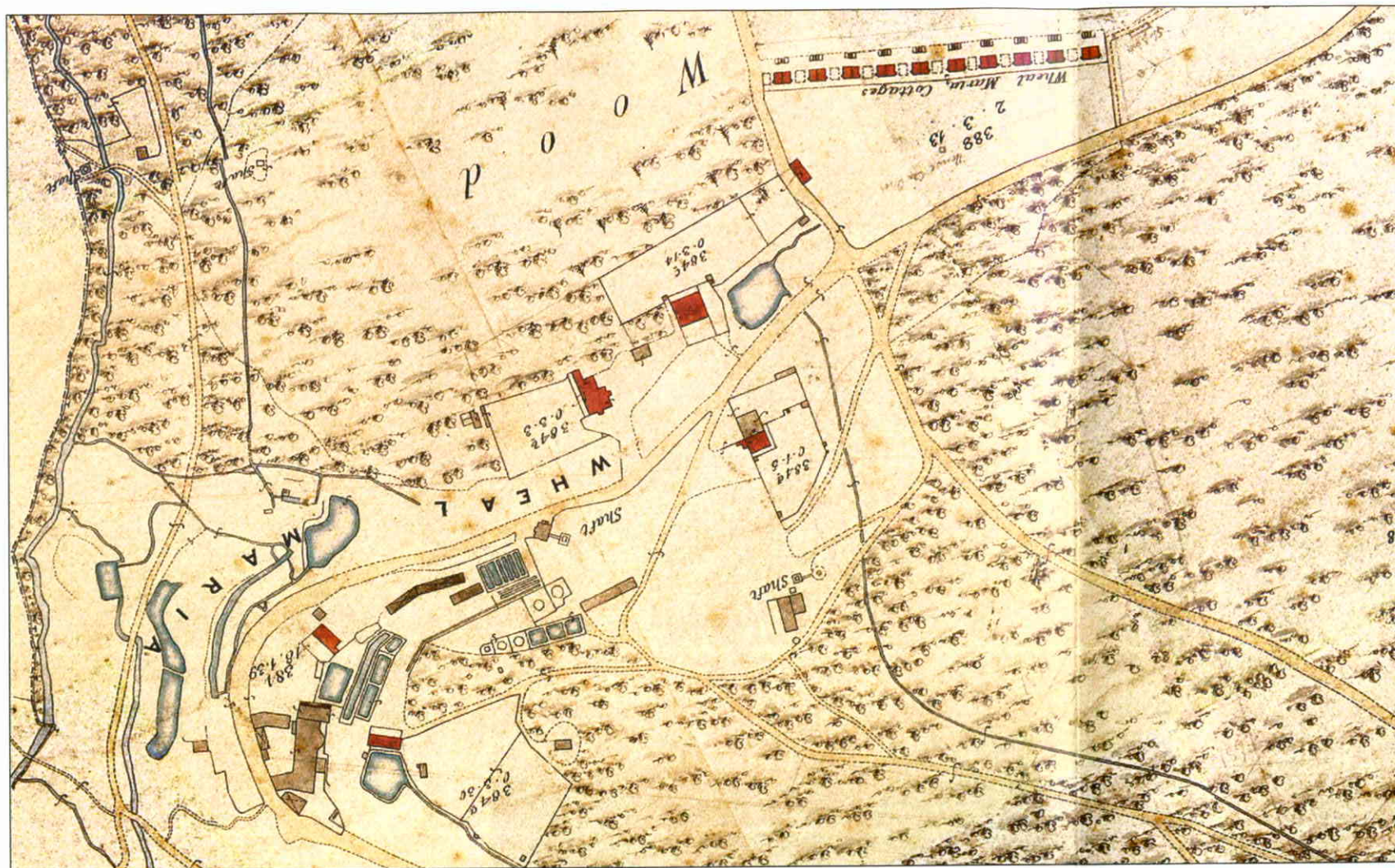
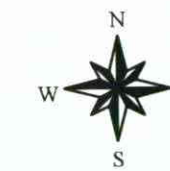
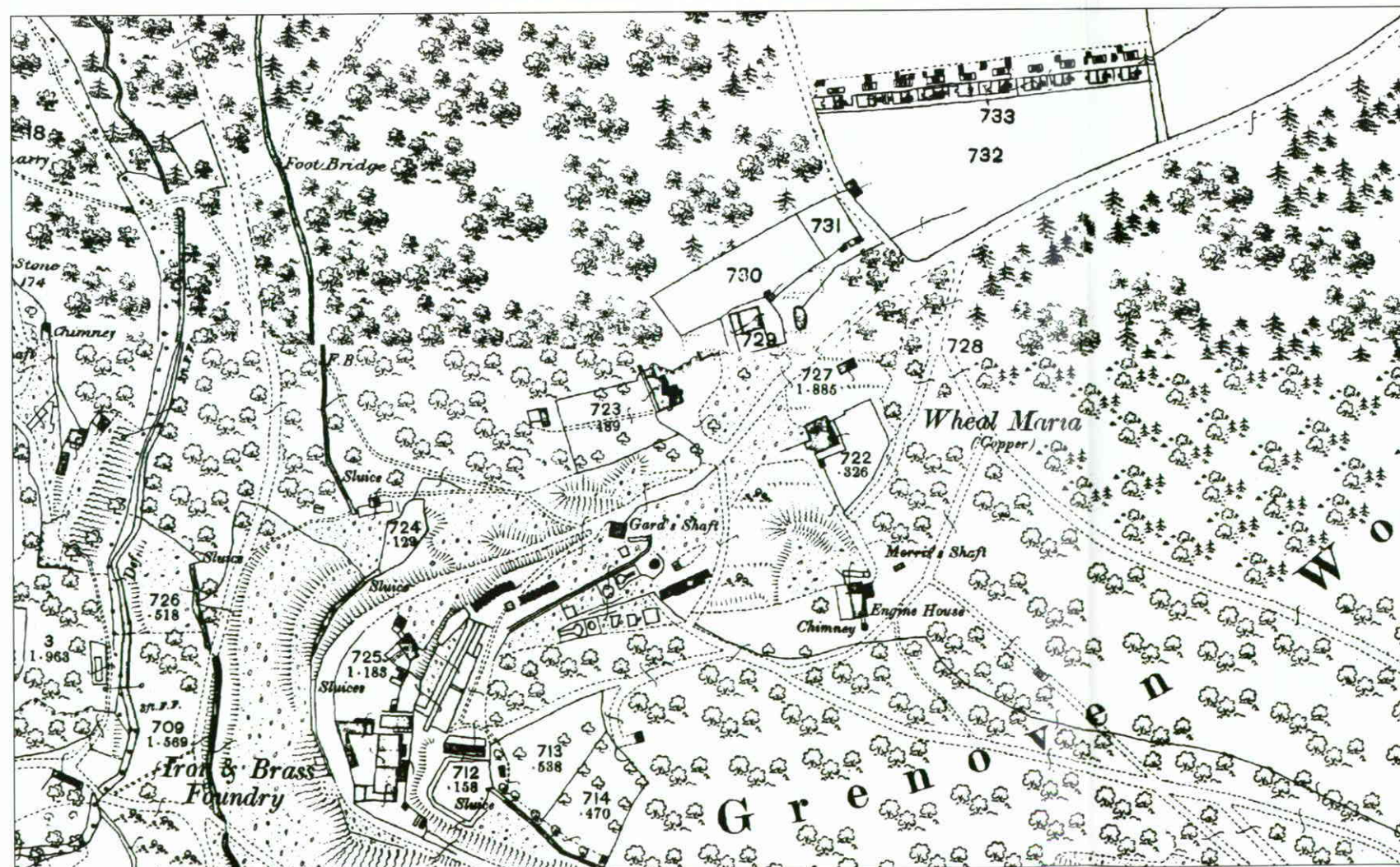


Figure 13 *Wheal Maria as shown on the surface plan 'Tavistock Parish (Div. No.1)' 1867*

(Tavistock Parish (Div. No. 1) - DRO/T1258M/E11 - 3 chains - 1 inch)

0 25 50 75 Metres



Wheal Maria as shown on the Ordnance Survey plan 1884

(OS 1884 - © Crown copyright and Landmark Information Group. CCC licence No. LA076538.)

0 25 50 75 Metres

Site 21 Upper Leat SX 41632 73885 to SX 41599 73829

Background

There are two parallel water-courses running below two of the adit outflows coming out of the vertical retaining wall. This is the upper course and is shown in detail on the 1867 map (Fig 13), whilst the 1884 map shows their banks. At either end of the leat the water could flow into the lower, longer and wider leat, or to the water wheel pit reservoir pond.

Survey

This leat is fed from the two adits that issue from the near vertical stone retaining wall below the road access around Wheal Maria Foundry. This upper leat appears to have been one of the primary sources of water to fill the reservoir pond for the adjacent water wheel. The leat measures approximately 2.0m in width with a 0.5m bank on its western side above the slope to the lower wider leat.

Recommendations

None. However it is recommended that prunings from tree cutting should not be used to fill in or cover up the leats. Refer to the general site management recommendations with regard to the preservation of archaeological features in a working woodland environment (Appendix III).

Site 22 Lower Leat SX 41620 73892 to SX 41588 73829

Background

This leat also appears to have been fed from the two adits that issue from the near vertical stone retaining wall below the road access around Wheal Maria Foundry. This lower wider leat may also have been a primary source for water to fill the reservoir for the adjacent water wheel, although its direct link to the pond is not shown on the map (it may have been underground). An alternative explanation is that contaminated water was coming out of the southern adit and the wider leat allowed the water to flow slowly permitting the contaminated material to settle before the water was fed back into the River Tamar. Both the upper and lower leats are shown in detail on the 1867 map, whilst the 1884 map shows their banks.

Survey

The leat measures approximately 3.0m in width with a 0.5m bank on its western side. Fig 38 (the site inventory plan of archaeological features) shows the extent of this feature.

Recommendations

Refer to recommendations made for the previous site.

Site 23 Drainage Portal SX 41600 73829

Background

Given the location of this portal it is likely that it provided an outlet for water from the foundry or reservoir pond (Site 59) or perhaps more likely, the tail race from the foundry water wheel pit.

Survey

This drain is also stone arched but its floor is located approximately 2.5m above ground level. Its crown opening is approximately 1.5m below the top of the stone faced retaining wall and measures approximately 0.9m in width and 1.0m in height and has water issuing from it. There are two nearly vertical timbers below the opening – presumably designed to carry the water away from the retaining wall. The timbers measure 0.3m in width, 0.06m thick are 3.0m in length below the opening. At the base of the timbers is a masonry feature of unknown function measuring 1.5m in height and 2.0m in length. Water coursing from the portal (which seems structurally stable), has eroded a gully that measures 2.0m in width and approximately 1.0 to 1.5m in depth down the steep slopes below.

Recommendations

It may be necessary to formalise the water outfall from the adit at times of heavy downpours or refer this potential problem to a Geotechnical engineer. It may be useful to ask people living locally if this presents a problem.

Site 24 Drainage Portal SX 41621 73757

Background

This drain portal is not shown on the maps used for reference purposes for this report. It appears to have functioned as the outflow from the foundry or perhaps as the tailrace from the wheelpit sited in the foundry.

Survey

This open drain measures 0.8m in width and 1.0m in height. The top of the opening is 1.5m below track bed level and slightly west of the upper foundry tunnel (Site 62). Internally there are timber supports to the roof and sides, with an outer timber lintel. The stone sides of the drain continue for a length of 3.0m (and a height of 0.7m) to the south, giving the impression that the roof has collapsed back to its present location. It is not certain if there is any connection between this feature and the open surface tunnel above (Site No. 62). At times of heavy rain it appears that this drain carries water.

Recommendations

This feature is accessible from the mine track above. It would therefore be appropriate to install a grille just inside the opening under supervision and watching brief recording to be carried out by a suitably experienced archaeologist.

Site 25 Reservoir Pond From SX 41569 73808 to SX 41572 73882

Background

The 1867 map shows in detail a rectangular sub-divided reservoir, whilst the 1884 OS map shows a topographical survey of the bank remnants. The feed into the pond and its outlet are not clearly shown. However it may be the case that this pond was used to settle contaminated water from the adits or foundry prior to returning it to the River Tamar.

Survey

From measurements taken from maps the reservoir measured 75.0m in length and 10.0m in width. The profile of the banks resembles those shown on the 1884 OS map (Fig 13).

Recommendations

None. However it is recommended that tree cuttings or prunings should not be deposited in this feature.

Site 26 Collapsed shallow adit and portal SX 41528 73810

Background

This site is not shown on archive maps used in writing this report, but appears to have functioned as an outlet for either mine wastewater or a water overflow.

Survey

At the western end of this series of pits (which appear to be collapsed roof sections of a shallow adit), there is an adit lobby that measures approximately 9.0m in length, 4.0m across its top and approximately 1.8m across its base. The water appears to have fed into the nearby stream. The first fenced collapsed section of ground on the eastern side of the adit portal measures 4.3m in depth and the opening measuring 3.5m (from north to south). The fence consists of wooden posts and three strands of barbed wire (1.0m in height) that also surrounds two additional areas of collapsed ground to the east (upslope).

Recommendations

It is recommended that the line of the adit and existing collapsed openings are fenced and signed. If an extant adit portal can be found, it should be cleared of debris, surveyed to ensure it will not collapse, and fenced to restrict public access.

Site 27 Settling Tank SX 41534 73894 (centered)

Background

The 1867 map shows a leat feeding into a rectangular shaped pond on its north side (probably contaminated mine water from the nearby adits), an outlet leat also feeding from this side and probably an inlet feed (of clean water) coming from its south-eastern corner. This pond may have been used to allow contaminated water to settle before it was returned into the stream and the River Tamar.

Survey

The boundaries of the pond can be seen on the ground and measure 14.0m by 11.0m. The banks that remain measure approximately 0.48m in height. The outlet leat is sited slightly upslope of the pond (to only allow the upper cleaner water to be removed). This feature is not shown on the 1884 OS map, although it can be seen in detail on the 1867 map (Fig 13).

Recommendations

None, apart from small-scale clearance of trees from the banks of the feature.

Site 28 Mine Building SX 41582 73808

Background

This building is shown on the 1867 map but not the 1884 OS map. Its function is unknown.

Survey

Sections of its rear stone retaining wall are visible and measure approximately 0.7 to 1.0m in height, although branches that have been cut down nearby obscure the feature. The wall measures approximately 2.2m in length.

Recommendations

Clearance of cut down branches from the site, and if finances permit, consolidation and repointing of the remaining masonry walls are recommended.

Site 29 Mine spoil finger dumps SX 41672 73903 (centered)

Background

These characteristic features result from mine spoil being removed from the workings via a shaft or adit and forms a long, thin but often high spoil dump. Gard's Shaft was the site of discovery of the Devon Great Consols Main Lode and must have been one of the main shafts from which this waste material was removed before workings progressed eastwards.

Survey

The westerly finger dump measures approximately 5.0m in width and 0.5m above track level to its south and is approximately 8.0m higher than the ground to its north; it is approximately 10.0m in length. To the east are four smaller finger dumps that measure approximately 0.5 to 0.7m in height and 1.0m in width (across their tops).

Recommendations

The spoil tips should be not wholly or partially removed.

Site 30 Castle Shaft SX 41670 73887 Grade C*

Background

'... the general bearing of Main Lode is from 15 to 20° south of east, underlying south about 1.5 ft per fathom ... It is a very large lode averaging throughout the run of the mines at least 12ft and often reaching 30 and 40ft....it sometimes makes in two or more parts....but they all essentially form parts of one great lode' (Hall 2000, 98). Castle Shaft is the western shaft of Wheal Maria and is located approximately 60fms. west of Gard's Shaft and was sunk perpendicular to a depth of 28fms.

Survey

The shaft could not be located in the field but the site has been suggested by a local resident (and is confirmed by Hamilton Jenkins shaft map). A local mining contractor (Daniels) has also confirmed that it was capped in 2000. This shaft was identified cartographically by Sherrell's desk-top survey but could not be found during their field survey. It has been covered over with dump material from adjacent to the shaft.

Recommendations

As the shaft has been capped it is unlikely that the site will need any other form of protection, although accurately locating the shaft and the provision of a shaft marker may be prudent, if only to monitor that there is no ground movement in the future.

Site 31 Pond SX 41776 73941 (centered)

Background

Although a pond is not shown at this location on either the 1867 or 1884 maps, it is shown on the 1954 3rd Edition OS map. This pond appears to have constructed since the closure of Devon Consols.

Survey

This appears to be a domestic duck pond as opposed to a mining related feature and is probably associated with the nearby house (Site 390) which is Listed Grade II and was originally Wheal Maria Count House. The building shown to the east of the Count House on the 1857 Lease map as Stables has since been converted to a domestic residence (Site 391) and is also a Listed Grade II building. The route of the stream that was originally a leat from Hele Farm to fill a reservoir pond (Site 34), now runs via the pond and then inside the southern garden wall (this is collapsing at numerous locations).

Recommendations

None.

Site 32 Site of Mine building SX 41752 73909

Background

A mine building is shown on the western side of the shaft on both the 1867 and 1884 maps. Although it does not appear to be an engine house it may have contained a steam winder/capstan to remove the ore from the working areas of Main Lode below.

Survey

Ground evidence of this building has been entirely removed leaving a rectangular site approximately 1.2m in depth, vegetation and dumps of material obscuring its interior.

Recommendations

It is recommended that the site is not disturbed, unless there is an archaeologist present to record any features that are uncovered (as part of an evaluation assessment).

Site 33 Count House outhouse buildings SX 41716 73966

Background

The 1867 map (Fig 13) shows two outhouse buildings outside the western wall of the low walled garden (these are not shown on the earlier 1857 map – Fig 7).

Survey

Both of the buildings are rectangular and elongated. They appeared to have been outside toilets or pig houses. The local farmer (who lives in the Count House) confirmed that there used to be three sets of toilets in the western range of buildings (it does however seem to be a long way to go the toilet!). The western building's slate roof has only recently collapsed and is plastered internally. This measures 2.25m in width, 4.1m in length and has a gable wall that measures approximately 3.5m in height. However, this building may also have been outside toilets. The eastern building has a corrugated roof and has similar dimensions.

Recommendations

It is likely that the occupants of the Listed Count House own these outhouses.

Site 34 Reservoir SX 41866 74037 (centered)

Background

A reservoir is shown on the 1867 and 1884 maps to the east of the house named Wheal Maria Farm. It was fed by two leats, one from the east and a second from the south, both feeding into the eastern side of the pond. Its outlet leat is not shown on the map and presumably went underground via a small tunnel (the route of which is still partially extant in places) to the west, emerging upslope of the Wheal Maria Wheelpit. Some of this water may also have been used at the mine's dressing floors.

Survey

The pond is still extant and measures 25.0m by 20.0m although it has been partially infilled from the eastern side and is overgrown in places inside its boundaries (low banks). Water still courses through this pond from the northern leat.

Recommendations

To improve the character of the site some tree removal could be carried out.

Site 35 Farm building (Wagon House) SX 41866 73988

Background

This building appears to have been added to a small complex of mine buildings first shown on Symons 1848 map (Fig 4) labelled as 'Stores, Yard and Timber Yard', extended by 1857 (Fig 7) and shown for the first time in detail on the 1867 map (Fig 13). A local farmer states that the building was a wagon shed.

Survey

This narrow long building is still fully extant and slate roofed. It is sited against the outer boundary wall of a domestic building and has an attached building (probably a store). It has masonry walls along its length but has a timber end gable to its east; its western gable is missing. The building measures approximately 4.5m in height and approximately 4.0m in width, with a window opening in the northern wall. Its walls are 0.47m thick above the lower section of wall on the northern side (which measures 0.9m thick for a height of 2.0m above ground level). This construction is not mirrored in the southern wall, suggesting some degree of adaptation and rebuild.

Recommendations

The building is owned by a local farmer and is currently in use.

Site 36 Site of House SX 41852 73957

Background

This building is in the centre of the complex of buildings described in Site 35. It may have been built by 1848 but is definitely shown as a domestic or office building by 1867 (Fig 13).

Survey

This building (shown red on the 1867 map), was finally demolished approximately 10 years ago to make way for a larger farmyard and associated buildings. It appears to have been lived in up to the turn of the century. In the 1930's the lower ground floor was used for storage and the upper floor was used for accommodation, though changed to farm storage soon after. The building (presumably a store/barn) shown adjacent to this house has also now been replaced.

Recommendations

Not applicable.

Site 37 Morris's Shaft SX 41877 73883

Grade A*

Background

This shaft is located 60 fms from Gard's Shaft and is sunk perpendicular to the 100 fathom level on the Great Crosscourse (which it meets at a depth of 90fms). This shaft was opened soon after Gard's Shaft and is clearly shown on Symons 1848 map (Fig 4) and in detail on the 1867 map (Figs 8 and 13), as being much closer to the engine house than labelled on the later 1884 OS map (Figs 9 and 13).

Survey

At the location given by the 1867 map there is a shaft like depression with a surrounding bank that measures 0.9m above ground level, the top edge of the opening measuring approximately 6.5m in diameter. There is neither fence nor visible shaft marker at the base of the shaft (which measures 1.8m in depth below ground level and is 3.7m in width). There is no visible evidence of the shaft capstan, as shown on the 1867 map.

Recommendations

Given the close proximity of the shaft to one of the possible public access routes around the mine, it is recommended that mining engineers confirm the exact position of the shaft and fence the site.

Site 38 Lode back pit/sub-surface collapse SX 41894 73889

38/1 Lode back pit/sub-surface collapse SX 41914 73889

Background

These deep depressions are not shown on archive maps and were not mentioned in Sherrell's Geotechnical mining report (2000, No. 1915) although they were identified in a subsequent report (A preliminary risk assessment in relation to public access within the site 2002, Map 3). This area is directly over the Great Crosscourse where the lodes have been heaved to the south. These features may represent shaft collapses of the upper sections of the lode or costean pits. Their alignment follows the course of Main Lode.

Survey

At Site 38 there is a deep circular depression (without a characteristic granite shaft marker) and on the eastern side of the adjacent track (Site 38/1 to the east), there is a similar deep circular depression (again without a characteristic granite shaft marker). Both of these depressions appear to be on the lode line and both may be shafts.

Recommendations

This feature which resembles a shaft is located 5.0m from the track and measures approximately 8.0m in diameter across the top of its circular depression and is 2.0m in depth, having a width at its base of 0.9m, with no shaft marker. The proximity of this feature to the track and the possibility that it may represent a collapse (on Main Lode) cannot be discounted. It is recommended that if the nearby track is to be used by members of the public, this feature will need to be investigated by a geotechnical engineer to assess the underlying ground conditions. A similar feature (Site 38/1) is located a similar distance away from the track on its western side.

Site 39 Engine House SX 41873 73871

39/1 Boiler House and chimney SX 41876 73857

Background

The engine house is shown on Symons 1848 map and in detail on the 1867 map (Fig 13). Bennett (1982, 19) quoting an article in the Mining Journal of 1850 states '*...in the year ending 31st March 1846.... Another steam engine of 40" cylinder had also been delivered on the mine and the engine house was in active progress*'. The cross section of the mine (Fig 10), appears to show pumping flat rods extending from Gard's Shaft up to this shaft (powered by the waterwheel lower down in the valley). Given the offset position of the shaft from the bob wall it does appear likely that this engine was of the rotative type and wound ore up from this deep shaft. The 1848 map (Fig 4) shows a tram road from this site down to the copper dressing floors and grinder house. It is quite possible that this engine also drew empty trams up from the dressing floors.

Survey

At the location shown by both the 1884 OS map and earlier 1867 map there is a 1.0m high mound of rubble measuring approximately 4.0m in length. At the northern end of the mound is a short section of wall measuring 1.8m in length and 0.7m in height. This appears to be a remnant of the lower section of the bob wall. At SX 41847 73891 there are two large granite stones that appear to be cylinder bedstones removed from the engine house. These measure 2.1m in length x 1.32 m and 0.5m thick.

The detached chimney (Site 39/1), located near the southern end of the boiler house (at SX 41876 73857), has been reduced in height to only 1.0m and resembles a pile of rubble measuring approximately 2.3m in width but overgrown with vegetation. A square flue opening is visible on its northern side. It has a section of boilerplate as a lintel above which is approximately 0.5m of rubble, stone and vegetation. The opening measures 0.6m in height and 0.45m in width. Sherrell's site S117 (2000 report) appears to have interpreted this opening as a small adit portal.

The 1867 map shows an un-roofed area on the western side of the boiler house. This may have been a coal store. These are very low remnants (evidenced by slightly higher ground levels), close to the edge of a large deep feature that appears to be a later quarry or the head of the incline tramway (see site below).

Recommendations

A small amount of tree clearance from the site of the engine and boiler house would stop further root damage to the surviving low masonry remnants of the buildings described above. Given the demolition of the engine and boiler house down to nearly ground level, it

may well not be practical to repoint the remnants - the existing rubble covering the site is preserving its mostly below-ground remnants.

Site 40 Quarry or Tramroad head SX 41848 73855 (centered)

Background

This feature is not shown on archive reference maps. It may be a stone quarry excavated during the 20th century. Alternatively it may be the head of the Tram road shown on Symons 1848 map (Fig 4) going down to the Wheal Maria Dressing Floors.

Survey

This deep feature measures approximately 25.0m in width. At its eastern end the feature is deeper (approximately 4.5m in depth from the ground level at the chimney), and water has collected in a round depression measuring approximately 2.7m in diameter. The sides at the east end are vertical but others have a less steeper angle of repose (and measure only 3.0m in depth). Access to the interior was from the west via a track although this has now been partially blocked by dumped soil.

Recommendations

If members of the public were permitted along the forestry track to the east, it would be prudent to fence around the top edge of the quarry.

Site 41 Costean/Lode back pits SX 42114 73899 to SX 42241 73863

Background

Exploratory costean pits/trenches were commonly excavated to search out lode outcrops. When this was found, lode back pits and openworks were sometimes excavated as the surface lode outcrop was followed. These features may well have been searching for the continuation of Worbridge's Lode (or South Lode) east of the Crosscourse (given as L30 in Sherrell's report - 2000, No. 1915, Plan 1B), or the continuation of Main Lode (both had been heaved by the Crosscourse to the south at Wheal Fanny).

Survey

In the woodland east of the trackway from Morris's Shaft to Wheal Fanny, the conifer-covered surface is characterised by costean pits. Typical these measure 2.0m in diameter and 1.0 to 2.0m in depth. Some of the pits have been excavated as trenches which measure approximately 7.0m in length.

Recommendations

It is recommended that when future tree lopping or pruning is carried out the cuttings should not be thrown into the pits.

Site 42 Shaft SX 42216 73869

Grade C

Background

This shaft is shown on the 1867 map (Fig 8) but not the OS 1884 map (nor Sherrell's Geotechnical survey).

Survey

The shaft has a granite post in its centre and measures 3.8m in diameter across its top and is 1.4m in depth. It is sited close to an old forestry access track and at the eastern end of the costean and lode back pits described in Site 42 above.

Recommendations

Although it is doubtful that this shaft presents a danger to members of the public, it may well be appropriate to fence it and to monitor the site in case of any ground movement.

Site 43 Water culvert portal SX 41838 73894

Background

The 1848 and 1857 maps show detail of the copper dressing floors prior to their being replaced by the foundry. The 1867 maps also show in detail the smaller settling ponds and buddles to the east of the foundry site. All of these processes required large amounts of water. This appears to have been supplied (at least in 1848) by a leat from the east (Site No. 56) possibly by 1857, but thereafter the new foundry would have needed the larger amounts of water that presumably were fed by this culvert. It emerges at SX 41838 73894 and was either supplied by the leat running east of Morris's Shaft (that fed the Reservoir – Site 34) or was fed directly from the reservoir itself.

Survey

This site is located approximately 10.0m north-west of Morris's Engine House. It is an ornately built granite stone water culvert portal with granite keystone. The opening measures 0.9m in width and 1.5m in height with timber uprights and roofing; there is some roof collapse inside the tunnel, the timbers being visible inside the tunnel for a distance of approximately 2.5m. The watercourse is not shown on either the 1867 or 1884 maps. The water supply from the adit portal went underground after it emerges from the portal, the culvert being timber lined. The watercourse has collapsed in many places on its route to the dressing floor.

The main spoil heaps from Morris's Shaft have been deposited in this area, but their top surfaces have been flattened, removing evidence of finger dumps etc. The watercourse runs down through the spoil heaps but at a distance of approximately 18.0m from the adit portal, opens into a wider surface channel that measures 1.0m in width at its base, is 1.5m in depth (from the top of the banks), and is cut into the ground by approximately 0.8m.

Recommendations

This feature is accessible from the mine spoil heaps below or the track to the east. It would therefore be appropriate to install a grille (after a structural engineer has inspected the feature), just inside the opening under archaeological supervision.

Site 44 Shaft/lode back pit SX 41803 73860

Background

This area is close to the Great Crosscourse where the lodes have heaved and appears to represent a costean or lode back pit. It seems to be over Worbridge's Lode (Sherrell 2000).

Survey

Near the start of the track access to the quarry (which diverges from the track shown on both the 1867 and 1884 maps) on its south side, is a large pit or possible shaft. The feature measures 2.0m in diameter at its base at a depth of approximately 1.5m, with sides that are nearly vertical. The top measures 5.0m in width, with surrounding banks measuring 1.0m above ground level.

Recommendations

If members of the public are to be permitted in this area from the trackways, it would be prudent to fence this feature around the outside of the banks or alternatively to repair any breaks in the bank.

Site 45 Site of Dressing floor building SX 41785 73880

Background

This long building may be shown on Symon's 1848 map (Fig 4) and the 1857 Lease map (Fig 7), but it can be seen in detail on the 1867 and 1884 OS maps (Fig 13). It may well have contained dressing floor machinery (or been the 'Bucking-Shed') where the copper ore was broken down into smaller pieces.

Survey

Although evidence of the walls are no longer visible, numerous roof slates can be seen at the base of the bank adjacent to which the building was sited.

Recommendations

None.

Site 46 Small ponds SX 41760 73862 (centered)

Background

These three ponds can be seen in detail on the 1867 and 1884 OS maps. They may have functioned as settling tanks but were more likely to have provided a head of water for the buddles and long thin settling tanks below to the north.

Survey

Internally the ponds measure approximately 4.0m x 4.0m and their floors lie at a depth of 0.9m below ground level. The boundaries of the ponds are earth banks (that may well obscure walls) that are higher internally to the south (due to the sloping ground down to the north). Internally, the western and centre tanks do not appear to have been as deep as the eastern tank.

There is no cartographic nor field survey evidence of the water supply to these tanks but it may have been brought along the top of a low bank (via a timber lined launder approximately 0.4m above ground level, running parallel to the quarry access track).

Recommendations

None (apart from surface vegetation clearance).

Site 47 Signalling platform? SX 41753 73794

Background

This feature's function may be a signalling platform used during the operation of sluices in leats to fill reservoir ponds etc).

Survey

Two fields have been created by woodland clearance, presumably for pasturage for a farm or a domestic building (Site 55). The hedges surrounding the fields are constructed with thin stones on edge built to a height of 0.65 to 0.7m in height. The ground is higher inside the fields than outside. Built on the inside of the stone hedge (located west of a building described below) at this NGR, is a round stone feature of unknown function. This is shown on the 1884 OS map but not the earlier 1867 map. It measures 0.75m in height and consists of stones placed on edge, with the feature a little higher near the hedge line. On the southern side there appears to be four small steps cut into its side measuring 0.47m in width. A section of the hedge immediately north of the feature has been removed for a length of 4.0m.

Recommendations

The feature should be seen as a possible candidate for consolidation and repair. It is recommended that no more sections of the hedge/wall nearby be demolished to make way for Tavistock Woodlands access routes.

Site 48 Powder Magazine SX 41762 73804

Background

Symons 1848 map (Fig 4) appears to label this building the 'Powder House'. Although the 1884 OS does not label this building, it has good track access, is located away from other buildings and had a cleared area around it to separate it from the surrounding woodland shown on the 1867 map.

Survey

The building is cut into the west-facing slope and has retaining walls to its north and south that measure approximately 4.5m in length. At its western end the wall measures 0.5m in height and 1.25m at its eastern end. At a distance of 3.0m inside the building (from its western opening), there is a vertical wall that measures 0.6m in height with an opening cut through that appears to have been the site of a doorway.

Recommendations

To reduce any further collapse of the walls it is recommended they are repointed and consolidated.

Site 49 Buddles (southern) SX 41735 73858 (centered) 49/1 Buddles (northern) SX 41752 73880 (centered)

Background

These four or five buddles can be seen in detail on the 1867 and 1884 OS maps (Fig 13). They have been divided into two groups on site: upper and lower. They functioned to

settle out differing specific gravities of fine copper ore and waste products that had come out from the 'jigging sheds' as part of the copper dressing processes.

Survey

The southern group of three buddles is shown clearly on the 1867 map and continued on the same alignment as the three reservoir tanks. Unfortunately the surface evidence of these features is not as good. The upslope wall of the buddle yard (southern side) is visible to a height of 0.3m as is the dividing wall between the western and central buddle. The ground where the buddles were sited consists of earth, rubble and vegetation. It is quite likely that these buddles were constructed of timber. The north wall has either been removed or is obscured by vegetation and earth.

The quality of survival of the northern pair of buddles (Site 49/1) is slightly better. The eastern buddle has vertical sides built of stone that measure approximately 0.6m in height (from its rubble floor) and 2.0m in diameter for the lower section. The upper diameter of the buddle is then widened as the surface is recessed horizontally for 0.3m and then rises for a further 0.5m. There may well be an opening on its northern side but the feature will need to be cleared of vegetation and rubble to permit a fuller interpretation.

The adjacent buddle to the west does not appear to be in as good a state of preservation, but dense Rhododendrons obscure it.

Recommendations

If members of the public are permitted access to this area, it may well be appropriate to excavate the rubble in the centre of the eastern buddle and repoint around its sides and base. Rhododendrons have been densely growing all over the previous site of the dressing floor. However, these have recently been cut down but the branches have not been cleared away, which makes it very difficult to survey archaeological features on the ground. These dense bushes need to be removed in places and their stumps treated.

Site 50 Site of Wheal Maria dressing floor settling tanks

SX 41742 73890

Background

The 1867 map records the location and size of each of the dressing floor settling tanks, which were presumably used to separate waste materials and other ores from copper ores prior to export and smelting. The possible location of the 'Jigging Sheds' immediately west of these tanks may well indicate part of the use of the water.

Survey

There is no surviving field evidence of these features. Presumably the settling tanks were built of timber with timber floors.

Recommendations

In case these features were not built of wood and have been covered over with earth/vegetation it is recommended that the site is not disturbed, unless there is an archaeologist present to record any features that are uncovered.

Site 51 Gard's Shaft SX 41769 73903

Grade A*

Background

This shaft, where the ore was first discovered at Main Lode in 1844, is about 60fms. west of the Great Crosscourse. It has been cut to the 100fm. level, lies 50 fms. perpendicular and 50fms. on the line of the lode and is drained to the 50fm. Level by 10" and 8" lifts (water pumps) worked by a water wheel (Hall 2000, 99), shown as Site 18. '*...the ore was met with at a depth of 17fms. at Gard's Shaft, but further east made up to within 10fms. of the surface. In length the very rich ore ground extended from the Great Crosscourse to 40fms. west of Gard's Shaft—a length of about 100fms...*' (Hall 2000, 99). As one would expect the shaft is shown on all of the reference archive maps.

Survey

This shaft is sited in an elongated depression with spoil dumps and vegetation consisting mainly of cut down Rhododendron branches and stumps. The shaft has a granite marker and lies within a depression measuring approximately 5.0m x 5.0m and 0.7m in depth.

Recommendations

The area of the shaft should be fenced and an appropriate sign erected.

Site 52 Site of two dressing floor buildings SX 41689 73876 (centered) 52/1 Site of dressing floor building SX 41711 73878 (centered)

Background

These buildings may be shown on the 1848 map but can be seen in detail on the 1867 map. They may have been '*Jigger Houses*' where ore was separated from other waste products by vigorous shaking of the material in cages in water using long hand levers. These were often operated by women or were sometimes water wheel powered. They may alternatively have been tanks to remove arsenopyrite, and other copper sulphides.

Survey

The area where the buildings were sited can be identified and in some places walls survive to a height of 0.3m but for the most part dumping and changes of ground level have masked the original site. There are no extant remains of these buildings.

Recommendations

It is recommended that the site is not disturbed, unless there is an archaeologist present to record any features that are uncovered.

Site 53 Dressing floor retaining wall SX 41696 73886 to SX 41730 73898

Background

This feature is not shown on the 1867 map (Fig 13), although it may well have existed. It does appear to be shown on the OS 1884 map. It functioned as a retaining wall for the dressing floor buildings sited upslope of the nearby road.

Survey

The retaining wall measures approximately 2.0m in height for a length of 5.0m, but at its western end there has been a collapse to ground level for a length of 4.3m. The wall then resumes its height for a length of 5.0m.

Recommendations

If members of the public are to use the adjacent track the wall will need to be surveyed by a structural engineer to assess its stability and structural integrity, with the likelihood of repairs needing to be undertaken.

Site 54 Linear reservoir/settling pond SX 41681 73861 to 41656 73806

54/1 Reservoir/settling pond SX 41683 73852 (centered)

54/2 Reservoir/settling pond SX 41676 73837 (centered)

54/3 Reservoir/settling pond SX 41667 73818 (centered)

Background

These ponds are shown in detail on the 1867 and 1884 OS maps. They may be shown on Symons 1848 map. The ponds may once have either provided water for the lower copper dressing floor and grinder located on the later site of the foundry, or may have been settling tanks. It seems possible that they were re-used for the functioning of the foundry.

Survey

These ponds are extant and in relatively good condition. The interiors of the ponds and walls are overgrown with trees. There is a marked difference in ground level between the interiors of the ponds and the surrounding ground level, varying from 0.75 to 1.0m in depth. The sluice outlet for these ponds appears to be located on the southern end of the long reservoir pond (Site 54), and leads to the edge of a vertical retaining wall above the foundry. The leat measures 0.5m in width at its base, 1.8m across its top and is approximately 1.0m in depth. A timber tree house has been built at the southern end of the ponds.

Recommendations

If members of the public were to be permitted in this area of the site, it would be advantageous to remove the trees from the interior of the ponds. Long-term preservation of this feature necessitates the priority removal of trees from the banks of the ponds, to reduce the likelihood of destabilisation by tree roots.

Site 55 House (Sluice operator) SX 41676 73798

55/1 Outbuilding SX 41694 73788

Background

This building and outhouse is shown (in red) on maps dating from 1867, and have been interpreted as either domestic or mine office accommodation. There appears to have been two paddocks associated with the building, which one would assume, suggests it was for domestic use. Given the number of reservoirs and settling ponds in the vicinity of the house it is suggested that this housed the person operating the many sluice gates, feeding ponds etc, associated with the foundry and dressing floors.

Survey

Both the house and outhouse are partly extant. Overall plan dimensions can be gained from the archive maps. The west wall of the stone and lime-mortared outhouse is extant to eaves level and measures 2.0m in height. The east wall has virtually collapsed and the south and north walls only measure 0.9m in height. Windows were located in the south and north wall elevations, with a doorway sited in the east wall. On the west side of the outhouse there is a small stone-lined pit. This measures 2.5m in length, 1.25m in width and 0.6m in depth.

The house plan is as shown on the archive maps. The end gable wall on the east side of the building is extant and measures approximately 3.75m in height, with a fireplace, 0.5m wide set into the bottom of this wall. A high retaining wall is located just behind this wall (that took the original leat (Shown on Symon's 1848 map), from Wheal Fanny to Wheal Maria dressing floor and/or Wheal Maria wheelpit). 2.75m from the end of the gable wall is another parallel wall with a long lintel and 0.5m of masonry above.

The north wall is also mostly extant (to a height of 2.7m) in its eastern half to wall plate height. Although the window lintel at its east end has gone, the remainder of this wall at the west of another window opening has been reduced to 1.0m in height, as have the remainder of the walls of this building.

Recommendations

It is recommended that the walls of this building are consolidated after a structural survey has been carried out. A measured building survey should be undertaken prior to any works being commenced, a consolidation methodology agreed with the County Archaeologist, and an archaeological watching brief carried out during these works.

Site 56 Leat SX 41689 73778 to SX 42017 73709 (Wh. Fanny)

Background

Symons 1848 map (Fig 4) shows this leat (labelled as a 'watercourse') from the reservoir pond at Site 92 (at Wheal Fanny) to Wheal Maria. It appears by this date to have fed the copper dressing floors and possibly also Wheal Maria wheelpit. By 1867 (Fig 14), this leat is shown feeding from the same source but running to a new reservoir that appears primarily to supply water to the foundry and possibly also its water wheel. Its course is shown on subsequent maps with another leat (Site 65) feeding into it (shown on later OS maps after 1884). However, between 1867 and 1884 (see Fig 14), another leat had been created (Site 71), to provide extra water to feed this leat (via an aqueduct over the Wheal Fanny valley floor).

Survey

This leat is generally in good condition, although tree prunings and branches have been thrown into its interior. At certain points along its length it has upslope retaining walls where the ground topography varies in height, as well as lower slope retaining walls. At the entry point of the leat into the reservoir at its east corner, it measures 0.75m across its base, 3.0m across the top of its banks and is approximately 1.5m in depth.

At a location immediately north of a small quarry (Site 63), the leat can be seen to good effect. It measures 2.0m in width across its base, and on its upslope side has a stone retaining wall varying in height from 1.5 to 2.0m in height. The lower bank (west side), varies in height from 0.5 to 1.0m in height.

At SX 42017 73709 the 1867 map shows a stone lined leat tunnel that measures 1.0m in width and 0.8m in height (to a rubble floor), (although its roof appears to have collapsed for two metres). Water is issuing from this drain.

Recommendations

If members of the public are able to access this leat, dead branches should be cleared out of its interior and the retaining walls surveyed for stability. The leat tunnel should be consolidated.

Site 57 Foundry wheelpit reservoir pond SX 41677 73780 (centered)

Background

The reservoir pond is not shown on the 1848 and 1856 maps, but can be seen in detail on the 1867 map (Fig 13) as can the foundry for the first time. Presumably the pond provided water for the foundry and in particular its water wheel. There is no map evidence to support the assumption that this feature provided water for the earlier grinder water wheel (see Site 60 below).

Survey

The sluice outlet of the reservoir pond is located in its north-west corner and measures 0.75m at ground level, 3.0m across the top edge of its opening and 1.5m in depth through its surrounding bank (which varies in height from 1.5 to 2.0m). There is another outlet in the south-western corner, which appears to be labelled sluice on the 1884 OS map (Fig 13), which has similar dimensions to that above. This may be an overflow sluice that connected to the water tunnel (Site 62).

There is evidence of recent attempts at water management by the building of plastic lined sumps downslope from the sluice, presumably to stop water from cascading into the foundry area and the track beyond. Trees are growing in the pond and on its banks, obscuring the size, extent and nature of the feature.

Recommendations

It is recommended that trees growing on the banks of the reservoir should be removed to reduce the possibility of being damaged and destabilised. If members of the public are permitted to access this site, total tree removal from the inside of the feature would allow the site to be presented to its full advantage.

Site 58 Site of Lower Foundry reservoir pond (north) SX 41648 73825 58/1 Lower Foundry reservoir pond (south) SX 41647 73827

Background

This reservoir pond may be shown on the 1848 map and so may have originated in the first phase use of the site and be associated with the lower copper dressing floors. It is shown on the later 1867 and 1884 maps as an outline but not coloured in blue, indicating perhaps that it was not in use. Site 58/1 is shown in detail on the 1867 and 1884 OS maps (Fig 13).

Survey

The site of the northern pond is rhomboidal in shape and is located in an area of ground that has been cut into the slope, measuring approximately 2.5m above track level. The

boundary banks of the pond are no longer visible, and the site is used as a play area by the occupants of the neighbouring house. There is a 1.0m high retaining wall running parallel to the foot of the slope of the ground above which are sited the four long reservoir/settling ponds.

The southern pond (Site 58/1) is located 1.5m below the track that runs along the western side of the long reservoir ponds (Site 54) on a separate area of ground above the foundry ground level. The site is full of vegetation that obscures its interior.

Sited west of both of the ponds is a 6.5m high (approximately) stone retaining wall with two masonry buttresses providing structural stability to the tall wall. These measure 1.5m in width and extend from the wall for a distance of 2.6m at ground level. There are two sluice outlets located at the base of pond Site 58/1 that measure 0.3m x 0.3m.

Recommendations

None. This land is privately owned.

Site 59 Foundry House SX 41647 73852

Background

The house does not appear on archive maps before the foundry was built by 1860. It is likely that the Foundry needed a 'Captain' to manage the workforce who was housed here.

Survey

The house is occupied and appears to have been extended from the plan on the 1867 and 1884 maps. The outhouse/cart house has been extended to create a garage and workshop.

Recommendations

None.

Site 60 Foundry wheelpit SX 41640 73807

Background

The wheelpit appears to have originated as the power source for a copper crusher (or grinder), and is shown next to the wheelpit on the Symons 1848 map. Bennett (1982, 17) quoting an earlier article by Murchison (1850) in the Mining Journal states '*A water engine, 24 feet diameter and 4 feet breast, with the requisite rods and jumps was erected at Wheal Maria. Two powerful and first rate water wheels, one for the purpose of grinding and stamping and the other for hauling (the hauling water wheel is described as Site 18) were nearly ready for erection*' (in 1846). Cartographic evidence suggests that this earlier water wheel was powered by a nearby leat (probably Site 56 from Wheal Fanny).

Hall (2000, 107) quoting a later article (dated July 7th 1860), in the Mining Journal states: '*wheel working foundry, 35 feet by 4 feet*'. It appears the water wheel was enlarged when it was used to power the foundry. It is likely that the entire foundry (presumably including the Boring Milling machine) was powered by this water wheel. Map evidence suggests that the reservoir pond above (Site 57), was constructed to supply water to this site. Refer to background comments given for the foundry below.

Survey

The surface dimensions of the wheelpit are uncertain due to its infill with wood, fly tipping and rubble. It appears to have measured approximately 6.0m in length and 1.5m in width. At a depth of 2.5m below ground level at the west end of the wheelpit can be seen the tailrace. Its opening measures 0.5m in width and is approximately 1.0m in depth. Rubble has filled up the east end of the feature from the retaining wall and water inlet from the reservoir pond above.

Recommendations

If members of the public are permitted access to this site in its present condition, the wheelpit will need to be fenced at its west end. However, it would be advantageous to clear out the contents of the wheelpit to display its original size and extent, and to fence around the opening.

Site 61 Foundry (and site of copper grinder) SX 41623 73794

61/1 Foundry water tunnel SX 41646 73769 to SX 41640 73760

Background

Cartographic and documentary evidence suggests that prior to the construction of the Wheal Maria Foundry by 1860, this level site was formed for the 'lower' copper ore dressing floors and a water wheel powered copper crusher (or grinder), see Symons 1848 map (Fig 4) and the 1857 Lease Map (Fig 7). This foundry operated together with the other smaller foundry between Wheal Anna Maria and Wheal Josiah (Site 145). It is quite likely that the Wheal Josiah foundry manufactured or assembled smaller or different products. Hall (2000, 110), reproducing an article written in July 1860 states: *'There has been a foundry established on the mines for some time, which at present employs nine men and two boys, and did work for the mines to the value of £4,754 last year; and has given during the last three years an average annual profit of £1,600. This foundry is a very interesting experiment, being, I believe, the only foundry attached to a metallic mine in the United Kingdom'*.

61/1: This drainage feature appears to be contemporary with the foundry and was used to remove excess water or used water from the foundry. The watercourse may well have gone under the nearby track after it emerged from the tunnel portal and then perhaps connected to the lower tunnel portal (see Site 24), located directly below the track.

Survey

At the north-eastern corner of the foundry site there is a blocked up brick arched opening measuring 1.5m in width and 1.9m in height. Part of the exterior front face of the feature has collapsed whilst the internal rear wall (within the arch) is set back from the front face to a depth of 1.45m. There is a horizontal timber lintel in this wall below which secondary blocking has been inserted.

The northern extent of the foundry is marked by the linear remnants of a single row of buildings running from west to east. The north wall can be plainly seen varying in height from 1.25m to 2.0m above ground level with evidence of timber inserts in the walls and brick infills throughout its length, although detailed survey was not possible due to dense Cotoneaster.

There are scattered foundation remnants of buildings within the foundry complex. The main extant remains are located in or next to the east side of the foundry which also acts as the site's retaining wall (approximately 3.5m in height), although this is densely covered

with trees and vegetation. A rounded feature plainly shown on the 1867 map can be reasonably interpreted as the location of the furnace. As with many of Devon Consols buildings, a high proportion of these features have been reduced to ground level.

61/1: The water course lay just below ground level (0.9m width and 0.4m depth to rubble floor), the roof of which has collapsed at SX 41623 73794 for a length of 8.0m. The tunnel is built of stone and brick and measures 1.6m in height and 0.75m in width (internally). The small retaining wall (3.25 m in height) either side of the south face (i.e. the trackside face) of the tunnel portal has partially collapsed and the stonework mortar eroded.

Recommendations

With the exception of the vertical retaining wall at the eastern side of the site, there are no recommendations. The retaining wall will need to be inspected by a structural engineer to assess its structural competency. If public access is to be permitted along the track around the foundry, the line of buildings described above should be cleared of vegetation. The north face of the tunnel needs to be consolidated as some of the facing stone has deteriorated and a survey of the remains carried out prior to any repointing and consolidation works.

61/1: This tunnel feature needs to be assessed by a structural engineer with a view to consolidation by repointing and repair of masonry where necessary. The site opens out to a probable permissive route for members of the public. However, given the size of the feature it may be possible to consolidate the feature and not have to grille its opening (as recommended by Sherrell 2002, Report 1915/2 Map 2).

Site 62 Foundry waste/slag tip SX 41634 73735

Background

This feature is shown on the OS 1884 map and appears to be the foundry's waste slag tip. This runs steeply from track level south of the foundry down to the foot of the valley where there is a leat. (Site 95).

Survey

The waste tip has mostly vegetated although the bottom of some of the 'concreted' slag deposits (including stone and brick), have eroded leaving bare slag on the hillside.

Recommendations

None, although it may be prudent for a Geotechnical engineer to carry out a risk assessment of the large lumps of slag jutting out of the side of the hill (and the possibility of these falling into the valley bottom below).

Site 63 Quarry SX 41693 73758

Background

This small quarry is not shown on any archive map although part of it can be seen on the OS Landline.

Survey

The quarry can be accessed from the nearby track. Its back wall measures 20m in length and 8.0m in width. The back wall is vertical in places and measures approximately 5.0m in height.

Recommendations

The quarry may need to be fenced off to restrict access by members of the public if the site is found to be dangerous by a geotechnical risk assessment.

Site 64 Retaining wall SX 41805 73722 to SX 41952 73726

Background

This wall is shown on the 1884 OS map (Fig 14) and presumably acted as a retaining wall for the downslope bank of the leat above (Site 56) at its junction with the track.

Survey

The stone-faced wall measures 1.0m in height and is 0.7m thick over the distance given by the NGR's above.

Recommendations

The wall is in a relatively good condition, although any small trees growing from it should be removed.

Site 65 Leat SX 42017 73771 to SX 41794 73724 (leat-Site 56)

65/1Leat SX 42020 73755 to SX 41819 73727

Background

The upper leat (Site 65) is not shown on archive maps, although is shown on the third edition 1954 OS map. It links up with another leat (Site 88) from Wheal Fanny to Wheal Maria (reservoir pond Site 34) and a leat (Site 56) from Wheal Fanny to Wheal Maria (reservoir pond Site 57). The lower leat (Site 65/1) is located approximately half way between leats 65 and 56 and is not shown on any archive maps.

Survey

Both leats measure 0.75m in width at their base, 1.0m in depth on the upslope side and 0.5m in depth on the lower side. The banks on the downslope tend to be higher than those on the upper sides. Both are cut into the side of a hill characterised by dense conifers.

Recommendations

None.

Site 66 Settling tanks SX 41913 73729 to SX 41939 73730

Background

These four square tanks are shown in detail on the 1867 and 1884 maps (Fig 14). They appear to be settling tanks, probably a final stage in the process of dressing copper ore.

Survey

These features have been well preserved. There is a rear retaining wall measuring 2.5m above the upslope banks with a lower retaining wall along the north, east and west sides. Leat 56 runs along the south side of the tanks as shown on the 1867 map (Fig 14). The partition walls are approximately 0.3m above tank floor ground level.

Recommendations

After a structural survey of the retaining walls has been carried out and any consolidation works agreed with the County Archaeologist, the only remaining recommendations would be to remove any trees whose roots may affect the feature's walls or banks.

Site 67 Copper precipitation trenches

SX 41953 73748 to SX 41955 73733

Background

These features are not shown on archive maps, and appear to post-date the mid 19th century. There are similar features to the south of Wheal Anna Maria's spoil tips (Site 363).

After the turn of the century, the re-working of spoil heaps and arsenic reprocessing took place up to 1925. But from the 1930's to the mid 1960's the main activity was copper precipitation: *'where metallic copper was extracted from the copper impregnated streams which flowed down through the enormous dumps of pre 1903 waste rock by precipitating it onto scrap iron - mostly old horseshoes...The water was led through narrow parallel wooden launders in which the scrap iron was placed.... Copper oxides were formed on the iron, which after being simply dried out, was scraped off for processing'* (Richardson 1995, 104). The main site used for this has previously been known to be at Blanchdown, but two additional sites have been identified during this survey (this being one). Both used a slightly different technique, by directing adit water through long timber lined channels within which the iron had been left (see Fig 27 – a photo of the 1930's precipitation launders). Presumably the nearby adit or shaft sited to the north-east (Site 69), may have provided water from the mine's working levels.

Survey

A number of long trenches have been cut into the slope in a north - south direction. These are sited approximately 4-5.0m apart and measure approximately 8-12.0m in length. The trenches measure on average 1.0m in width and 1.5m in depth.

Recommendations

Again, branches cut from trees and other pruning dumped in these features has resulted in some of the trenches being filled or obscured. Such ground excavations seemed not to be infilled or covered up.

Site 68 Shaft SX 41970 73732

Grade C

Background

This feature, interpreted as a shaft, is not shown on any archive map found during the production of this report. It is sited directly over Maria or Main Lode at the junction of the Great Crosscourse where it is heaved to Wheal Fanny (from Wheal Maria).

Survey

The shaft has a surrounding low-banked wall that measures 0.4m in height, with a tree growing out of the shaft's western side. It measures 6.8m across the top of the bank, and is choked at a depth of 1.0m below the top of the bank.

Recommendations

Although the shaft has a low bank, this may be an opportunity to either raise the bank or fence the shaft, due to its proximity to the track (approximately 10.0m).

Site 69 Shaft SX 41964 73748

Grade C

Background

See comments for site 68 above.

Survey

This shaft is cut into the hillslope, measures approximately 3.0 x 2.0m in plan and is 3.0m deep on its north-west side. A wooden post (1.0m high) and two strands of a barbed wire fence surround it. Immediately west and upslope of the shaft is another small collapse (1.0m x 1.0m and 0.8m deep), that may be related to the shaft or to general ground instability over a lode.

Recommendations

Given the shaft's proximity to the track (and open excavation area to the east – see site below), it is important that this is fenced.

Site 70 Site of openwork SX 41969 73730 to 41993 73721

Background

The 1867 map shows an elongated depression at this location, which is directly over Main Lode. Hall (2000, 100) states '*A little east of the cross-course the ore made up to within 18ft of the surface*'. The depression appears to be an openwork cut onto the top of the lode, from which ore was raised. This map also shows slightly to the south-east of the depression the site of a capstan. The 1884 OS map appears to show that the depression had been filled.

Survey

The ground is levelled and overgrown in places, and is at a similar ground level to that of the nearby dressing floor site.

Recommendations

None.

Site 71 Leat SX 42598 73105 (Anna Maria-Site 219) to SX 42004 73701

71/1 1925 Tramline (from Frementor to arsenic works)

SX 42370 72495 to SX 42571 73306

Background

Between 1867 and 1884 (see Fig 14), a new leat was created from Site 219, an adit and possible water wheel (east of the arsenic refinery complex at Wheal Anna Maria), perhaps to provide extra water to feed another leat (Site 56-via an aqueduct over the Wheal Fanny valley floor), both eventually supplying the reservoir to Wheal Maria (Site 57) - a distance of 3000m (or just under 2 miles). It was probably built soon after 1867 (to supplement the

water supply for use at the new foundry), but few leats are shown on the 1874 Lease maps viewed during research for this report. Interestingly the leat is shown on the 1867 Lodes/shafts map (DRO T1258M-E14B), but not the surface features map (Fig 14), suggesting the latter map was surveyed a little earlier than the lodes/shafts map.

An aqueduct was built over the Wheal Fanny valley to take the leat at the correct gradient to continue with the leat on the northern side of the valley (Site 56). The leat and aqueduct can be seen in detail on the 1884 OS map.

At Wheal Anna Maria the source of the leat may have come from the lower dressing floors until approximately the late 1860's, but after expansion of the arsenic complex in later years, water is shown coming out from the valley side from a tunnel east (and downslope) of the arsenic complex (or perhaps water ponds near the arsenic chimney), shown on the OS 1884 map (Fig 16). Site 219 (possibly a water wheel), may have been powered by the water coming out of the tunnel. The leat originally went southwards around South Lode Shaft to the quarry near Wheal Frementor (over a timber launder), and then to Wheal Fanny along the side of Blanchdown Wood.

The section from Wheal Frementor to the arsenic complex (Site 71/1) was subsequently (in 1925), altered and widened (to 3.0m in width), to take a narrow gauge railway (see background section of Site 352).

Survey

The aqueduct was founded on a mound of mine waste to take it across the lower ground in Wheal Fanny's valley bottom. It measures approximately 2.0m in width, 1.5m above ground level on its eastern side and 2.5m above the ground to its west. This bank is overgrown with trees and vegetation. At SX 41871 73626 the leat measures 0.75m in width at its base, 1.5m across its top and its banks are 0.5m in height above ground level (at the downslope side).

71/1: From SX 42350 72489 to SX 42538 72874 evidence of the leat has been removed as it was widened in 1922 to accommodate a narrow gauge railway from Wheal Frementor to the arsenic complex. The railway measures 3.0 to 4.0m in width and now resembles a track.

Recommendations

Refer to summary recommendations given for long term preservation of earthwork features (Section 6.0).

Site 72 Wheal Fanny dressing floor buddles SX 42046 73703

Background

Symons 1848 map (Fig 4) labels the site as 'Floors' below the site of the copper '*Grinder*'. The 1857 Lease map (Fig 7) replicates this. As the Main Lode displacement from Wheal Maria to Wheal Fanny was discovered in 1845, it is likely that the dressing floor was operational soon after that date. The 1867 map (Fig 14), shows each dressing floor building and buddles in detail. A detailed description of the operation of the dressing floors is given by a Mining Journal account dated 7th July 1860 (reproduced by Hall 2000, 107-109).

Survey

The two buddles shown on the 1867 and 1884 maps measure 4.0m in diameter and have stone faced side walls to a depth of 0.3m. They appear to be in good condition.

Recommendations

Given the proximity of these features to a track that may well be used as a designated route for members of the public, and the relatively good condition of the buddles, it is recommended that one of the buddles is excavated internally and consolidated, whilst the second buddle is simply consolidated.

Site 73 Site of dressing floor buildings and grinder SX 42070 73702

Background

See background history section given for the site above. The 1848 and 1857 maps show the site of (and label) the 'Grinder'. Bennett (1992, 19), reproducing an account of the mine in 1850 states: '*In addition to its other machinery, a first rate water engine, with powerful crushing apparatus was erected*'. The dimension of the wheel is given as 35ft. by 4ft. (*op cit*, 107), although this relates to a wheel powering a few heads of stamps (is described in the later 1860 account), as opposed to the earlier crushing engine. However, given the speed at which the lode was removed, it is likely that a copper grinder existed from approximately the mid 1840's until the late 1850's after which it was not used, but may have been replaced by a set of stamps, duly referred to in the 1860's account of the mine.

The site of the water wheel and adjacent grinder/crusher (from cartographic evidence of the 1884 OS map), appear to be next to the mine buildings at SX 42074 73717. The water supply appears to be from a leat (Site 56), that is carried on a low aqueduct (or wall) to the eastern side of the building (see Fig 14), and emerges west of the buildings to rejoin the leat (Site 56) supply to Wheal Maria. There is another water wheel on the mine (Site 79) that also provided power for winding from Western Shaft.

Survey

There is no surface evidence of the mine buildings or water wheel pit. The surviving evidence is characterised by a flattish area, somewhat overgrown. There is an intact low retaining wall measuring 1.3m in height and 5.5m in length. This is shown on the 1867 map next to the northern end of the dressing floor mine buildings.

Recommendations

There may well be below ground archaeological remains of these dressing floor buildings, water wheel pit and copper crusher/later stamps. It is recommended that there is no sub-surface ground disturbance of this area.

Site 74 Adit SX 42012 73738

Background

This adit portal was identified cartographically and by Sherrell (2002, 1915/2, Map 3).

Survey

Branches that have been dumped over and into its excavation obscure the adit portal and lobby. However it measures approximately 1.0m in width and 1.2m in depth. The open lobby measures approximately 12.0m in length.

Recommendations

If members of the public are permitted access to this part of the site, the lobby sides should be fenced.

Site 75 Shaft SX 42017 73771

Grade C

Background

This shaft was identified and located by Sherrell (2002, 1915/2, Map 3). It is not shown on any archive maps found to date.

Survey

The shaft appears to be located in a depression measuring 6.0m x 5.0m and 0.5m deep, with a low spoil mound on the downslope side (south) of the shaft.

Recommendations

The shaft should be fenced and warning signs erected.

Site 76 Western (Engine) Shaft SX 42120 73691

Grade B

Background

'This shaft, part of Wheal Fanny (90fms. on the eastern side of the Great Crosscourse) also exploited Main Lode and Worbridge's Lode, which going westward, forms a southerly branch of Main Lode about 70fms. E. of the Crosscourse. Main Lode, which underlies south trends E. 12° S. near the cross course...Western Shaft....follows the underlie of Main Lode to 135 fms. below shaft collar....Westward of Ventilating Shaft (Site 116) the lode above the 55fm. has been stoped and about 65% of the ground removed There are short drives below this but little stoping has been undertaken. Like Wheal Maria, therefore, the ground in the bottom of Wheal Fanny workings appears to have been unproductive' (Dines 1956, 657). Hall (2000, 100) describes the shaft as being *'drained by 10" Lifts, with the same (water) wheel as pumps at Wheal Emma'*. Ore was wound up the shaft by a water wheel powered winding drum (see Site 79 below) and had a capstan sited to the north-west (see Site 78 below). The shaft, one of three main shafts in this mine, is likely to have been cut in 1845/6 and therefore is shown on all archive maps.

Survey

A granite marker marks the site of the shaft. There is a shallow depression here measuring approximately 5.8m x 3.7m with a depth of 0.6m. The shaft is approximately 5.0m south of an adjacent track that goes to Wheal Maria and Morris's Engine Shaft.

Recommendation

The shaft should be fenced and warning signs erected. It would be prudent to monitor the shaft in case of any ground movement indicative of shaft fill subsidence.

Site 77 Finger dump spoil heap SX 42108 73671 (centered)

Background

The spoil heap from Site 76 is shown on the 1884 OS map, this, an indicative landscape feature of a large working shaft being used to extract ore from the working levels below. It is likely that a single tram line and skip road was used to dump waste rock to form this feature.

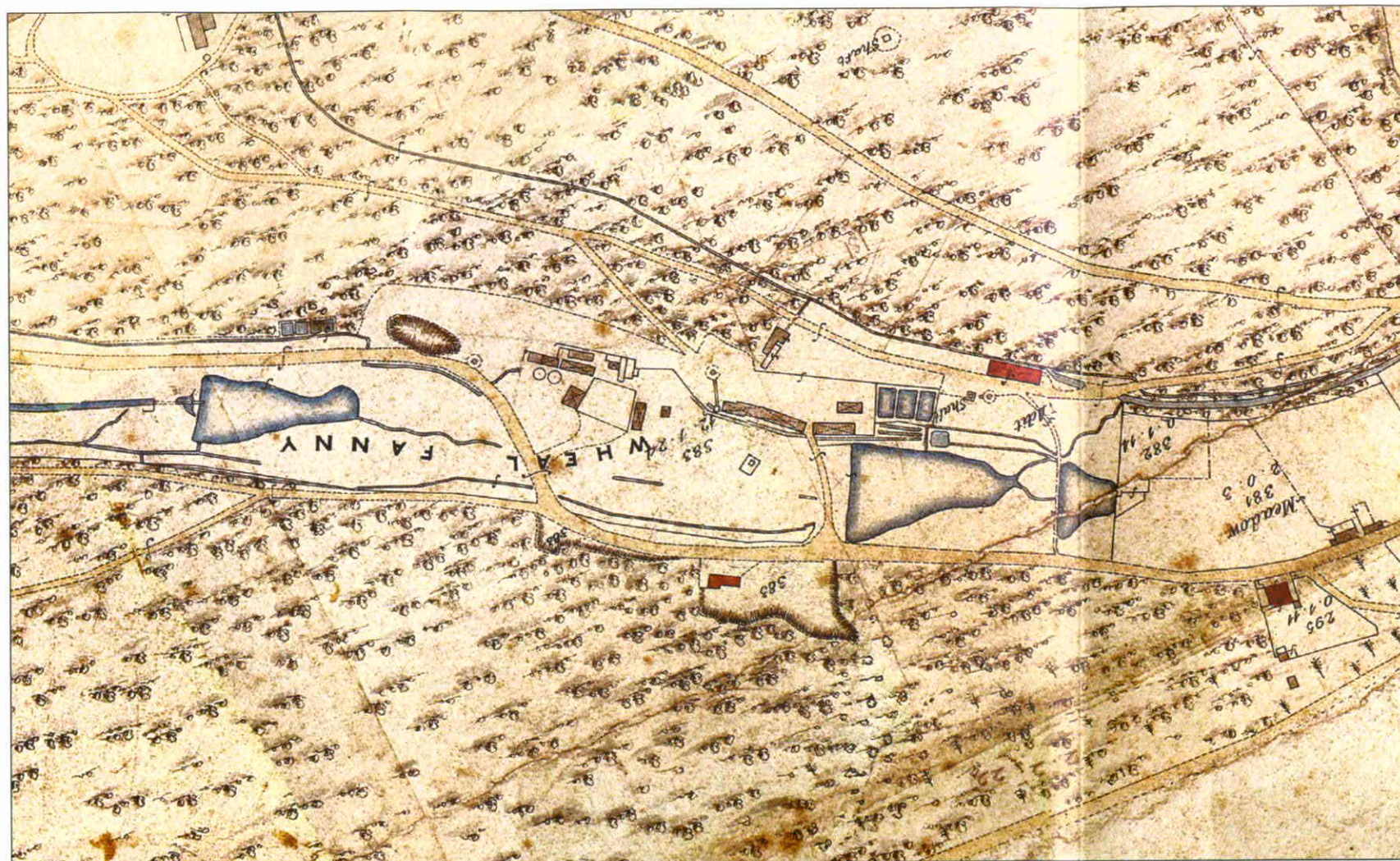
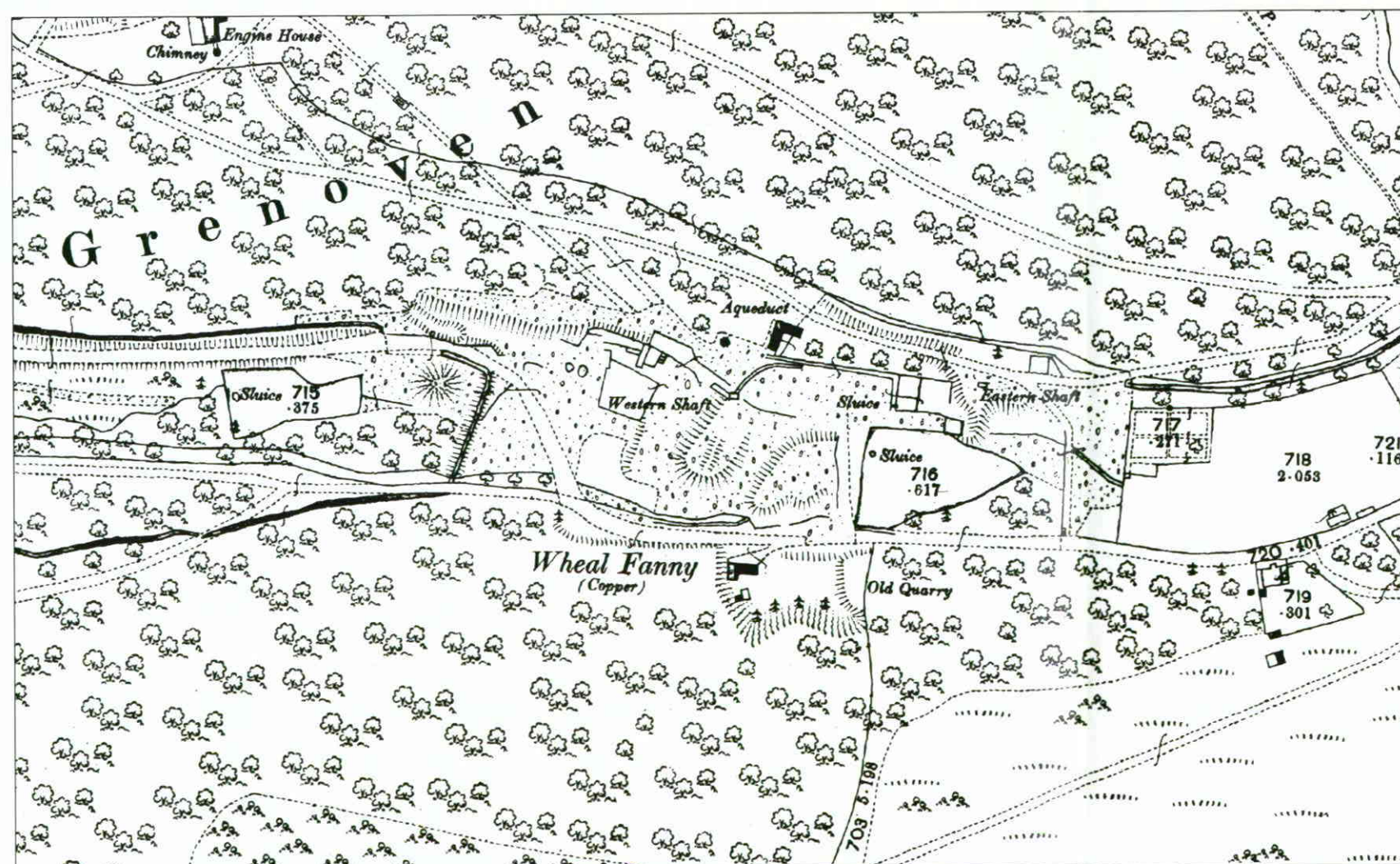


Figure 14 *Wheal Fanny as shown on the surface plan 'Tavistock Parish (Div. No.1)' 1867*

(Tavistock Parish (Div. No. 1) - DRO/T1258WE11 - 3 chains - 1 inch)

0 25 50 75 Metres



Wheal Fanny as shown on the Ordnance Survey plan 1884

(OS 1884 - © Crown copyright and Landmark Information Group. CCC licence No. LA076538.)

0 25 50 75 Metres

Survey

The characteristic finger dump spoil heap replicates the shape shown on the 1884 OS map (Fig 14). It is approximately 5-6.0m above ground level for a length of approximately 15.0m south of the shaft.

Recommendations

None.

Site 78 Western Shaft capstan (in Quarry) SX 42117 73716

Background

Both the capstan and quarry can be seen in detail on the 1867 and 1884 maps.

Survey

The rear (northern) wall of the quarry is approximately 4.0m below the hill slope ground level to the north. The face of the wall does not appear to be very stable. The site of the capstan measures approximately 4.0m in diameter and 0.4m in depth.

Recommendations

If members of the public regularly use the adjacent track, the quarry walls may need to be stabilised and loose sections removed or alternatively the entrance to the quarry fenced. A structural engineer should assess the quarry walls for stability.

Site 79 Waterwheel powered winder SX 42143 73722

Background

From a survey of the mine in July 1860, the inventory includes: '*Drawing-machine wheel at Wheal Fanny 32ft. by 4ft.*' (Hall 2000, 107), the water wheel powering a winding drum to raise or lower the kibbles up and down the shaft. The leat feeding the wheel can be seen on the 1867 map (Fig 14), north-east of the shaft, being a short spur taken off a larger leat (Site 88). This is labelled as an '*Aqueduct*' by the 1884 OS map (presumably water transported by launders over the nearby track). Both the 1867 and 1884 maps show that the tail-race from the wheelpit went in an easterly direction close to three reservoir/settling tanks and then appeared to re-join the leat (Site 56).

Survey

The winder drum masonry structure is difficult to identify, given a spoil mound at this location, although this may well obscure masonry remnants. The site of the water wheel may be located in an area of ground adjacent to the eastern side of the spoil heap. It measures 3.5m in width at its south end, 6.5m in width at its north and at its deeper north (upslope) end is cut into the ground to a depth of 3.7m below ground level. The maximum depth to the sides of the wheelpit (at its south end) may be 2.8m below ground level (although the ground may be raised at this point). Interpretation of this wheelpit site is not certain.

Recommendations

If members of the public are permitted access to the site, loose material from the sides of the spoil heap and water wheel area should be cleared away, to masonry that may need to be consolidated. It also may be necessary to fence the site of the wheelpit, although this may well not be necessary, as it seems to have been infilled.

Site 80 Ore floor SX 42154 73701 to SX 42170 73700

Background

Refer to Site 72 above for the background of the Wheal Fanny dressing floors.

Survey

The ore floor is characterised by stones placed on edge to provide a solid, level surface. The material consists either of slate or granite cobbles. The flat area north of the adjacent track measures 9.0m in width with a 4.0m high bank cut into the uphill slope.

Recommendations

It is recommended that there is no sub-surface ground disturbance of this area and a restriction is placed upon heavy vehicles crossing it.

Site 81 Site of dressing floor buildings SX 42126 73688 to SX 42183 73681

Background

These buildings (shown in detail on the 1867 map, but not the OS 1884 map) appear to be of a similar size and location to the reservoir/settling ponds at Site 52 (Wheal Maria) and may be jigger houses or tanks. A detailed description of the operation of the dressing floors is given by a Mining Journal account dated 7th July 1860 (Hall 2000, 107-109).

Survey

There is no surface evidence of the dressing floor buildings. The area is characterised by a somewhat overgrown flatish area strewn with rubble.

Recommendations

It is recommended that there is no sub-surface ground disturbance of this area.

Site 82 Three settling ponds SX 42211 73691 (centered)

Background

Refer to sites above for the background history of the Wheal Fanny dressing floors and to detailed accounts given above.

Survey

The first (western) tank is in a relatively better condition than the remaining two; its plan measurements can be calculated from Fig. 14. The banks of the first reservoir measure 0.6m in height and have a width of 0.5-0.75m. The floor of the tank is approximately 0.4m below ground level. The other two pond banks are more broken down in various places.

Recommendations

It is recommended that there is no surface or sub-surface ground disturbance in this area.

Site 83 Eastern Shaft (with side portal tunnel) and capstan

SX 42238 73695 Grade A

Background

'The Eastern engine shaft (which is, however, not now an engine shaft) is down 5 fms. below the 80 – 15fms. perpendicular and the remainder on the course of the lode ... Located 65 fms. east of western engine shaft' (Hall 2000, 100). This shaft, one of three main shafts in Wheal Fanny, is likely to have been cut in 1845/6 and therefore is shown on all of the archive maps. There is no cartographic evidence of any surface evidence for pumping or winding taking place at this shaft, though a capstan was shown nearby.

The 1848 map (Fig 4), labels the area east of the shaft *'Water Wheel'*, which may well, in its early years (1845-1860), have provided power to either pump or wind from this shaft. The site of the wheel pit however, cannot be found, although it may be below the adit (Site 85 described below).

From approximately 1915 to 1925, Eastern Shaft appears to have been the main shaft used to access the arsenical sulphides left in the stopes during previous mining operations.

Survey

On the western side of the shaft is a stone lined tunnel (partly obscured by a tree that has fallen over its portal entrance). Its opening measures 1.6m in width and 2.2m in height. The stone tunnel roof and sides appear to have collapsed for a length of approximately 3.5m, leaving a rubble mound at ground level measuring 1.8m in height. The tunnel is blocked internally 5.0m from its opening.

The shaft can be identified by a granite marker post in a rectangular shaped depression (1.0m depth), measuring approximately 3.6m x 3.6m with an encircling wall measuring 1.0m in height above the height of the base of the choked shaft.

The centre of the capstan (or whim) is located 5.0m to the east of the shaft, as shown on the 1867 map (Fig 14), and a long depression measuring 1.0m in depth and 4.0m in length connects to the shaft. The circular depression (within which the central pivot was sited), measures 2.0m at its base and 4.0m across its top edge (at a depth of 1.0m to rubble).

Recommendations

If the forestry track adjacent to this shaft and capstan is to be accessible by members of the public (and access to the lower shaft tunnel permitted via the dressing floors), all of these features will need to be assessed for a variety of works, fencing the shaft and consolidation of the tunnel and walls of the excellently preserved capstan.

Site 84 Launder and tramroad SX 42281 73685

Background

The remnants of this site both relate to the second and third decades of the 20th century. Underground mining re-commenced at Wheal Fanny in approximately 1915 and continued fitfully at surface (reprocessing dump ore) for another ten years. A narrow gauge incline railway was constructed from the 1920's arsenic works to Eastern Shaft to carry arsenic that had previously been left in the higher stopes and levels (Richardson 1995, 96-101).

Survey

There are two vertical timbers at this location (4.0m in height with a crosspiece) that appears to have carried a launder (presumably from Leat Site 88 to the north). These are set behind a small stone built structure (of unknown function). There are an additional two pairs of timber uprights in a line (aligned north to south), although they are shorter in height.

East of the large pair of timber uprights are three sections of tramrail lying on the ground, all measuring approximately 5.0m in length. These may be remnants of the incline railway (shown on a map in Richardson 1995, 95, Fig 17) or alternatively a tramway from the adit described below (Site 85).

Recommendations

If the timber is deemed to be worthy of preservation, it may need to be treated with wood preservative. Iron pins may anchor the tram rails to the ground.

Site 85 Adit (and site of wheelpit) SX 42277 73691

Background

This adit is labelled on the 1867 map (Fig 14), although it was omitted from the later 1884 OS map. It appears to trend towards the shaft at Site 87 (SX 42264 73704), north of this site. It may have been re-opened during the second two decades of the last century to remove ore from the workings. This adit, given its high floor relative to the adjacent ground level (approximately 1.6m), may have provided water for a wheelpit sited just below its opening.

Survey

The adit portal has, in recent years, been rebuilt to restrict access and now has six horizontal steel bars with brick and stone supporting sides. The adit measures 0.7m in width and 1.2m in height. The ground above the adit is overhanging the opening (1.0m of soil overlying 0.5m of bedrock), and there are two trees growing above the opening.

Recommendations

The adit grille seems to be robust although a structural engineer should confirm this. The ground above the opening needs to be cut back and the trees growing on the adit roof removed.

Site 86 Site of Office/house SX 42253 73706

Background

The 1848, 1857 and 1867 maps of the area show a single rectangular building, either an office or house (as it is shaded red on the 1867 map). However, the 1884 OS map shows a smaller square building. It may be the case that this building was originally a row of four mine workers cottages, only one of which was extant when the 1884 map was surveyed (although roofless). The building(s) were likely to have been built when the mine started in 1845/6.

Survey

There are no visible signs of the building. However the site is characterised by dense vegetation and piles of vegetated rubble mounds. There is a banked area of rubble running

along the northern boundary of the site that may represent the remnants of a bank or revetment wall for the slope to the north.

Recommendations

None. It is recommended that there is no surface or sub-surface ground disturbance within this area.

Site 87 (Air) Shaft SX 42264 73704 Grade C

Background

This shaft is not shown on any archive maps that have been found to date, although given its location a little distance north of the adit, it is likely to be an air shaft.

Survey

The shaft was difficult to find, although it is assumed that it is located immediately east of the site of the building described above (Site 86) in a raised area that may have been a shaft mound. There is a depression at this location measuring approximately 2.0m x 2.0m and 0.5m deep.

Recommendations

Given the proximity to the nearby mine track, it is recommended that the shaft is fenced and warning signs erected.

Site 88 Leat SX 42502 73766 (Site 113) to SX 41866 74037 (Wh. Maria) 88/1 Leat SX 41904 73852 to SX 41738 73864 (Site 49)

Background

The 1848 map shows a leat from Hele Farm (labelled 'Engine Leat') going down to the wheelpit described in Site 85. The 1867 map (Fig 14) shows the leat continuing from the wheelpit (still fed at this date by its source near Hele Farm), to run parallel (but slightly upslope) of the track from Wheal Fanny to Wheal Maria. The 1884 OS map shows the same leat, but cut off at SX 41905 73852, before being diverted down to the Wheal Maria dressing floors. At a point north of Site 79 (waterwheel winder) the leat is shown on the modern OS map to be diverted (Leat Site 65) to join Leat Site 56.

Survey

The 1867 map details the route of the leat as it goes under the track at a point east of the site above, after it joins the water from the reservoir pond (Site 113). At a point immediately west of this position (SX 42300 73700), the leat ran parallel to the track in a small tunnel (its roof located 0.3m below ground level). For a length of 3.0m this roof has collapsed leaving the feature open immediately next to the track. This stone lined tunnel measures 0.6m in width and 0.9m in height.

In open woodland the leat generally measures 0.5m in width at its base, 1.2m across its top banks, whilst its downslope banks measure 0.4m in width and height. These measurements vary however as the ground topography changes throughout its course.

Recommendations

Refer to general site management recommendations for archaeological features in woodland environments (Appendix III). The open section of leat running parallel to the

track should be either fenced (on the road side), or preferably its roof replaced with flat stones.

Site 89 Reservoir pond SX 42268 73657 (centered)

Background

The valley bottom at the head of Wheal Fanny valley, was in 1848, filled by two large reservoir ponds (Fig 4). By 1857 however the upper pond had been drained for pasture (and a walled garden – see Site 109 below), and was named '*Capt. Richard's Meadow*'. This is shown in detail on the 1867 map and this area has continued in this use to date.

Survey

Water emerges from the valley floor (presumably via an underground leat supply) through a sluice gate set in the centre of the near vertical 'dam' wall (measuring 0.6m in width and 1.0m in depth) that also marks its western boundary with the field valley bottom. The wall measures 3.0m in width (including an earth build up along its east face) and 3.5m in height. The 1867 map shows a larger pond than its surviving extent.

Recommendations

The sluice should be cleaned out and monitored to ensure it does not become blocked.

Site 90 Leat SX 42305 73647 to SX 42241 73672

Background

The 1867 map shows a 'clean' water leat running directly from the reservoir pond (Site 113) at the head of the valley to supply long settling tanks and the main reservoir pond for Wheal Fanny dressing floor (from the north). The 1884 OS map does not show these small leats.

Survey

The leat, from the supply running along the north side of the valley, runs along a raised bank of mine waste measuring 0.75m in height and 0.35 m in width. A finger dump of spoil from Eastern Shaft (probably from the early 19th century reworking), overdumps this feature. Surface evidence for this feature has been lost where it meets the elongated settling tanks to the west (shown on the 1867 map).

Recommendations

None.

Site 91 Small settling pond SX 42224 73674

91/1 Leat/channels SX 42224 73674 to SX 42111 73700

Background

Refer to the 1867 map (Fig 14) for a detailed view of the features. The historical background and function of the features are discussed in Site 81 above (Wheal Fanny dressing floors).

Survey

The small rectangular settling/reservoir pond measures approximately 1.0m in depth below ground level with earth banks on all four sides which measure 0.5m in height above ground level. The plan dimensions of the feature can be taken from Fig 14.

Recommendations

There are be no long-term management implications for this feature.

Site 92 Large reservoir pond SX 42198 73657 (centered)

Background

This pond is the largest surviving of the Wheal Fanny reservoirs. It is shown on the 1848, 1856, 1867 and 1884 maps and provided water to both the dressing floors and other leat systems for a variety of end uses.

Survey

The extent of the pond can be seen in detail on the 1867 map. The pond is now larger than in the past and reaches the edge of the north - south track that traverses the valley bottom (which also acts as a dam). At times of rainfall this track floods because the sluice located on the south-west corner of the pond has become blocked with branches etc.

Recommendations

It is recommended that the sluice and tunnel under the road are cleared of debris and mud etc, and dredged from the vicinity of the sluice area to clear the water outfall at times of high water level. It is highly likely that once the sluice outlet works more efficiently, the water level will reduce, revealing the original western edge of the pond.

Site 93 Flooded area SX 42175 73653 to SX 42276 73651

Background

The ground west of the north - south track appeared to contain very little on archive maps, although a leat runs at surface on its southern side and underground.

Survey

The eastern part of this site is now flooded, whilst the western side is characterised by spoil heaps, rubble and gorse. The 1884 OS map shows a large spoil heap at this end that appears for the most part to have been removed (probably for reprocessing from the 1870's onwards). The leat shown on the 1867 map (along the southern side of this area - Site 95 below), now takes a similar route but then rejoins the underground leat which is blocked.

Recommendations

The existing leat and stream takes the water down the valley, but it may be necessary to review the route of the stream with a view perhaps to reducing the flooded area. It is not certain if the underground leat can take all of the water from the main pond to the east (see site above), it certainly did not do this a century ago.

Site 94 Large reservoir SX 41880 73690 to 41943 73692

Background

This is the second largest surviving of the Wheal Fanny reservoirs. It is shown on the 1867 and 1884 maps, and provided water to both the dressing floors and other leat systems for a variety of end uses. The map (Fig 14) shows either the sluice position, and/or a water wheel (although its function cannot be determined). The 1884 OS map only labels the site 'Sluice'.

Survey

The pond is extant and has trees growing out of its interior; presumably its water level varies with the seasons. At its western end is a vertical 'dam' wall (3.5m high) with a slight dip in the top centre of the wall acting as a sluice. It may be the case that the sluice was set at a lower level in the base of the wall, and that this has become blocked up, resulting in the water now pouring over the top of the wall (creating a picturesque waterfall).

Recommendations

A structural engineer should survey the retaining wall. It may be necessary to consolidate or repair the section of wall near and below the present outlet. The possibility of a blocked sluice here should be investigated.

Site 95 Leat SX 42165 73631 (Site 92) to SX 41560 73726 (Leat Site 5) 95/1 Leat tunnel SX 41624 73705

Background

The leat is shown on the 1867 and 1884 maps, was supplied from reservoir pond Site 92 and ran down the southern side of the valley close to the track. It joins up with a lower leat at the bottom of the valley (Site 5) and possibly from here to join the nearby stream. The leat may simply have been an overflow taking unused or unwanted water from the ponds.

Survey

The leat can be seen in its original profile at its western end. Its profile measures from 1.0 to 1.5m in width across its base and 3.0m across its top banks. The lower bank (north side) is approximately 1.0m in height and 0.75m across. The leat's eastern end is not as well preserved and has been damaged by reprocessing works and other activities.

95/1: At SX 41624 73705 the leat goes under the road via a tunnel. The opening is faced with stone and arched, measures 0.9m in width and is 1.2m in height (although the original floor has eroded to a deeper level). The tunnel appears to be in good condition and measures approximately 8.0m in length. There is a modern 0.02m diameter steel pipe running through the tunnel (attached above water level on its north side). At a depth of 0.6m below the crown of the arch (on the south side), there is residual evidence of timber planking (and supporting iron spikes), that appear to have supported a launder. At the west end of the tunnel, the structural stability of the facing stone is not in good condition and will need rebuilding.

Recommendations

Refer to general site management recommendations for woodland leats (Appendix III at the rear of the report) and to recommendations made in Site 93. A structural assessment of the tunnel will need to be carried out, as it is likely that heavy loads will be placed on its

surface, as this is an important access route. Any structural works recommended to be carried out should be agreed with the County Archaeologist before implementation (and an archaeological watching brief commissioned).

Site 96 River Tamar Footbridge site and Quarry SX 41397 73669

Background

The Tamar footbridge is shown on the 1867 and 1884 maps. It may be shown on Symons 1848 map (but is obscured by a mine sett marking). Barton (1964, 77-78) states: '*A great number of the miners made their home in and around Gunnislake or Latchley and after a boat ferrying thirteen miners across the river overturned in the winter of 1849 with the loss of several lives the company decided to erect a bridge across the river at the latter place. This structure was washed away in the 1890's by river floods and never replaced*'. Thus, the bridge was built to allow Cornish miners from Latchley, Chilsworthy and Luckett to work at Devon Great Consols, without having to go to Gunnislake via Newbridge or by boat.

An adjacent small quarry (on the Devon side of the bridge), is not shown on the 1884 map although a line boundary goes around its upslope edge, suggesting its presence. Presumably the small quarry provided stone for the foundation plinths of the bridge.

Survey

There is no visual evidence of the footbridge, although there is a track through the open field down to the site measuring 0.75m in width. There is a small quarry outcrop on the northern side of the footbridge site. The back of the quarry measures 3.25m in height and is cut into the west-facing slope for a length of 5.0m.

Recommendations

None. This is a potential site for the creation of a new footbridge across the River Tamar.

Site 97 Site of Building SX 41461 73644

Background

There is a small building shown here on the 1867 map, though it is not shown on any other map viewed for this report. It may have been an agricultural building (field barn) as opposed to being industrial in function.

Survey

The front and side walls of the building have gone. The rear of the building was part of the field boundary wall, but its location can be seen where it measures 1.75m in height and is approximately 5.0m in length.

Recommendations

None.

Site 98 Timber summer house SX 41486 73442

Background

This site is privately owned (although it has been included in the project area), as part of Weir Cottage. It was built at the turn of the century in 1906. The reason for its inclusion is that the trackway that runs parallel to the River Tamar was turned into the 'Dukes Drive', - one of a number of long tracks (see Site 330 - Blanchdown Drive), that were created in

approximately 1813-15, to provide a scenic trip down the Tamar Valley for the Duke and Duchess of Bedford: the landowners. At desirable locations along the drive (from Endsleigh House to Impham), small timber framed rough bark walled teahouses (and perhaps toilets), were built. This building has the appearance of one such although the owners of Weir Cottage may have built it, perhaps as a summerhouse.

Survey

The timber building has an octagonal brick chimney. It measures approximately 3.0m in height, 5.0m in length and is set on a stone plinth 0.45m in height above ground level. The building has two sets of small cottage style windows, and a door, its walls are of rough bark.

Recommendations

None, it is presumably privately owned.

Site 99 Adit SX 41513 73383

Background

The site of the adit is not shown on any archive maps viewed. Symons 1848 map shows a number of east - west lodes at South Huel Maria, on the Cornish side of the River Tamar opposite the location of this adit. East of the adit and aligned along the lode are a series of lode back pits and linear openworks (Site 178). From documentary and field evidence these appear to date from the 18th century.

Survey

The adit portal is within private land held by the owner of Weir Cottage, but can be seen from the track next to the River Tamar. It appears that the adit portal is in an area of ground that has been quarried to provide stone either for the leat or the nearby house. The sides of the portal have been reinforced with concrete that support steel grilles and a steel door. The lintel appears to be of timber and the opening measures approximately 1.8m in width and 1.75m in depth.

Recommendations

None, presumably the site is privately owned and is the responsibility of the landowner.

Site 100 The 'Great Leat' SX 41486 73383 to SX 43245 72914

100/1 River Tamar sluice gate SX 41489 73365

100/2 Sluice gate SX 41922 72551

100/3 Building SX 41935 72553

100/4 Tunnel SX 42674 72585

100/5 'Lower' copper processing works

SX 42854 72868 to SX 42948 72917

100/6 Leat bridge SX 43116 72443 (west of adit 323)

100/7 Site of sluice gates SX 43347 72992

Background

The 'Great Leat' (as labelled on the 1857 Lease map), was not shown on the 1848 map, but can be seen in detail on the 1867 and 1884 maps. Bennett (1982, 19) states; '*Devon Great Consols made full use of the water power now made available to them (by a grant of the use of*

the water of the Tamar from Duchy of Cornwall at an annual rent of £250 (by 1860 increased to £350 pa) by constructing an extensive system of leats bringing water from the Tamar and from workings at the mines themselves' (i.e. Leat Site 5). Bennett (op cit) quoting a survey of the mine in 1850 also states: 'The shaft at Anna Maria is drained by the new water wheel (completed in 1849) which also drains the two shafts at Wheal Josiah The water is brought about two miles from a point up the river in order to get the proper fall by a leat, (a weir on the river ensured a good supply)...'. Presumably this large leat (labelled as an 'Old Canal' on the 1954 3rd Edition OS map), was built in the latter years of the 1840's to power five large water wheels (see Sites 318, 322, 325 below).

Survey

This is a truly impressive feature that resembles a canal more than a leat. It measures approximately 4.5m in width at water level and is cut through the ground on its western (River Tamar side), to a depth varying between 2.0 and 3.0m. The upslope side is deeper but at its junction with the forested hill slope, a track has been cut back into the slope varying from 0.3 to 0.75m in width. This may well have functioned for maintenance access purposes. In places the downslope walls can be quite high (up to 5.0m) and in others just a low bank, the same applies to the upslope wall, depending on the site's topography.

The 'Great Leat' is filled with water in many places throughout its route - standing at some sites and flowing in others, though elsewhere it is completely dry. This is an incredible feature and represents a feat of surveying and engineering. For virtually its whole route, the Great Leat has retained its original width. The local fishing club now uses some sections of its banks to access specific sites. At a number of sites (collectively numbered 346 on the Site Inventory map – Fig 38), there are small quarry pits that may well be the evidence of attempts to source localised stone to construct the flanking walls.

100/1: The granite walls that once supported the large timber sluice gates stand to their full height. Timber remnants of the sluice gates are still extant at the higher front (north) end of the granite walls. These measure 3.0m in height and are approximately 5.0m in length, constructed of large un-mortared granite blocks. At the lower end of the feature the side walls measure 2.5m in height above internal water level. Given the shape and size of this feature its similarities to a lock cannot be discounted.

The 1857 map gives the impression of an excavation from the front of the sluice gates at river level which allowed the water to enter the leat via the sluice gates. Part of this route appears to have been excavated inside the landowner's boundary fence, although much of it appears to have been backfilled. There is a small stone built structure near the sluice structure (in private ownership) that may well have provided a refuge for a worker who operated the sluice gate.

100/2: At SX 41922 72551 there are features which have been interpreted to be a major sluice gate, designed to remove excess water from the leat. The 1867 (Fig 8) and 1884 map (Fig 9) shows the water from the leat going into the River Tamar at this point. Cut in the south bank of the leat there is a stone revetment wall which measures 1.7m in depth, 2.6m in length and 2.3m in width. South of this revetment is a wide, deep area where the water that had been let through the sluice has eroded a depression measuring 7.0m in width and 10.0m in length to a depth of 1.0m. Presumably there was a winch operated timber sluice gate here.

100/3: At this location there is a small building located approximately 10.0m north-east of the site of the sluice gates. Presumably, this acted as cover for the person who operated the

sluice. The building is small, and measures approximately 2.0m in length and 1.8m in width. The highest wall is the rear (north) wall which is up to 1.2m above ground level. The side walls measure approximately 0.7m in height. There appears to have been an opening in the south wall (probably a door) and the northern end of the east wall (probably a window).

At times of heavy rainfall, many sections of the leat that are dry, flood; adits that are dry also tend to flood, adding to the water carried by the leat. At the rear of Site 338 (Environment Agency cabin) part of the south bank of the leat has been removed, resulting in water from now flooding around and into the cabin. A rebuilding project is proposed to return the bank to its original height.

100/4: To the east of the Environment Agency cabin there is a track down to the River Tamar, which is also shown on the 1867 map. At the point where the track goes over the Great Leat, a tunnel was built. This is now not visible, although it may well be extant and simply blocked with leaves etc.

100/5: The 1940's 'lower' copper processing works used the bed of the Great Leat as railway sidings and for timber precipitation launders from Site 329 to Site 328 (a length of approximately 100.0m). Blocks of slag (similar to Scoria blocks but smaller), have been used in the bed of the leat to form a hard surface upon which the horizontal timbers were laid. The blocks measure approximately 0.15m in depth, 0.45m wide and 0.3m in width. These are visible for a length of approximately 15.0m but the ground is broken up in places, obscuring the surface features. There is surface evidence of timber sleepers and tram rails at ground level. Also there are some sections of vertical timber supports that may have held launders (see Fig 27 – a photograph of these timber features).

100/6: At SX 43116 72443 there is a stone bridge (or viaduct) spanning a small north - south tributary cutting across the route of the leat. The south (nearly vertical) stone revetment face measures a maximum of 3.0m in height, with a parapet wall measuring 0.5m above track bed level and 0.65m thick. The leat measures approximately 4.5m in width and has standing water in many places.

100/7: A pond of unknown depth is sited at this location. It is not shown on the 1884 or later maps. The source of the water is possibly from the tailrace of the upper water wheels (fed by the Blanchdown Adit). There appears to be an outlet for this water in the form of an underground pipe that comes to surface over the site of the Agnes wheel (Site 322/1).

Recommendations

A structural engineer should inspect the granite sluice gate, report on its structural integrity and make recommendations for its consolidation and preservation. These should be agreed and works supervised by the County Archaeologist.

There appears to be little consolidation works necessary for this feature. It may be prudent however for a geotechnical survey to be undertaken of the entire leat route. Water cascading down the south sides of the leat in places during heavy rainfall may be causing other site or structural problems. Also Site 341/1 (SX 42565 72500) appears to be orange coloured contaminated mine water from South Fanny Deep Adit that is welling up in the centre of the leat and likely to be entering the River Tamar downstream.

Site 101 Site of Weir SX 41451 73382 (centered)

Background

The weir is shown on the 1848 map (labelled 'Head Weir') and in detail on the 1867 map (Fig 9). Presumably the weir was built for fishing as opposed to mining interests, but nevertheless its siting provided a suitable location for the Great Leat to remove water from the Tamar on the Devon side and for another small leat to be built on the Cornish side powering a water wheel (See Symons map, Fig 4). There is a small feature shown on the Devon side of the river against the weir, but this is of uncertain function.

Survey

The weir appears to have gone, having either been dismantled or simply washed away.

Recommendations

None.

Site 102 Adit portal SX 41470 73507

Background

The site of the adit is not shown on any archive maps. Refer to comments made in the background section to Adit Site 99 above.

Survey

Adjacent to the edge of the track is a blocked, dry, adit portal measuring 1.2m in width and 3.0m in height. The adit lobby measures 3.4m in length.

Recommendations

After survey by a structural engineer and consultation with the site archaeologist, it would be prudent to restrict access to the open portal of the feature.

Site 103 Costean pits SX 41548 73358 to SX 41612 73207

Background

The costean pits are not shown on any archive maps and appear to be running parallel to the track. This site is an area between two groups of east - west lodes shown on Symons 1848 map (on the Cornwall side). Presumably the miners were searching for any lode outcrop on the Devon side of the river.

Survey

The small pits are 2.0 to 3.0m apart and measure approximately 2.0m from east to west, 3.0m from north to south and approximately 1.0 to 1.5m in depth. Small elliptical spoil heaps have been deposited on the downslope sides of most pits. Fallen branches and tree litter obscure many of the pits.

Recommendations

None.

Site 104 Possible timber treatment/maturing ponds

SX 41529 73280 to SX 41609 73055 ('standing' area from SX 41530 73280 to SX 41561 73154)

Background

No archive evidence has been seen (either cartographic or documentary) to explain the function of these features. The 1867 map (Fig 8) shows in detail the plan outline of these two sites. Hall (2000, 111) quoting an 1860 survey, details the timber used by the mine (*'red and yellow pine and Norway...the Norway particularly is very different from the small kind now usually seen in Cornwall...The timber is brought up by the railway in regular timber-trucks into the timber-yards and to the saw-mill'*). It is difficult to interpret the function of these series of rectangular ponds, connected to the leat. However, notwithstanding the documentary extract reproduced above, they have been possibly interpreted as small timber treatment ponds. Given the location of this mine in dense woodland, it would have been prudent to utilise local timber. The long rectangular flat area created on the western side of the ponds may well have been a standing area for the timber to dry. Presumably the timber that was matured was of a relatively small size. However there is no railway track at this location to efficiently move the wood to meet the needs of the mine.

An alternative hypothesis is that the small tanks next to the leat, are simply settling tanks and the flat area nearby the flattened spread layer remnants of the settled materials. Bennett (1982, 19) quoting an 1850 mine survey states; *'...and the water pumped out of the mines and operating the crushing wheels and all other necessary work is brought round by another leat to assist in working the new wheel ...'*. This site may well have been used to settle out mine water contaminants between Wheal Fanny and Wheal Maria *en-route* to Blanchdown and the mine's water wheels.

Survey

The earthen-banked ponds (probably with a hidden stone core) are well preserved, and as shown on the 1867 map (Fig 8). The pond floors are all approximately 1.0m below ground level and measure approximately 10.0m in length (check with GIS). The banks all measure approximately 0.75m in width and 0.5m in height above ground level. The ponds at the northern end of the series are not accessible as trees have been cut down (or fallen) and have been left in-situ, completely obscuring the ponds. The flat area shown on the map can be seen on the ground in good detail (although somewhat overgrown), its west scarp measuring approximately 2.0m in height.

Recommendations

Long-term management recommendations for this feature should include the removal of cut or fallen trees obscuring it and removal of existing trees growing on its banks.

Site 105 Site of Reservoir SX 41680 73698 (centered)

Background

This is shown on the 1884 OS map only. It appears to have been fed by a small leat coming down the centre of the valley from another reservoir (Site 94). Its outlet may have been at its south-west corner where it joined Leat 95.

Survey

The reservoir is no longer extant. Its location has been partly occupied by a spoil heap located to its north and against the nearby track from Wheal Maria.

Recommendations

None.

Site 106 Rubbytown Leat SX 42372 73597 (Wh. Fanny) to SX 43598
73590 (Agnes Shaft)

106/1 Leat tunnel and aqueduct (Site 166/1) SX 42875 73433

106/2 Leat railway crossover (over Site 180) SX 43198 73376

Background

Symons 1848 map labels this feature '*Leat of water taken from Rubbytown*' (see Fig 4). The complete length of the leat is also shown on the 1857 lease map (after its northern end at Wheal Fanny had been slightly extended to go behind a house (Site No. 393 named Tree View, and along an embankment that can be seen in the rear garden). Its route from this point is not certain, but it may have turned to the north and gone under the road at the same point as the later incline tunnel (Site 111), to supply the reservoir ponds in the valley bottom. The leat follows the topography of the hillside from near the head of the valley south of Rubbytown Farm, westwards into an area drastically altered by the later dressing floors/arsenic complex and then around Blanchdown (or Frementor Wood), presumably to feed the upper Wheal Fanny reservoir pond. Surprisingly, the entire course of this leat is not shown on the 1867 map (Fig 8).

The OS 1884 map does not show the section of leat from Wh. Anna Maria's 'lower' dressing floors (reservoir pond - Site 168) and arsenic refinery complex through Frementor/Blanchdown Woods to Wheal Fanny. This section appears to have gone out of use in the 1870's, although it is shown (on the 1867 map) from the reservoir pond (Site 168) through the arsenic refinery to the Quarry (Site 218). However, the route from Rubbytown (Agnes Shaft), is shown (and is extant), as it runs in parallel with the main railway line to the dressing floors and arsenic complex, and was presumably still in use.

The course of the leat was affected in two places in 1857: firstly by the railway line, as the latter crossed its original course and secondly by the construction of the railway bridge (Site 180/2) under the waste railway line (Site 166), necessitating a short tunnel and aqueduct. Also the leat was joined by a section of leat (Site 162/1), from the main leat (from Agnes Shaft water wheel tailrace) to the 'upper' dressing floor reservoir pond.

Survey

This long leat (over 3000m or just less than 2 miles) is in a relatively good condition in the wooded areas, but in open sites has not survived. At SX 42195 73587 (east of Wheal Fanny quarry) the leat measures 0.75m in width at its base, and is cut into the ground to a depth of 1.25m on its upslope side. There is a bank on its lower side measuring approximately 0.3m high above ground level and 0.6m in width. The later quarry (Site 107 below) has cut the leat. The leat was found again at SX 41633 73513 where it was cut by a later mine track as it went around Frementor/Blanchdown Woods. Unfortunately, it was unrealistic to schedule field survey time to follow individual leats for their entire courses, and, like other leats on this site, only accessible sections were inspected.

At SX 42758 73402 (east of the arsenic complex) the leat and upper railway line to the arsenic complex (Site 180) appear to run very close together up to the site of an aqueduct and leat tunnel (Site 106/1). There is a short section of leat (from a point labelled 'Sluice' on the OS 1884 map), for a length of 40.0m (SX 42678 73369 to 42634 73358). It may be the case that the leat (or two leats merging) went into a tunnel, as their beds disappear near

a 1.5m high vertical section of ground with evidence of a truncated vertical section of dry stone wall.

To the east of the 'Sluice' location the leat is not visible until the woodland cover again preserves the feature (at SX 42717 73388). The leat measures 0.6m in width at its base and has a depth of 0.4m, with a bank on its north side measuring 0.4m in height. It runs parallel to the railway line (180/1) on its north until it meets the aqueduct and tunnel (Site 106/1).

The aqueduct (Site 106/1) is constructed as a mine waste platform measuring 1.2m in height, 0.75 in width across its top surface and 1.5m in width at its base (for a length of approximately 20.0m). The leat tunnel opening (at SX 42880 73433 on its western side) measures 0.7m in width and 1.0m in height. The original end of the tunnel is extant and constructed of faced stone. Vertical and horizontal timber supports are visible inside the tunnel, which measures approximately 4.0m in length. The feature has collapsed for a length of 1.0m from the location of its original east face. The leat appears to have been supported by timbers to the east of the tunnel. As the ground steeply falls away to the south this leat merged with Leat 162/1. At SX 42911 73442 (east of the leat tunnel), the leat measures 0.4m in width at its base and 0.4m in depth on its downward (south) side. The downslope bank measures 0.7m in width.

Site 106/2: This is located at a point where this leat crosses over the later railway track (from north to south at SX 43199 73376) and then after running along the south side of the railway, goes over the flat rod cutting to Richard's Shaft (SX 43230 73362). Presumably a timber launder took the leat over the railway, and then onto the top of a stone wall that also acts as a retaining wall (the ground slopes steeply away to the south). The wall measures 2.5m in height above a track to the south that is not shown on a map - presumably a new forestry route, and is approximately 30.0m in length. Trees are growing along this wall, damaging it in places. There is a high wall on the east side of the flat rod slot (that took a timber launder from the top of the aqueduct wall), that measures 4.0m in height and 3.0m in width (facing the flat rod cutting).

East of Agnes Shaft (SX 43522 73589) the leat follows the lower edge of the valley (below Agnes Shaft) and along the southern edge of a narrow raised embankment between two reservoir ponds (Sites 249/1 and 249/2). The leat measures 0.4m across its base, with low banks either side (the lower bank measures 0.6m across its top), and 0.3m in depth below the top edge of the bank.

Recommendations

Refer to general site management recommendations for woodland leats and refer to recommendations made in Site 93. All stone built features (aqueducts etc) related to the route of the leat should be inspected for damage and to identify trees that need to be removed, since they may damage the structure.

Site 107 Quarry SX 42145 73600 (centered)

Background

The quarry may have been in existence by 1848 and may be shown on Symons map by a slight curved line at this location. It is shown in more detail on the 1867 and 1884 maps (Fig 14). The quarry appears to have been used to supply stone for the Wheal Fanny mine buildings.

Survey

The quarry does not appear to have changed its plan since the 1867 map was drawn. It has steep, vertical back and sides (approximately 10.0m in height above rubble level), although immediately in front of these is a large amount of scree and rubble. The plan measurement of the site can be calculated by referring to Figure 14. A small stone retaining wall measuring 0.5 to 0.75m in height and 0.45m in width has been built around its west and part of its south sides.

Recommendations

A geotechnical and safety inspection will need to be carried out at the back and side walls of the quarry if members of the public are to use the nearby track as an access route through this part of the mine.

Site 108 House SX 42127 73608

Background

The 1867 map shows in detail the house (shaded red) sited at the western end of the quarry. The OS 1884 map also shows a small building to the south, presumably its outhouse/toilet. There appears to have been little change in the layout of the buildings after this date. The building may have been two or three cottages inhabited by masons working the quarry.

Survey

There are surviving walls up to 1.5m in height on the south wall of the 'outhouse'. A slightly newer 'L' shaped feature has been constructed with rubble from the house walls next to the outhouse building to a maximum height of 1.6m and width of 0.6m. This building had a door in its north elevation and a small hole in the lower section of the east wall (0.75m high) may have been the trapdoor leading to a small stone toilet lined pit (with a section of its south wall visible at ground level). An alternative hypothesis is that the masonry feature is a remnant of a powder magazine, the 'L' shaped rubble hedge, the safety blast wall.

The main building's walls appear to have been removed entirely, leaving a trench measuring 0.5m in width and 0.3m in depth. Inside the robber trench are piles of rubble the only evidence of interior walls.

Recommendations

Limited consolidation works are necessary to the outhouse walls. These should be carried out under supervision of an archaeologist.

Site 109 Walled Garden (Capt. Richard's Meadow) SX 42325 73673

Background

The 1848 map shows this part of the valley to be occupied by the upper Wheal Fanny reservoir pond. By 1857 the upper pond had gone and the site was labelled 'Capt. Richard's Meadow'. The 1884 OS map shows a south-facing walled garden (within which were four gardens subdivided by paths) in the valley floor's north-west corner.

Survey

The southern and eastern walls have been removed. The northern and western walls seem to be fully extant, and act as retaining walls for the higher banks behind. Leats run along behind the north wall and down the side of the west wall.

Recommendations

The land is presumably privately owned and the field is not likely to be accessible to members of the public.

Site 110 Site of mine buildings SX 42402 73628 to SX 42424 73638

Background

Two mine buildings are shown at this position on the 1867 and 1884 maps (see Fig 14). They both appear to have outer courtyards. The western building is shown on the 1904 OS map but had gone by the publication of the 1954 3rd Edition OS map.

Survey

There are no extant remains above ground level.

Recommendations

None, although it is recommended that there is no ground disturbance in this area.

Site 111 Possible incline railway tunnel SX 42382 73621

Background

The portal of this tunnel is shown on the 3rd Edition OS map. This tunnel has been interpreted as an incline railway tunnel (going under the road to Wheal Maria from Wheal Anna Maria), that ran from Wheal Anna Maria arsenic works (powered by a converted steam lorry with winding drum), to Wheal Fanny, when underground development works were being carried out to remove arsenic from the sides of the Main Lode stopes (refer to Site 119). Richardson (1995, 99) states '*At that time (1922) arsenic ore was coming from Wheal Fanny ... By mid-1922 we have the first mention of the building of a railway between Wheal Fanny and the arsenic works, which included cable-operated inclines to take it over the intervening higher ground.*'

Site 106 mentions the possibility that this later tunnel may have been enlarged from a smaller leat tunnel that may have been constructed by 1848.

Survey

The open tunnel portal is obscured behind dense brambles and its stone arched crown less than 1.0m below road level. It measures 1.65m in width and 1.7m in depth. Its roof is constructed of reinforced concrete and steel beams that can be seen for a distance of approximately 9.0m, until rubble fills the tunnel (presumably equivalent to the southern side of the road). The sides of the tunnel are also of concrete.

Recommendations

A structural engineer should survey the structure to assess its structural integrity.

Site 112 Spoil tip SX 42477 73699 (centered)
112/1 Leat/railway tunnel SX 42493 73714 to SX 42468 73698

Background

The spoil tip is first shown on the OS 1884 map, though it may have originated at an earlier date as the 1867 map does not show spoil tips. The tunnel is shown on the MRO Abandoned Mine Plan 15314 Fiche 10/11 (Titled 'Anna Maria Sand Dump' and dated December 1940). Given the location of the tunnel (unlike those cut along the centre of the dressing floor tips-Sites 358, 359), this appears to have carried a leat or was possibly a tramway route. This may have been cut in the 1920's as part of the inclined plane railway (wound by a converted Garrett steam engine), from Wheal Anna Maria arsenic works to Wheal Fanny for both surface dump reprocessing and underground development – removing arsenic left on the sides of Main Lode.

Survey

The spoil tips have a similar topography to those shown on the 1884 OS map, although have become somewhat denuded. Map evidence shows that there were two spurs (oriented north-east), which resembles two finger dumps with tramrails on their surface. The spoil is brown coloured, fine and granitic/crystalline in nature, and so may well be waste material from a nearby copper crusher/grinder. The maximum height of the mounds appears to be 5.0 - 7.0m high, although the tops have become flattened.

122/1: Remnants of the tunnel exist in the western spur of the spoil heap, but the eastern spur tunnel has completely collapsed leaving a wide opening to ground level for a length of 8.0m. The opening measures 0.5m in height and 1.75m in width. The Geotechnical report (Sherrell 2002 1915/2, Map 4) indicates that there are arsenic crystals on the inside of the walls.

Recommendations

There is no doubt that use of this area by motorbikes has denuded the spoil heap and that the material is contaminated with heavy metals. The tunnel cut through the spoil tip is not stable and may collapse. It is recommended that the spoil heap is fenced off.

Site 113 Reservoir pond SX 42502 73766 (outlet sluice SX 42477 73748)
113/1 Adit SX 42527 73711

Background

This pond is not shown on the 1857 Lease map, but is shown on the 1867 map. It appears to have been a settling pond used to remove contaminated elements from the nearby adit water (Site 113/1) and from the adjacent smaller settling ponds (Site 117), before it entered the River Tamar. The pond was fed by the leat from Hele Farm and the adit supply from Wheal Anna Maria dressing floors (see Fig 15, the 1884 OS map). The adit portal location is suggested by the label on the 1848 Symons map as 'Adit Tail'. The leat coming from this pond (via the sluice outlet) is quite wide, which would help the contaminant particles to settle out before the water joined Leat 88.

Survey

The pond is full of water and has trees growing from its interior. The adit portal feeding the pond (from Wheal Anna Maria dressing floors), measures 0.45m in width, 0.6m in

depth and is timber lined (at 0.4m intervals). The adit is blocked internally at a distance of approximately 4.5m by a roof collapse, whose depression can be seen on the surface.

At the location shown on the OS 1884 map, the pond's outlet sluice is still extant and functioning, and takes the water under the adjacent track to feed the leat that fed both the Wheal Fanny dressing floor and Leat 88. Unfortunately the sluice tunnel has become blocked at its entrance by vegetation, fallen branches and silt, resulting in some of the water from the pond flooding over the road.

Recommendations

Trees could be removed from the pond, but the outlet sluice and tunnel will need to be cleaned out to ensure that the water can run freely out of it.

Site 114 Shaft SX 42538 73697 Grade C*

Background

This site appears to be a collapsed shallow air shaft on an adit and was located by Sherrell (2002 Report 1915/2, Map 4). It is not shown on the 1867 shaft/lodes map (Fig 8).

Survey

The opening measures 1.0m in width and 0.6m in length. It is visible for a depth of 2.0m, where the timber supports for a relatively shallow 'adit' running to the north can be seen. This shaft (if that is this depression's function), appears to give access to a 'Y' junction between two underground water channels before they join the adit at Site 113 (above). The water channels come from the Wheal Anna Maria dressing floors and possibly the steam winding and crushing engine. This site is approximately 5.0m from the adjacent track.

Recommendations

The feature should be cleaned of collapsed material to investigate visibly if it is a shaft. Given the amount of underground detail that is visible (at such a shallow depth), it may be appropriate to grille the feature horizontally at ground level, assuming no archaeological features are affected by this option for preservation or fence the area around it. All ground works should be subject to consultation with the County Archaeologist who should also arrange for the recording of any exposed archaeological features.

Site 115 Adit Shaft SX 42553 73684 Grade C*

Background

This shaft was located by Sherrell (2002 Report 1915/2, Map 4). It is not shown on the 1867 shaft/lodes map (Fig 15), although it is labelled on the 1848 Symons map as 'Adit Shaft'.

Survey

There are no definite ground indications for the location of the shaft. Its approximate location has been given following Sherrell's reported location.

Recommendations

Given the approximate sites location near access tracks down to Wheal Fanny, it is recommended that the shaft be located (if possible by using non-ground intrusive techniques, to preserve any underground archaeological features), or as a last resort, drilling. Once located, the shaft site should be fenced and warning sites erected.

Site 116 Ventilating Shaft SX 42367 73719 Grade C

Background

This is the third main shaft that was cut to access Wheal Fanny lode. *'The ventilating shaft (is located) 65 fms. east of eastern engine shaft ... is down 55fms. on the lode from surface'* (Hall 2000,100). The shaft is not shown on the 1848 or 1857 maps, but is shown in detail on the 1867 and 1884 maps.

Survey

The shaft is very difficult to find (being 5.0m north of the track in deep undergrowth), consequently the following description may be mistaken. The shaft was not located by Sherrells. It appears to be marked by a depression in the ground measuring 1.0m in depth and 4.0m in width. There is a linear depression running south from this feature to the track that measures 1.0m in depth and width.

Recommendations

If the nearby track is to be used by members of the public, this shaft should be accurately located and fenced.

Site 117 Site of Jigger house SX 42539 73732 117/1 Waste settling tanks SX 42567 73738 (centered)

Background

The 1867 map shows these sites in detail, but the OS 1884 map shows little detail (see Fig 15). There are sites on two levels, both possibly related to each other. The upper site appears to consist of four rectangular ponds and a settling pond, perhaps to settle mine waste water from the Wheal Anna Maria dressing floors.

The lower site includes twelve thin settling tanks (or drying frames) adjacent to a rectangular building. The building (probably the jigger house), may have been powered by flat rods from Wheal Anna Maria Engine Shaft (Site 141), as it is aligned along this route from the Anna Maria wheel at Blanchdown. It is possible also that the building was used to separate fine slimes by using Brunton's frames (see 1860 survey reproduced in Hall 2000, 108), if the assumption that the engine house to the south is the 'old' copper crusher then; *'The work from the crusher is conveyed by a stream of water to the 'sizing sieves' ... from which it is carried by a stream of water to the 'separating cistern' ... the work that passes through ... is at once jigged by machinery, which operation, and that of 'tyeing', is repeated until the ore is fit for market'*. The stream of water from the copper crusher is shown on the 1867 map.

Survey

The sites of the twelve tanks or drying frames and building are only evidenced by a long rectangular earthwork cutting and platform approximately 2.5m below the upper pond's ground level.

The site of the four rectangular ponds and larger waste-settling pond are preserved in fine detail. The pond banks stand to a height of 1.8m above ground level, whilst their interior floors measures 1.0m in depth from the top of the banks (which are 1.0m in width). Since the 1867 survey, it seems some more tanks had been added to the north.

Recommendation

None. It is recommended that there is no surface or sub-surface ground disturbance of this area.

Site 118 Reservoir SX 42636 73766 (centered)

Background

The reservoir is shown on the 1857 Lease map (Fig 7), in outline on the 1867 maps and on the 1884 OS map. The 1867 map shows a leat from Hele Farm feeding the pond from the north, with another leat going around its northern and western edges. The OS 1884 map does not show the leat from Hele Farm, nor how the pond was filled. The pond appears to have functioned to have supplied water for dressing floor use or to have been a boiler pond for the nearby winding steam engine and copper grinder.

Survey

This is an impressive feature that deserves to be better presented. The interior and sides of the pond supports numerous trees that have grown to full height. The banks on its western side are approximately 1.5m higher than surrounding ground level, whilst those to the north and east measure in excess of 2.0m in height. The floor of the pond is 1.0m below the top of its side banks. The leat running along the western and northern banks measures 0.6m in width and 0.2m in depth.

Recommendations

Trees should be cut down from the banks and thinned from the interior of the pond. A structural engineer should carry out a survey of the east and west banks to establish their stability.

Site 119 Site of 1925 Incline railway line

SX 42602 73348 (arsenic works) to SX 42266 73703 (Wh. Fanny)

119/1 Incline railway cutting SX 42454 73568 to SX 42419 73587

Background

After the closure of Devon Consols in 1903, various parts of the mine was sporadically reworked - some underground above adit level, but most at surface either to provide material for the copper precipitation works or for mine waste re-processing. *'In 1922 .. arsenic ore was coming from Wheal Fanny ... By mid-1922 we have the first mention (in contemporary workbooks), of the building of a railway between Wheal Fanny and the arsenic works, which included cable-operated inclines to take it over the intervening higher ground ... a stationary Fordson tractor (was) suitably modified by the addition of a winding drum to haul a train of wagons up one incline and to lower it down the other'* (Richardson 1995, 99).

119/1: This site appears to be an earthwork incline coming from the location of the converted steam Garrett engine winder (not found) on top of the hill between the 1920's arsenic complex and Wheal Fanny. The route appears to go down a cutting and into a tunnel under the road (Site 111). It then appears to have gone across the field and perhaps used an adit (Site 86), or Eastern Shaft (Site 83) to access the upper workings to retrieve arsenic for processing.

Survey

The approximate location of the route has not been found during the course of the archaeological field survey. It is likely to have been a narrow gauge tramway sited on top of existing tracks. Richardson (1995, 95 - Fig 17), shows the approximate route. Its route came up from the 1920's arsenic refinery to the site of the winding drum, and thereafter down through the earthwork cutting (Site 119/1). A route has been shown on the Site Inventory map but this is only a possibility (based on interpretation of archaeological field

evidence and Richardson's map). The possible site of the winding drum may be at SX 42522 73531. There is unlikely to be surviving evidence however, though the extant tramlines at Wheal Fanny (Site 87) may well be associated with this feature.

119/1: The cutting measures 1.3m across its floor profile at a depth of 0.75m. Trees are growing along its length and branches etc have been thrown into its floor, obscuring its true depth and location.

Recommendations

Refer to general recommendations made above concerning the dumping of cut branches over deep excavated and archaeological features.

Site 120 Site of mine building (Magazine ?) SX 42379 73564

Background

This small building is shown on the 1867 and OS 1884 maps. The latter map may show a small courtyard on its western side. Although there is no cartographic evidence for this assertion, this does seem to be an ideal site for Wheal Anna Maria's powder magazine.

Survey

There is no evidence of this feature at ground level.

Recommendations

None. It is recommended that there is no surface or sub-surface ground disturbance of this site.

Site 121 Blackwell's Shaft SX 42336 73419

Grade B

Background

Symons 1848 map shows a lode running north-west from this location and over Wheal Fanny running parallel to the Great Crosscourse (Fig 4). Dines (1956) does not mention this shaft. Presumably the shaft worked this lode in a northerly direction and lay on its southerly extension. This shaft is shown on a map for the first time on the 1867 maps. Fig 8 (a map showing shafts and lodes), labels this shaft as being 'Filled', whilst the more detailed 1867 map (Fig 15) shows two small buildings near the shaft, one long one to the north-east and a smaller one to the north. The longer building may have housed a portable steam engine to wind ore up or to pump water out of the workings.

Survey

On the western side of the shaft (marked by a granite stone) is a spoil mound approximately 4.0m in height (that may have sited a horsewhim platform). Remnants of the long building north-east of the shaft survive up to a maximum height of 0.6m for a length of 2.0m (although obscured by vegetation). There is no evidence for the location of the smaller building to the north. The shaft is on the south-eastern side of the spoil heap and marked by a depression in its western corner measuring 1.0m in depth.

Recommendations

The shaft should be fenced and its stability regularly monitored.

Site 122 Shaft/Lode back pit SX 42322 73419

Grade C

Background

See Site 121 above.

Survey

This feature may be a shaft or lode back pit. It measures 3.0m in diameter and 1.5m in depth. It is sited against the northern side of the spoil mound.

Recommendations

A non-intrusive means of assessing whether this feature is a shaft should be adopted. If it proves to be open at depth, it should be fenced and its stability regularly monitored.

Site 123 Reservoir SX 42453 73442 (centered)

Background

East of Blackwell's Shaft are a small number of reservoir ponds which appear to have been constructed in the mid 1860's. The ponds are shown on the 1867 Lodes/Shafts map (Fig 8), but not the 1867 surface plan map (suggesting that the lodes map is later than the surface plan map). The OS 1884 map shows the site to contain at least two and possibly three ponds that appear to have been constructed to serve either (or both) of the Wheal Anna Maria dressing floors. The 'old' floors were constructed in the mid 1840's and the 'new' floors by the early 1850's. It is not known how these ponds were filled, unless the water was pumped from Blackwell's Shaft to the west.

Survey

This reservoir is in a good condition with extant banked sides, inner floor and is rhomboid in shape. Its banks measure 1.5 to 1.75 m in height above ground level, are 0.75m in width and have a depth of 1.5m to the reservoir floor. Trees are growing out of the floor and banks of the feature. The plan dimensions of this feature can be taken from the map (Figs 9 and 16). A leat (Site 130) runs along this feature's north bank (parallel to the track).

Recommendations

Trees should be cut down from the banks and thinned from the interior of the pond.

Site 124 Reservoir SX 42446 73417 (centered)

Background

See background history given for site 123 above. Sluices are labelled on the 1884 map at the northern end of this feature.

Survey

This reservoir is in a good condition with extant banked sides and inner floor and is square in shape. Its banks measure 1.5 to 1.75m in height above ground level, 0.75m in width and a depth of 1.5m to the reservoir floor. Trees are growing out of the floor and banks of the feature. The plan dimensions of this feature can be taken from the map (Figs 9 and 16). A leat (Site 127) runs south of the feature and appears to feed into the arsenic works (OS 1884 map).

Recommendations

Trees should be cut down from the banks and thinned from the interior of the pond.

Site 125 Adit Portal SX 42441 73398

Background

The adit may be shown on the 1867 (Lodes/Shafter) map, but is shown in detail on the OS 1884 map (Fig 16). Its portal is sited next to the south bank of a reservoir (Site 124 above). This adit may have drained the lode worked by Blackwell's Shaft (possibly suggesting that its adjacent long building housed a small steam engine to pump water up to adit level to drain out of this portal). An alternative hypothesis is that the adit may have had a small tram rail to remove spoil from the lode pumped by Blackwell Shaft and the waste dumped on the spoil heap to the south (see Site 126 below).

Survey

The portal opening has collapsed, but measures 2.75m in height. It has a long cutting that measures 0.75m internally and is 1.0m in depth (below ground level). This runs along the outside edge of the southern bank of the reservoir pond.

Recommendations

The adit will need to be investigated to confirm its function. If there is to be public access to this area of the site, fencing of the portal site may be appropriate.

Site 126 Spoil dump SX 42543 73392 (centered)

Background

This feature is shown on the 1884 OS map (Fig 16) at a location south-east of a reservoir pond. The linear cutting from the adit portal leads to the southern side of the spoil heap. The spoil mound feature appears to be waste rock removed from driving the adit.

Survey

The south-western end of the spoil dump includes a well-preserved finger dump, which at its maximum height is 3.5m above ground level to the south. This feature is not the same shape as shown on either the OS 1884 or 1904 maps. The spoil dump may therefore have been reworked (probably for arsenic production), either in the latter years of the 19th century or during the first quarter of the following century. Most of its east side has been removed. Its material resembles yellowish/greyish clay or slimes, as if it derived from a slime pond or perhaps represents the clay base of a larger reservoir pond.

Recommendations

None.

Site 127 Leat SX 42462 73411 to SX 42502 73237(arsenic refinery)

Background

This leat is shown on the 1867 Lodes/shafter map (Fig 8) and the OS 1884 map (Fig 9). The leat appears to supplement that from the reservoir (Site 168) to the north of the late 1850's arsenic complex. Both leats join and then enter the arsenic complex. It is likely that they powered a water wheel or were perhaps used in the arsenic refining process (to cool the arsenious gases).

Survey

The leat can be seen in the woods to the south of the reservoir ponds and measures 0.6m in width at its base, with banks 0.4m high and 0.5m wide.

Recommendations

Refer to general recommendations made above concerning the dumping of cut branches over deep excavated and archaeological features.

Site 128 Site of reservoir SX 42517 73409 (centered)

Background

This lower pond is shown on the 1884 OS map. It is not certain if this was a settling pond (to remove contaminants in mine water from the nearby adit), or simply a mine reservoir.

Survey

There is very little evidence on the ground for the presence of this feature apart from the low remnants of the south bank, which measures 0.5m high and 0.4m wide.

Recommendations

None.

Site 129 Site of spoil heap SX 42519 73456 (centered)

Background

This long spoil heap is shown only on the 1884 OS map and may have been a linear south-westerly extension of a larger spoil mound on the western side of the Wheal Anna Maria (earlier) dressing floors. This must have dated from the late 1840's when this 'upper' site was the mines main dressing floor. Unfortunately, the 1857 and 1867 maps do not show spoil heaps.

Survey

There is virtually no evidence of this feature. Presumably as this seems to be an early spoil dump, it appears to have been re-processed to remove the previously unwanted arsenic sulphides.

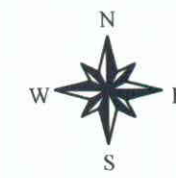
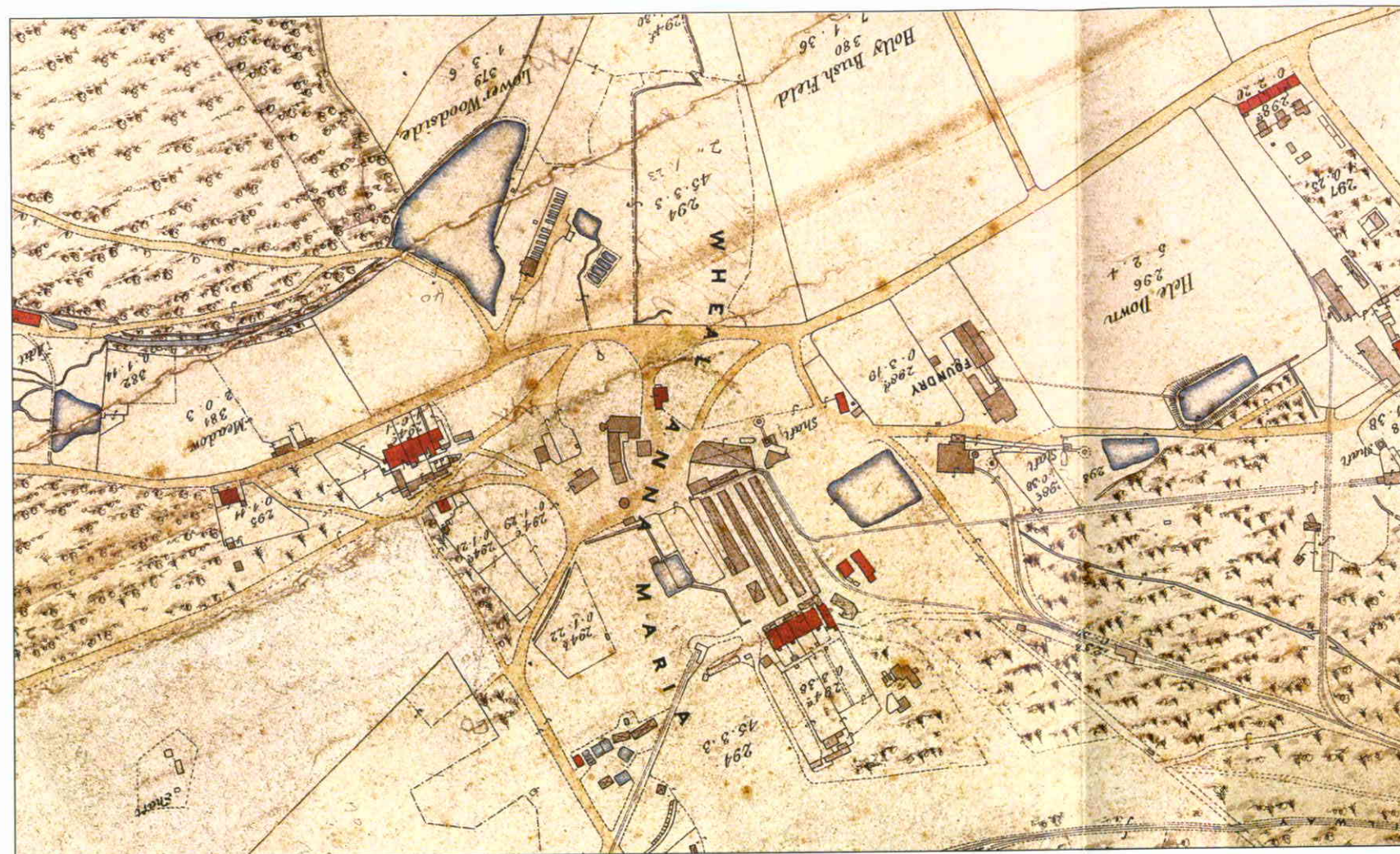
Recommendations

None.

Site 130 Leat aqueduct SX 42438 73438 to SX 42570 73583

Background

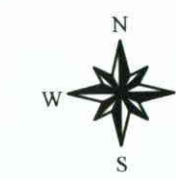
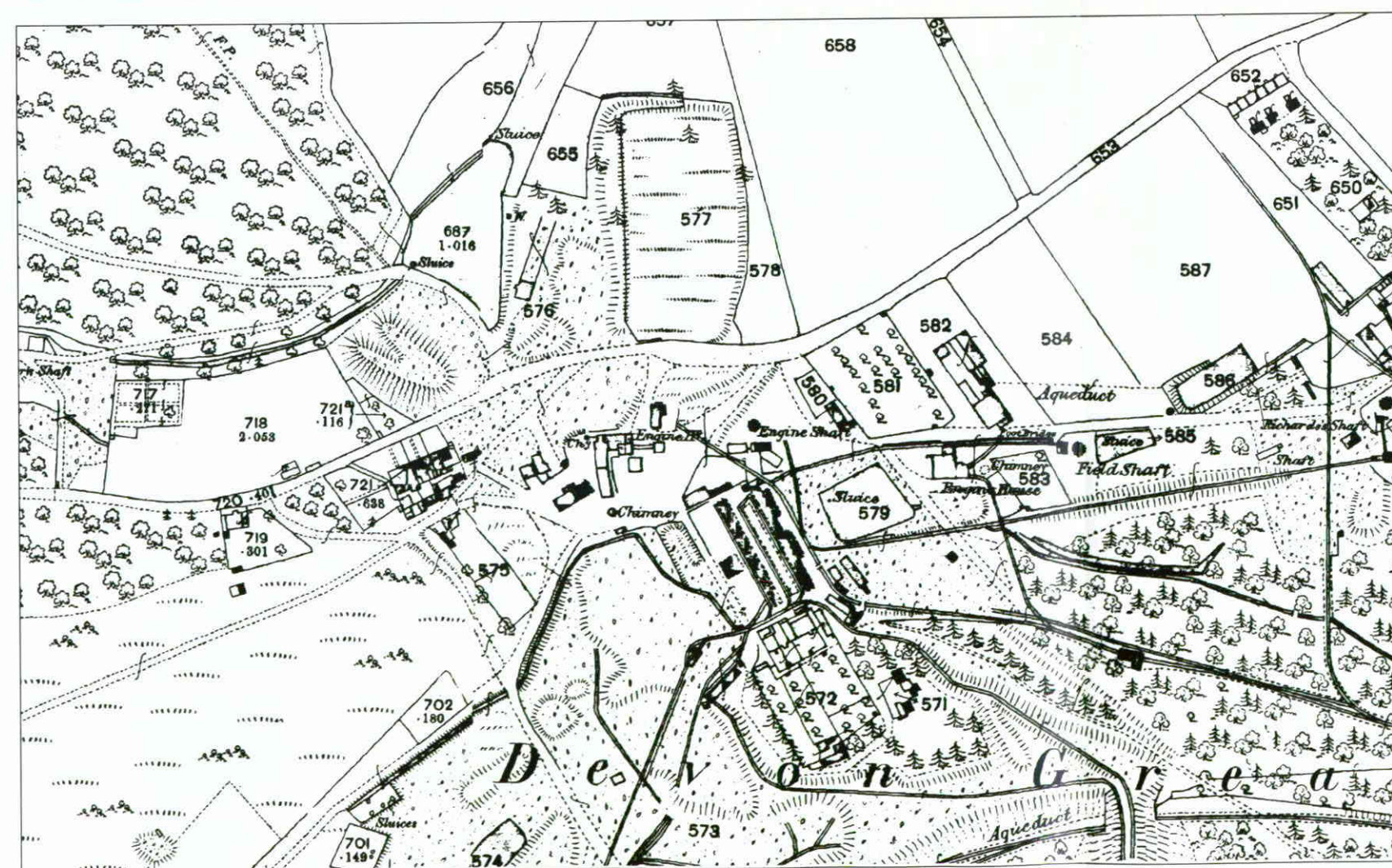
The 1867 Lodes map (Fig 8) appears to show the route of a leat aqueduct either running from or to a reservoir pond (Site 123). It seems to connect this with the Wheal Anna Maria dressing floor, and either carried dressing floor waste water (via two settling ponds-Site 134) in a westerly direction, or was an additional water supply for the dressing floor, from the reservoir pond.



0 25 50 75 Metres

Figure 15 The northern section of Wheal Anna Maria as shown on the surface plan 'Tavistock Parish (Div. No.1)' 1867

(Tavistock Parish (Div. No. 1) - DRO/T1258M/E11 - 3 chains - 1 inch)



0 25 50 75 Metres

The northern section of Wheal Anna Maria as shown on the Ordnance Survey plan 1884

(OS 1884 - © Crown copyright and Landmark Information Group. CCC licence No. LA076538.)

Survey

The aqueduct bank measures 0.5 to 0.75m above ground level and measures 0.9m in width on the top of the bank. At a point north of the 1920's arsenic chimney, the aqueduct bank has been removed (SX 42571 73583).

Recommendations

None. Although it is recommended that there is no surface disturbance of this site.

Site 131 1920's Arsenic chimney SX 42580 73557

Background

The Exeter Museums Archaeological Field Unit undertook a detailed archaeological survey of the 1920's arsenic works in 1989 (Pye and Dixon 1989). It is not the intention of this report to replicate this work, but simply to refer to its more detailed field survey and interpretation where appropriate. All of the 1920's arsenic buildings (including the flue and chimney stack) are Listed (Grade II-5/117) and now have an even higher level of statutory protection due to their recent designation as a Scheduled Monument (SM 15559).

Richardson (1995, 99) and Pye and Dixon (1998, 9) both describe the construction of a new Brunton calciner in late 1921 (from contemporary workbooks). A calciner was operating in January 1922 and producing crude arsenic. It is highly likely that the arsenic flue and chimney stack were constructed by this date (i.e. late 1921). Cartographic evidence confirms that the arsenic flue and stack were of an entirely new build and did not use elements of any older flues etc (as suggested by Richardson 1925, 99).

A local farmer who has lived in the area since the 1930's (at Wheal Maria couthouse), has stated that a firm of specialist chimney contractors (named Pellow from the Luckett area) built the stack. It functioned to vent the fumes coming from the arsenic calciners via the arsenic condensers and waterfall chamber. Its location and height attempted to limit the amount of arsenic that would affect the vicinity.

Survey

The arsenic flue enters the stack through the south side of the chimney via the lower of two brick arched openings. Dense Cotoneaster is growing along the flue and over the entrance, which makes measurement of the opening very difficult. However, it measures approximately 1.0m x 1.0m.

Directly above the lower flue opening is another brick arched opening that measures 0.65m in width and 0.88m in height. A green crystalline material can be seen inside the flue through this opening. Pye and Dixon (1998, 18) suggest; *'this may have contained a damper to regulate the draught of the chimney. Opposite it on the other side of the stack is a hollow iron tube through the width of the wall. This has a ring of boltholes in its outer flange, possibly indicating the presence of a shutter'*. An alternative view is that the tube is a condensate drain used to remove water vapour from the chimney gases after they had passed through the waterfall chamber.

Approximately two-thirds of the chimney is built of stone and the remainder is of brick. There appears to be either a lime or concrete render on the top of the stack where the gases vent. Foot irons have been inserted into the north face of its fabric. The chimney is reputed to be 100ft high (although the main stack of the original arsenic works were

required to be 120ft high (L1258/MC/1866 Lease agreement), and structurally it appears to be in a good condition.

Recommendations

The chimney should be surveyed by a structural engineer and recommendations for its consolidation drawn up. A little repointing is necessary to the stone face but it is likely that the upper brick section will need to be repointed over larger areas (particularly prevailing wind faces) as well as the top render. A lightning conductor should also be installed inside the chimney and earth mats/rods sited at suitable locations so as not to affect any likely below ground archaeology. A watching brief will be required during the installation of any earthing mats.

Site 132 1920's Arsenic flue SX 42585 73456 to SX 42580 73557 132/1 Arsenic waterfall chamber SX 42584 73460

Background

The arsenic flue (approximately 250m in length), transmitted the arsenious gases from the last arsenic condenser to the exhaust chimney via a waterfall chamber. The function of (this later) waterfall chamber is indicated by quoting a section of the earlier 1866 Lease agreement (L1258/MC/1866): *'The precipitation of the arsenic sulphur gases and volatile substances which shall pass beyond the main flue and chambers shall be effected by means of water falls or water showers ...and cisterns shall be provided in the bottom of the ... flue for the reception of all substances precipitated as above mentioned with means at the side for their cleansing and refitting where necessary'*.

Survey

The arsenic flue runs from the site of an arsenic condenser (Pye and Dixon 1989, Fig 4a), located north-east of the extant arsenic condenser (Site 195), for a distance of approximately 50m and then turns to the north to run straight to the chimney.

The roof of the flue (originally probably of brick) has been removed and is open from the extant arsenic condenser up to the point where the flue goes under the track. It continues underground beyond the other side of the track (although the roof has collapsed in places) until the waterfall building is reached. Beyond this, the flue is visible (but dense Cotoneaster masks its depth in places), and roofless up to the chimney. The flue walls are 0.45m thick and from 0.9 to 1.0m in internal width. Occasional access/maintenance doors are visible in places along the flue line (from the waterfall chamber to the stack), with wooden lintels (0.8m wide) and occasional lower opening brick blocking.

At the point where the flue goes under the track to the east of the large reservoir pond (SX 42595 73385), the flue has an intact brick arched roof with stone sides. The flue measures 0.9m in width and 1.5m from the floor to its crown. It appears to be intact in some places.

The waterfall chamber (Site 132/1) is located at the NGR number given above. It is a rectangular structure and sits astride the arsenic flue. The flue entered through the south wall and exited through the north (at a higher level). Wooden beams intersect the open flue and pass through it (forcing the arsenic fumes to pass through the water shower/gorse/limestone layers). The walls are extant to a height of 1.75 to 2.0m and are 0.5m thick. There are the remnants of a small subsidiary chamber on the northern side of the feature although this now consists largely of rubble.

Recommendations

The walls of the exposed sections of flue need to be cleared of vegetation (or managed to provide visual access). The walls should be consolidated (if Health and Safety constraints can be met given probable arsenic contamination), if members of the public are permitted access to this part of the site. Given the unstable nature of the underground flue section (especially under the main track), a structural survey is necessary and fencing of some underground sections may need to take place.

Site 133 Site of leats SX 42663 73539 to SX 42572 73584 133/1 Shallow waste-water leat SX 42574 73576

Background

The 1867 surface map shows in detail surface leats etc that either transported water to condensing ponds or removed waste-water from mine adits or dressing floors. This site is a small section of an unmapped shallow collapsed leat or culvert.

Survey

The culvert is visible in a localised area of collapse. The tunnel measures 0.7m in width and 0.66m in depth, whilst its roof is only 0.2m below ground level. It is partly stone lined, but mostly timber lined with old railway sleepers and is thus likely to date from this century. Water is issuing from this feature.

Recommendations

There may well be shallow culverts almost anywhere within or adjacent to Wheal Anna Maria dressing floors. The area should ideally be surveyed with ground probing radar (or any other non-intrusive technique), to record the locations of these shallow channels. However due to the intensive use of this part of the site it is recommended that there are no surface disturbances to the site, except along approved access routes. The existing localised collapse will need to be fenced or filled.

Site 134 Site of two dressing floor settling/reservoir ponds SX 42614 73573

Background

Refer to background comments given in Site 130. There may have been another longer pond constructed on the eastern side of the two ponds shown on the 1867 map and on the OS 1884 map.

Survey

The features are no longer readily visible at ground level, although there are remnants of the north bank of the long pond described above that measure approximately 0.8m in height above track level, and of its east bank approximately 0.6m above adjacent ground level.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

**Site 135 Site of Wheal Anna Maria crushing engine/boiler
house/miner's dry SX 42586 73615 to SX 42587 73649
135/1 Site of chimneys SX 42587 73608 and SX 42572 73649**

Background

In the mid to late 1840's 'work had also begun at this time at Wheal Anna Maria Extensive dressing floors were also erected at Anna Maria, to which all the ore raised at Wheal Josiah, a distance of 210 fathoms is brought down ...' (Bennett 1992, 19). Hall (2000, 107) reproducing an 1860 survey of the mine quotes; 'we have two grinders or crushing engines (at Devon Great Consols), one (a 36-in. cylinder) on the old floors at Anna Maria, and the other (a 30-in. cylinder) on the new floors'. (Op cit, 108) '... the old grinder, at Anna Maria, worked by a 36-inch double engine, which is used for crushing the coming halvans ...'.

Symons 1848 map does not show this engine house complex, although it is shown on the 1857 map and in detail on the 1867 and 1884 maps (Fig 15). By 1904 the OS map shows that the engine and boiler house have been removed. Unfortunately maps do not indicate what the function of the engine house was, although this has been interpreted from documentary and map evidence. The complex appears to consist of a steam engine and boiler house (with its chimney at the western end of its boiler house at SX 42573 73648), that powered the copper crusher. The detached rectangular building (near the 'N' of 'Anna' on the 1867 map) may well be the copper crusher. Copper ore raised from both Hitchen's Shaft (Site 233) and Field Shaft (Site 153) at Wheal Josiah was transported via an inclined plane tramway (Site 150/1) to this building for crushing.

The two long buildings attached to the south side of the boiler house may be a miner's dry and perhaps a coalhouse.

As the main arsenic complex was not in production until the late 1860's, it may be that the southern rectangular building (or the detached building to the west – see Site 136 below), attached to the engine house may have been a reverberatory furnace to burn off impurities from the crushed copper ores, and was used up to the construction of the arsenic complex i.e. from the late 1840's to the late 1860's). In which case a detached tall chimney (c100-120ft high) may well have once been sited at this location, as labelled by the OS 1884 map.

Survey

There is no surface evidence for the possible detached chimney at SX 42587 73606. The buildings complex described above was sited on a platform area that had been cut into the side of the north facing valley. All the buildings appear to have been reduced to ground level and their materials removed. The area is partly wooded and is overgrown with a variety of vegetation and marked by small piles of rubble.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 136 Site of possible shaft/building/wheel pit SX 42546 73637

Background

The 1857 Lease map and (in greater detail) the 1867 and 1884 OS maps, show a single building here accessed from the lower track. Given the slope of the ground above the building, it appears to have been sited on a platform cut into the slope. Its function is

unknown but may be related to that of the previous site. No shafts have been identified by any source at this location.

Survey

There is a relatively large depression in the ground here with much fly tipping filling the feature. It is approximately 4.0m in diameter across its infilled base and 6.0m below slope ground level to its south. Two trees are growing out of the centre of the depression and dense Cotoneaster is growing out of its northern side, (usually an indicator of lime mortared masonry and therefore a building). It measures approximately 2.0m in depth. This feature may not be a shaft, but its physical appearance resembles such. A gully (measuring 1.0m in width and 0.5m in depth) is leading to the depression from the south.

Recommendations

To restrict any further fly tipping the access to this area and the depression should be fenced. Site investigation of the feature to confirm its status as a possible shaft might be prudent.

Site 137 House SX 42613 73660

Background

This building is shown on the 1867, 1884 and 1904 maps (shaded red). It is likely to have been accommodation or offices for Wheal Anna Maria's supervisors. Given its proximity to the copper crusher complex it is possible that it was an captain's office/house. The number of buildings is impossible to confirm, but it may have been from one to three.

Survey

With the exception of part of a wall, for the most part the building remnants consists of low-lying mounds of rubble covered with heather etc. The surviving wall seems to be from the north wall of the building and measures 0.6m in height, 2.0m in length and 0.45m thick.

Recommendations

Although this is a relatively low priority, if members of the public are permitted access to this area, the wall remnant should be appropriately consolidated.

Site 138 Site of railway siding SX 42635 73525

138/1 Railway line (to dressing floor)

SX 42663 73539 to 42588 73302

138/2 Site of railway line (to Site 169)

SX 42672 73554 to SX 42621 73448

138/3 Site of line (to waste dump)

SX 42595 73405 to SX 42715 73417

Background

More extensive descriptions of the 'new' and 'old' dressing floors at Wheal Anna Maria appear elsewhere in this report (sites 140 and 187), but the mechanism for transporting material to be processed or for waste disposal was usually by railway. The 'new' halvan

floors were built in the late 1850's and appear to have been used for dressing the '*rough and small halvans*' and dressing '*the old halvans from the burrows*' (Hall 2000, 108).

A railway is shown from this location (from a siding west of Wheal Anna Maria cottages), down to the newer dressing floors on the 1867 map (Figs 15 and 16). This material presumably originated from the copper crusher and perhaps from the 'upper' (or older) dressing floors in front of the cottages. The railway is shown as a single line, but has the appearance of an incline. There is an 1850 description of an incline railway but this seems to refer to a line between Wheal Josiah and Wheal Anna Maria (see Site 150/1 below). The later OS 1884 map shows that this railway line had been joined up (from the top sidings), to a new line running from the upper dressing floors to a large waste tip (Site 177), via another section of track (Site 166/1). There is also a 100m length section of railway (oriented north - south) shown on the OS 1884 map that intersects this line half way down the slope. It appears to be old and unused.

A new section of line (Site 138/2) is shown on the OS 1884 map running parallel, but downslope from the line described above to a location immediately above Site 169, a reservoir pond or settling tank (although there is a break in the line). The line is also connected at its top to the waste tramway (Site 166/1).

At site 138/3 The OS 1884 map shows an east - west section of tramline with a junction with line 138/2 at SX 42598 73406. At its eastern end small spurs had been added that appear to have allowed the dumping of waste material in arcs around the end of the lines.

Survey

The railway siding at SX 42635 73525 has been obscured by two spoil heaps. The spoil heap to the north has the appearance of a hard standing (although it may be waste material whose upper surface was 'concreted') and pieces of timber placed or embedded into the surface. Another flat spoil heap on the south side of a line of barbed wire has a similar topography and characteristics.

There are remnants of this railway line (Site 138/1) from its origin down to the dressing floors. At the top of the line cutting into the spoil heap are remnants of a dry stone retaining wall, measuring approximately 0.8 to 1.4m in height for lengths of approximately 2.0 to 3.0m. At SX 42614 73482 there is a raised area that marks the height of the line above the surrounding ground level. The line is approximately 0.9m above ground level on the upslope side and measures 8.0m in length and 1.3m in width. There are re-used sleepers running along the top of this raised platform upon which later sleepers were mounted. Some damage has been caused to this feature by pedal and motor bikes using it as a ramp. From this point down to the dressing floor there is little surface evidence of the route of the railway line (138/1), apart from fragmentary evidence near the 'lower' dressing floor reservoir (Site 168) of a 2.0m length section of associated revetment wall measuring 0.5 to 0.75m in height.

There is no surface evidence of any part of the rail line (138/2) shown on the OS 1884 map, nor the connecting spur line (138/3).

Recommendations

The degree of public access over this site has yet to be decided, but it will be important to ensure that the preservation of these features is not compromised. Limited repair of the stone retaining walls could be carried out, but members of the public should not be

allowed to climb or ride up or down the sides of the spoil tips and raised section of railway line.

Site 139 Site of settling tanks and mine buildings SX 42585 73447

Background

These buildings are shown on the 1867 map although the later OS 1884 map only shows a single building surviving. The buildings are a combination of square settling tanks and mine buildings, one of them being shown as a small office or house. This may be a small floor used to dress small amounts of material.

Survey

There is no visible evidence of any of these buildings. The area has been cut by the later 1920's arsenic flue and is characterised by scattered spoil mounds measuring 0.4 to 0.7m in height and 3.0 to 4.0m in length.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 140 Site of Wheal Anna Maria 'upper' dressing floor buildings SX 42669 73588 (centered)

Background

These buildings are shown on the 1857 Lease map (labelled 'Halvans' and 'Dressing Floors'), the best detail being shown on the 1867 map. The OS 1884 map shows slightly larger but shorter, squarer buildings. Quoting a survey of the mine in 1850 by Murchison, Bennett (1992, 19) states; '*Extensive dressing floors were also erected at Anna Maria, to which all the ore raised at Wheal Josiah ... is brought down*'. In contemporary accounts these first dressing floors are called the 'upper' or 'older' floors.

A later mining survey in 1860 (reproduced by Hall 2000, 107), quoting another source states; '*that the present prosperity of the undertaking (that is Devon Consols) has been considerably influenced by the excellent system of machinery introduced into the dressing department. The separation of the crop ore from the halvans, which is done on the upper floors, by the usual process of spalling, cobbing and picking, and riddling and jigging the smalls, requires no special description. The rough crop ore is sent to the crusher, crushed dry, and from the sizing sieves falls into little iron wagons, which are rolled by the attendant boys to the ore-bins and emptied. The crop smalls are jigged in the usual manner, and put to pile from the hutches.*'

As the mine expanded from the mid 1840's to its zenith of copper production in the late 1850's, so the transport of the ores to, and waste from, these upper floors became more industrialised and railway lines were used for movement of material on a massive scale.

Survey

All of the dressing floor buildings shown on the archive maps have gone. However, the floor itself remains as a flat surface with evidence of either cobbles or stones laid on edge with timbers. An occupant of a nearby house states that on cold, frosty mornings evidence for regularly spaced timber sleepers can be seen across the entire floor area. There is a single dump of material on the site of the floors but for the most part the area is open, although sheds used by the occupants of the nearby houses have been built along the eastern side of the floors.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 141 Anna Maria Engine Shaft and site of angle bob pit SX 42672 73642 Grade A

Background

'Wheal Anna Maria has two shafts on Main Lode, which courses a few degrees north of east and underlies 25° S. down to the 80-fm. level ... Engine Shaft ... is vertical to the 30-fm. Level (below surface) follows the lode to the 80-fm. Level, below which the dip of the lode steepens and the shaft, continuing with the same underlay to 135 fms is connected to it by crosscuts northwards...Almost all levels between Shallow Adit Level (15 fms.) and the 124-fm. Level connect the two shafts (i.e. Fields Shaft) and extend eastward into Wheal Josiah' (Dines 1956, 657).

The 1860 mine survey (reproduced by Hall 2000, 100-1) states; *'The engine shaft ... is drained by 12-in. pitwork, worked by one of the great wheels.... In this mine (Anna Maria) the ore made up to within 15 fms. of the surface, about the engine shaft, and continued down to the 30, at which level the lode became poor for 30 fms...East and west of the engine-shaft the lode made enormously large – in some places 7 fms. wide, solid ore'.*

As mentioned above, this shaft was pumped by flat rods (2,376 ft uphill lifting 400 gallons of water a minute from 480 ft-Booker 1971, 150), powered by a very large waterwheel (named Anna Maria - Site 318/2 via the long flat rod cutting Site 159), sited on the bank of the River Tamar. The engineers of the mine *'decided to adopt water power in preference to steam...The shaft at Anna Maria is drained by the new water wheel (1849) which also drains the two shafts at Wheal Josiah (presumably at this date by a separate flat rod) ... It is connected ...by means of very strong flat rods (given as 3.25" round profile in the 1860 survey) working upon rollers on the top of very substantial (timber) supports' (Bennett 1992, 19 – quoting the 1850 survey).* Detailed descriptions of the water wheels and flat rod routes are given elsewhere in this report (Sites 318 and 159 respectively).

Interestingly, the 1857 Lease map (Fig 7) shows the flat rod route from the water wheel to Richard's Shaft (at Wheal Josiah), and then continuing north-westwards to Fields Shaft and Anna Maria Engine Shaft. This confirms the 1850 account given above. However the later 1860 account (Hall 2000, 106), describes that the Josiah wheel pumped Richards and Hitchins Shafts (at Wheal Josiah) and the Anna Maria wheel pumped Engine Shaft and Fields Shaft. The increasing depths of the shafts had taxed the power of the water wheel to such an extent that another wheel with a separate flat rod was necessary. This work was carried out by 1857.

The 1867 map (Fig 15) shows in detail other related features near the shaft, namely the balance bob box and mountings to the north-west, the angle bob box next to the shaft to the south-east (transferring the horizontal motion of the flat rod to a vertical movement), and the capstan to the north. The 1860 survey also confirms that this shaft had a steam capstan. It is assumed that this shaft was used only to pump water from the working levels below.

Survey

The shaft is visible at the south-eastern end of a long depression measuring approximately 20m in length and 5.0m in width. The shaft itself measures approximately 4.0m in length and 3.0m in width and is marked by a granite stone at its north-west corner. The fill in the shaft has partially slumped on its northern side revealing further its extant horizontal and

vertical timber collar on its north and west sides, to a depth of 1.5m below ground level. The excavation to the east of the shaft is likely to have been the site of the angle bob pit. South of the shaft a section of the railway line shown on the 1884 map can be seen, although it has been over dumped with spoil to a height of 1.3m.

Recommendations

Given the high importance of the archaeological features on all sides of the shaft, and the visible evidence of ground instability, it is recommended that the shaft be fenced and warning signs erected. The high spoil heap near the shaft (to the south), may provide an opportunity to site a low profile viewing platform, to enable members of the public to see into the shaft.

Site 142 Site of Coal yard and building SX 42641 73615 (centered)

Background

The 1867 and 1884 maps show three mine buildings within a large yard area at the northern end of the long narrow north - south line of dressing floor buildings. '*On the mine it (Devon Consols standard gauge railway) commenced at Anna Maria, where there were sidings into a large store-yard for coal and other materials and where overhead ore-bins were constructed capable of holding two hundred tons*' (Barton 1964, 75). Bennett (1992, 22), also confirms this when quoting an 1860 survey; '*A large coal yard was also built at Anna Maria to enable extensive quantities of coal to be stored there instead of being piled on the quays, taking up valuable space*'. Presumably this was built therefore in the period 1857 to 1859 (the construction dates for the railway).

Survey

All of the buildings and yard boundary walls shown on the archive maps have gone.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 143 Shaft SX 42683 73654

Grade C

Background

This feature is not shown as a shaft on any archive map seen during the production of this report. Sherrell's Report (2002,1915/2) noted the shaft after it had originally been identified by a West Devon Borough Council Mine survey (No 183). This feature may have been a small footway shaft (to access Engine Shaft at a lower level-below the surface pitwork), or alternatively the site of the capstan that was also located north of the shaft. Symons 1848 map (Fig 4) shows Engine Shaft, but also quite a large excavation (or spoil mound) to its north. This feature may have been sunk during that period.

Survey

The feature is a depression measuring approximately 2.0m x 2.0m and 0.4m in depth. It has been filled with fly-tipped debris to an unknown depth. There is a wooden post and barbed wire fence (only two strands) surrounding the feature, but it is not in poor condition.

Recommendations

It is recommended that the shaft be re- fenced and warning signs erected.

Site 144 Pair of houses SX 42717 73660 (centered)

Background

The houses are shown (shaded red) on the 1867 map, and on the OS 1884 map (with a walled garden to the north). Presumably the buildings were either office accommodation or houses for supervisory surface workers (perhaps surface captains). Outhouses appear to have been located south-east of these buildings.

Survey

The semi-detached single floor cottages are extant and roofed with slate on the west face and corrugated iron on the east. There is a chimney on each gable end (approximately 4.0m in height) of the building and lathe and plaster visible on its interior walls. There is a wide opening in the centre of the south front elevation which gives the impression it has been reused for other purposes than domestic accommodation since the closure of the mine. The roof is constructed with a simple 'A' frame trusses. The first cottage on the south side of the building has a brick floor. The garden to the north is densely overgrown.

Recommendations

This building is worthy of consolidation. It may be a site that could ultimately be used for exhibition or display purposes. Some repointing is necessary and replacement of the corrugated material for slate hanging may be an option if finances permit.

Site 145 Site of Foundry SX 42788 73685 (centered)

Background

The foundry is not shown on the 1857 map, but can be seen in detail on the 1867 map. It is likely to have been built at a similar time as the Wheal Maria foundry, but may have specialised in smaller or different products from those of the other foundry. The 1860 survey quote reproduced in relation to Wheal Maria Foundry (Site No 61), may also relate to this site. Booker (1971, 151) states that the foundry contained '*a large hammer, lathes, and punching and cutting machines*'. It is likely to have been powered by a water wheel (or perhaps from the nearby winding rotary engine house).

Survey

There is no surface evidence for the foundry site, which is an open field, with a 0.3m high bank marking the eastern side of the foundry's building platform.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 146 Reservoir pond SX 42925 73676

146/1 Site of aqueduct SX 42899 73673 to SX 42803 73678

Background

This feature is shown on the 1867 and 1884 OS maps in detail. An aqueduct feed over the adjacent field to the foundry is also shown on both maps, as is a leat that runs underground possibly from its west end and south of the adjacent reservoir pond (Site 152). Provision of water to the foundry may well have been one of two main functions of this pond, although a back up supply for the boilers of the nearby steam winding engine house cannot be discounted. The location of the supply to this 'condensing' pond (as

described in contemporary texts), is not certain although the saw pit water wheel tailrace appears to have been one of the sources. There is a leat (Site 238) from this pond to the south of the Josiah dressing floors to another pair of long reservoir ponds (Site 245).

Survey

The reservoir pond is extant and in a good state of preservation. Its dimensions can be gained from Fig 21. The banked sides of the pond measure 2.0m in height (internally), although the north-east corner is less than this. This may have been a later inlet source of water (perhaps from a sump shaft in the adjacent field see Site 147 below). The width across the top of the banks averages 1.25m. Trees are growing both inside the pond and over its banks.

There is no evidence for the site of the aqueduct which was probably built of timbers supporting a large launder.

Recommendations

Trees should be cut down from the banks and thinned from the interior of the pond.

Site 147 Possible shaft SX 429945 73741

Grade C

Background

This feature is not shown on archive maps examined for this report. If the feature is a shaft it may have provided water to fill the reservoir.

Survey

There is a depression in the nearby field that was seen from the reservoir pond. It appears to measure 6.0m x 7.0m. The local farmer has been filling in the feature with rubbish and debris.

Recommendations

The local landowner or farmer needs to be contacted to identify the background of the feature. It is doubtful that members of the public will be permitted access to this field.

Site 148 Site of Richards's Engine Shaft, angle bob pit

SX 43025 73655 and capstan SX 43025 73663

Grade B

Background

This shaft is shown on all of the maps (including the 1848 OS map) and was one of the earliest shafts on Wheal Josiah. The 1857 map shows the route of the flat rod cutting from the 'Josiah' water wheel to this shaft (as described in Site 385 below). Booker (1971, 150), states this was a distance of 2,160 ft uphill lifting 270 gallons of water a minute from 690 ft in the shaft. The 1867 map shows the location of the angle bob pit on its south-east side, whilst the 1884 OS map shows the site of the capstan (described in 1860 as being steam powered), on the north-east side of the shaft and possibly the balance bob site on the eastern side.

Richards's Shaft pumped the workings on Main, Middle and South Lodes and was sunk on the underlie of Main Lode. This shaft is the deepest on Devon Great Consols (300 fms = 600m below surface). *The levels from the 40 fm. down to the 144 fm. are continuous from the Wheal Anna Maria section on the west to 30 fms. E. of Hitchen's Shaft and nearly the whole of*

the ground within this block has been stoped away ...Richards Shaft is reputed to have been sunk below the copper stopes to prospect for the tin zone believed to exist in depth' (but only traces of tin were subsequently discovered - Dines 1956, 658). Hamilton Jenkin (1974, 24) corroborates this comment: 'The decision to prolong the mine's life by exploiting its rich arsenic deposits was supplemented by two attempts to find tin beneath the copper zone. This had happened at Dolcoath mine, and conditions at Devon Great Consols were thought to be similar...Richard's Shaft at Wheal Josiah (chosen because it was nearest the granite-the first attempt) was deepened in the early 1870's from 230 to 300 fathoms, but without any tin being found'.

The 1850 survey (reproduced in Bennett 1992, 19) makes the following observations with respect to Richards's Shaft. *'... the new water wheel (1849) which also drains the two shafts at Wheal Josiah.... It is placed at the bottom of a hill, at a distance of about 390 fathoms from Richard's Shaft and about 64 fathoms below it ... It is connected with Richards's Shaft by means of very strong flat rods ...'.* Refer to the background history for Wh. Anna Maria Engine Shaft given above (Site 141).

The later 1860 survey (reproduced in Hall 2000, 101), states: *'Richards Engine Shaft ... being 200 fms. down – 20 fathoms perpendicular and 180 fms. on the line of the lode, and is besides now sinking. It is drained by 12 in. and 14-in. pitwork'.*

Two man-engines were used at the mines, one at an unspecified shaft at Wheal Josiah, and another at Wheal Emma. *'Two man-engines had then been installed, the first one soon after 1864 at Wheal Josiah to 144 fathoms,...'* (Barton 1964, 79). It is perhaps likely that this shaft was used, as the mechanism could be attached to the flat-rod powered pump rods.

Survey

Unfortunately the landowner leaving no visible evidence of any sort at surface has recently capped this, being the deepest and one of the most important shafts on the mine. It is thought that the owner had the shaft sealed with a concrete slab. There is no surface evidence of any other adjacent shaft features, as the area has been landscaped as a grassed field.

Recommendations

Although the site of the shaft is not accessible to members of the public, perhaps negotiations can be undertaken with the landowner to mark the site of the shaft, in view of its importance and the fact that it can be seen from the nearby track to the west leading to Wheal Anna Maria.

Site 149 Old Shaft SX 42965 73639
149/1 Old Shaft SX 42953 73662

Grade C
Grade C

Background

'South Lode has been worked by crosscuts south, 25 to 55 fms. in length from Main Lode near Hitchins Shaft, some of which also pass through Middle Lode... South Lode, which branches from Main Lode in Wheal Anna Maria section, reunites with it in Wheal Josiah ... Stopping on this lode has been extensive between the 40-fm. and 144-fm. levels' (Dines 1956, 658-659).

This shaft was located by Sherrell (2000, Report No 1915) and is shown on the OS 1884 map. During the Sherrell field survey it was recorded that the adjacent landowner stated that it was filled in the 1950's (Table 2). However, the Symons 1848 map shows a shaft north-west of Richards Shaft, but to the north of this location at approximately the NGR given (Site 149/1). Either the location shown by the Symons map is incorrect, and the

location given by the 1884 map is correct, or alternatively there are two shafts. The site of the shaft shown by Symons may have been lost for some time.

Survey

The shaft is sited in a large area characterised by a 0.75m deep excavation and has left no visible evidence for its location. Within the shallow excavation there is a mound of rubble that may site the shaft, although the entire site is overgrown with trees.

Recommendations

If members of the public are permitted access to the nearby track or railway embankment then the accurate location of the 'filled' shaft will need to be determined as well as its nature and extent of its fill. At the same time the possibility of there being another shaft to the north will need to be investigated. Both should be fenced once their locations are securely identified.

Site 150 Wheal Josiah railway lines (1857 Railway)

SX 42625 73656 (upper floors) to SX 43495 73548 (Agnes Shaft)

150/1 Incline railway SX 42697 73583 to SX 43147 73644

150/2 Saw mill line SX 42934 73809 to SX 43001 73488

150/3 Field Shaft winder line SX 42789 73628 to SX 42832 73539

Background

The railway lines in and near Wheal Josiah appear to be the earliest on the mine. There is documentary evidence (Bennett 1992 quoting the 1850 survey) for an incline tramway between Wheal Josiah and Anna Maria dressing floors (Site 150/1): *'Extensive dressing floors were also erected at Anna Maria, to which all ore raised at Wheal Josiah, a distance of 210 fathoms is brought down by means of a self-acting plane – being a double tramway on which empty wagons are moved by the weight of those that are loaded as they descend'*. This presumably ran from the north side of Hitchins Shaft (Site 233) to the copper crusher at Wheal Anna Maria (Site 135), either along the existing track, or along the embanked railway between the dressing floors and the south side of Hitchins Shaft. It is probable that the latter route was used, as the material would have been broken up in the 'bucking/spalling' floors first (Site 140) and the embankment route would have incurred a great deal of cost to create the correct gradient between the Hitchins Shaft site and the dressing floors. This route seems to have been changed to a single standard gauge line that continued to feed material from the shaft to the dressing floors (probably using large ore bins located over the tracks).

The 1857 Lease map (Fig 7) only labels one section of railway (Site 150). This links the Anna Maria dressing floors with Agnes Shaft (Site 257). This railway line appears to have been the first section of the new railway from Anna Maria dressing floors to Morwellham (although all of the 1857 Railway Lease maps start at the Agnes Shaft site and go to Morwellham). This suggests that the Agnes Shaft to Anna Maria section of line predates the main line to Morwellham. Perhaps it was originally used to transport ore from Agnes Shaft to the dressing floors on the same basis as the earlier incline railway from Wheal Josiah.

The 1867 map shows that a new railway line had been created up to Wheal Josiah saw-mill (Site 150/2). This site is referred to in the 1860 survey but has not been labelled on the map, and it is assumed that the site lies between Wheal Josiah cottages and Wheal Josiah administrative buildings.

Site 150/3 is the short section of line from the main line (linking Anna Maria 'upper' dressing floor to Agnes Shaft) to the winding engine site at Field's Shaft.

Between 1867 and 1884 a later small extension of the line from the Anna Maria dressing floors to a location near the copper crusher (Site 135) was built, as well as a link from the northern end of the dressing floors to Field Shaft (Site 153).

Survey

The probable railway incline (Site 150/1) route ran between Hitchins Shaft and Anna Maria dressing floors, the sloping ground being built up to a suitable height for this. The resulting embankment (built of mine spoil) measures 2.5 to 3.0m in height. There are remnants of timber revetment posts along the embankment, which runs for a total length of approximately 150m. Some sections of the embankment have been removed (presumably for hardcore in recent years) for lengths of up to 10.0m and 1.5m in height. The landowner has removed all surface evidence of the line eastwards from its intersection with the saw-mill line.

The main line between Anna Maria and Agnes Shaft (Site 150) is in a good condition. At a location near the Wheal Anna Maria cottages, the line is on an embankment constructed of mine waste (varying from 0.75 to 1.5m in height depending on the ground topography), above the surrounding ground level. At SX 42800 73544 the railway line infills the flat rod cutting (Site 159) from Anna Maria (water) wheel to Anna Maria Engine Shaft. The cutting measures approximately 4.0m in depth at this point, 2.0m across its base and 7.0 in width across its banks. It is a distinct possibility that the flat rod went underneath the railway via a small tunnel currently obscured by earth and rubble. The railway line measures approximately 3.8m in width at SX 42945 73506.

The saw mill railway line (Site 150/2) has been removed from the probable saw mill site to a point 10m north of its intersection with the incline railway (SX 42993 73644) (this being the part of the line owned by a private landowner). At this point the line measures 4.0m in width and ran on a platform 0.8m above ground level. The removed section of line has now been landscaped flat for horse pasturage. The remainder of the line south of the intersection can be seen in its woodland setting where it measures 3.4m wide and 0.3m deep below the surrounding ground level.

Site 150/3, the short section of line to Field Shaft winding engine can be made out with difficulty in the surrounding wooded landscape.

Recommendations

It is possible that the main line from Anna Maria to Agnes Shaft (Site 150), will be accessible to members of the public. The track bed is in quite good condition and needs little in terms of long-term management. Fencing all along this route will be costly, although it would limit access to some unsafe sites, but would have a detrimental affect on the character of the route. Sites which can be accessed from this route can be identified in this report (see maps) or Sherrells Report No. 1915/2 (Maps 5-7).

If Site 150/1 is open to public access there should be a presumption against any further removal of the embankment for hardcore or for any other purpose. The only recommendations for sites 150/2 and 150/3 relate to the removal of trees from the track bed to recreate lines of sight and the long term preservation of the physical remnants of the track bed. There should be no new forestry works that would impinge upon the existing remains.

Site 151 Reservoir Pond SX 42875 73643 (centered)

Background

This feature is shown on the 1857 Lease map (Fig 7) and in greater detail on the 1867 and 1884 OS maps (Fig 21). It may have provided water for the nearby winding engine house boilers.

Survey

The reservoir pond is extant and in a good state of preservation. Its dimensions can be gained from Fig 21. The banked sides of the pond measure 1.25m in height (externally). The width across the top of the banks averages 1.0m. Trees are growing both inside the pond and over its banks.

Recommendations

Trees should be cut down from the banks and thinned from the interior of the pond.

Site 152 Leat SX 42909 73635 to SX 42848 73612

Background

This leat is shown on the 1867 map only. It appears to come (via an underground section) from the larger reservoir pond (Site 146) to the east. The function or destination of the leat is not certain.

Survey

The leat is set on slightly raised ground measuring an average of 0.2m in height (dependant on ground topography); the leat base measures 0.4m in width, with slight banks either side measuring 0.4m in width. There is some low-lying overgrowth within and on its banks.

Recommendations

The overgrowth could be removed to reveal the course of the leat.

Site 153 Field Shaft site and capstan SX 42848 73640 Grade B

Background

Field Shaft is not on the 1848 map but is shown on the 1857 and later maps, particularly in detail on the 1867 map (Fig 21). The 1857 map details the route of the flat rods from Richard's Shaft to Field Shaft, although the 1860 survey source states (Hall 2000, 106), the '*Anna Maria (water) wheel ... works 12-in poles in Anna Maria engine shaft 137 fms. deep, and Field's shaft, by 396 fms (710m) of same-sized flat-rods (3 1/4 in. round iron)*'. This same source also confirms that there is a steam capstan at this shaft.

The 1867 map clearly shows the balance bob on the southern side of the shaft and the capstan to the east. This is the eastern of the two main shafts in the Wheal Maria Sett on Main Lode. '*Field's Shaft is down 154 fms. – 10 fms. perpendicular, and the remainder on the lie of the lode*' (Bennett 1992, 101). This shaft was used mainly to remove ore from the workings and levels in Wheal Anna Maria Sett, although was also used to pump the workings (probably from South Lode). Booker (1971, 151) states; '*In 1856 the efficiency of the big pumping wheels was further improved by a Tavistock Carpenter, John Vigurs, who by 'linking the motion of the pump rod to the axle of a wheel' enabled water power hitherto solely used for pumping to be utilised for hauling from the shaft at the rate of 15 kibbles an hour*'

(saving the company £300 a year). It is not known if Richards and Anna Maria Engine Shafts also had this adaption fitted.

Survey

The site of the shaft appears to have been landscaped (presumably since the Sherrell field survey) and there is now a spread layer of rubble over the area making its location indistinguishable from its surroundings. However, the Sherrell survey (2000, Report 1915, Table 2) records; '10m diameter depression, 2.5m deep, overgrown with brambles, less than 5m from track'. The site of the capstan is still visible as a 0.3m circular depression over a diameter of 3.0m.

Recommendations

It is important to determine if the shaft has been securely capped (preferably by non-intrusive methods). Once located the shaft should be fenced. However, if the adjacent track is to be accessed by members of the public it may be necessary to regularly monitor the site.

Site 154 Site of Anna Maria (winding) engine/boiler house

SX 42776 73629

154/1 Site of detached chimney SX 42797 73630

Background

This winding engine house was described in 1860 as being of 24" cylinder (Hall 2000, 107). Barton (1964, 77) describes the engine as being 'horizontal' (and 34 horse power-1864 newspaper article). The 1867 map (Fig 15) shows the building and what appears to be a skip road between the engine house complex and Field Shaft. The building may well have contained not only the engine house, boiler house and detached chimney (SX 42798 73627) but also another miners dry. South Lode was accessed from this shaft, which appears to have been important for the mine as a whole. The separate railway link (Site 150/4) appears to have not only been used to bring in coal supplies but also to load ore brought up from the shaft via the (possible) skip road onto railway trucks, to then be taken to the bucking/spalling floors (Site 140).

Survey

Unfortunately, there is no visible evidence for any of the buildings described above. However, the site is very densely overgrown with trees and brambles etc and therefore it is not certain that there are no low-lying building remnants.

Recommendations

It is recommended that the site is cleared of low-lying vegetation to allow an adequate archaeological survey to take place. Given the general history of the site (buildings were reduced to ground level), it is likely that sub-surface remains are present. If there are low-lying masonry remains these should be consolidated, but even if not, the site should not be affected by forestry operations, given the likelihood for buried archaeology here.

Site 155 Reservoir pond SX 42728 73612 (centered)

Background

This feature is shown on the 1857 Lease map (Fig 7), and in greater detail on the 1867 and 1884 OS maps. It is likely to have provided water for the nearby dressing floors.

Survey

The pond is extant and in a good state of preservation. Unfortunately there has been some fly-tipping in its southern end. Its dimensions can be gained from Fig 15. The banked sides of the pond measure 2.0m in height (externally). The width across the top of the banks averages 1.0m. Trees are growing both inside the pond and over its sides.

Recommendations

Trees should be cut down from the banks and thinned from the interior of the pond.

Site 156 Office/railway building SX 42713 73570

Background

This building is shown for the first time on the 1867 map. It is shaded red on this map and so was in use either as an office or for domestic occupation; the former appears the more likely. Given its proximity to the railway, its function may well have related to this feature.

Survey

This single-storey building is extant and roofed, this being hipped and slated. The building measures approximately 4.0m in height (internally up to the top of the roof), whilst the outside walls have a maximum height of approximately 2.0m, with the walls measuring approximately 0.45m in thickness. Internally it appears that a later partition has been added after the mine closed. A doorway and three windows have been blocked in with brick on its north side. On the south (front) side of the building two wide openings have been made either side of the partition wall. The roof is constructed in a traditional style for the mid-19th century using small slates. Unfortunately it is not in a good condition and is beginning to collapse.

Recommendations

This is one of very few buildings that have survived on this mine. For this reason alone, it is recommended that the roof is rebuilt in the same traditional style and the walls repaired where necessary. It may be necessary for a structural survey to be carried out and for the nature and extent of works to be agreed by the Devon County Archaeologist. Works on site should be supervised by an archaeologist.

Site 157 Site of office/house SX 42724 73571 157/1 Site of mine building SX 42716 73551

Background

Both buildings are shown for the first time on the 1867 map. Site 157/1 is shaded red on this map and so was in use either as an office or for domestic occupation, but the former appears the more likely. Given its proximity to the railway, its function may well have been related to it. Site 157/2 is shaded grey on this map and so was as a mine building. Unfortunately its exact use is not known.

Survey

There is no surface evidence for either of these buildings.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 158 Site of Wheal Maria Stables

SX 42178 73629 to SX 42210 73629

Background

Symons 1848 map labels and shows the location of stables adjacent to the south side of the main reservoir. These buildings are not shown on any other maps thereafter. Bennett (1992, 19) quoting an 1850 survey of Wheal Maria mine; '*...extensive stables for the company's horses ... and in every direction the best possible roads were made, in order to facilitate the transit of ores to their place of shipment*'.

Survey

There is no visible sign of the stable blocks. Presumably they were of timber construction or have been thoroughly demolished.

Recommendations

None. It is recommended that there is no surface or sub-surface ground disturbance of this area.

Site 159 (Wheal Anna Maria) Engine Shaft flat rod cutting

SX 42680 73635 (shaft) to SX 43432 73053 (water wheel)

159/1 Leat bridge SX 42928 73444

159/2 Track bridge SX 43312 73150

Background

This site relates to the earthwork cutting only, within which the flat rod and its timber supports were sited. The dating of the feature would be contemporary with the construction of the water wheel approximately 1849 (Site 318). '*the new water wheel (1849) ... is connected ... by means of very strong flat rods working upon rollers on the top of very substantial (timber) supports*' (Bennett 1992, 19).

Survey

Generally, the flat rod cuttings are in a relatively good condition. However, they are overgrown with trees and low vegetation. The entire route from the water wheel site to the shaft has not been surveyed, although some accessible sections have.

At SX 42804 73542 the railway line infills the flat rod cutting (Site 385). The cutting measures approximately 4.0m in depth at this point, 2.0m across its base and 7.0 in width across its top banks. It is a distinct possibility that the flat rod went underneath the railway via a small tunnel currently obscured by earth and rubble. On the north side of the railway on the same alignment as the flat rod cutting is a linear excavation measuring from 0.6 to 0.8m in depth below ground level, 3.0m across its base (west/east) and 5.0m in length (north - south). Presumably this is a remnant of the flat rod cutting to the north of the railway line.

159/1: At SX 42928 73444 there is a small bridge over the flat rod cutting. This has been interpreted as a small footbridge or leat aqueduct over the cutting. The southern side of the masonry (which is oriented east - west) is in a relatively stable condition. The stone-faced arched opening measures 2.0m in height and 1.53m in width. There is a stone parapet wall 1.15m in height above ground level. The maximum height of wall above the flat rod

cutting ground level is 3.5m and this has a length of approximately 4.0m. The north face of the feature has collapsed for a depth of 1.2m.

159/2: At this location a small stone bridge has been built to allow the flat rods to run under a mine track. The opening was arched, although at a later date it has been blocked up. Trees growing across the top of the arch have destroyed its crown (on its south side). The opening measures 2.0m in width and is 2.5m in height.

At SX 43344 73120 (west of Blanchdown), the flat rod gulley is cut by a leat (see Site 5/2). The gulley at this point measures 2.5m in width (at ground level), with a bank on both sides measuring 1.0m in width (at its top) and is 0.75m in height. Approximately 6.0m south of this location (43350 73117) there is a small vertical wall set on the southern side of a mine track (near Plunger Shaft) at the point where it goes over the flat rod gulley. The wall measures 1.5m in depth, over the width of the gulley.

At a site next to the long quarry (Site 366, at SX 43074 73351), material excavated to achieve the correct flat rod cutting ground level has been formed into a high long bank on its west side. This measures 3.0m in height, but from sloping ground level to the west of the bank measures 5.0m in height. On top of the banked ground (2.75m in width), there appears to be a leat. This measures 0.45m in width and has a depth of 0.43m, with outer banks. At SX 43121 73296, the leat comes off the top of the bank and runs down the inside to join the flat rod bed.

Recommendations

If members of the public are to access these routes it will be necessary to clear them of vegetation and to allow an assessment of the stability of the relatively high sides of the cuttings. If public access is not permitted, and total clearance deemed not to be cost effective, then clearance of the vegetation from the base and sides of the cutting could be carried out to create sight lines along the cuttings, from the routes that the public will access. For long term management of these earthwork features it will be necessary to inspect both the edges and sides of the cuttings to identify any trees that may affect their stability.

159/1: For long-term preservation of this feature the collapsed north face of the small bridge should be rebuilt and the structure repointed where necessary.

159/3: The faces (and blocking) of the bridge should be consolidated and repointed. This site is visible from the mine trackways that will be accessed by members of the public.

Site 160 Leat SX 42734 73578 to SX 42761 73554

Background

This feature is not shown on any maps seen during research for this report. It resembles a leat and it may have been an overflow channel from the reservoir pond to the north (Site 155). The channel may have gone down the flat rod cutting.

Survey

The linear cutting in the ground measures 1.2m in width across its base, 0.4m in depth, its banks to the west measuring 1.2m in height and 0.75m in width. The feature extends for the length shown on the site inventory plan (Fig 38).

Recommendations

The overgrowth could be removed to reveal the course of the leat.

Site 161 Site of mine building SX 42780 73579

Background

A small mine building of unknown function is shown on the OS 1884 map.

Survey

There is no surface evidence of the building.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 162 Leat SX 42797 73595 (Site 155) to SX 43425 73614 (Site 247) 162/1 Leat SX 43203 73467 to SX 42902 73440 (Site 106)

Background

The leat is shown in detail on the 1867 and 1884 OS maps (Figs 15 and 21), running from the Agnes water wheel tail race to the west between the 'upper' railway line (Site 180) and a leat (Site 238) around the side of the hill to a point to the south-east of the large dressing floor reservoir pond (Site 155) where it goes underground, a length of approximately 850m. It appears this leat may have filled this reservoir. The connecting leat (Site 162/1) links up the main leat with the older leat (Site 106).

Survey

At SX 42808 73594 the leat goes underneath the single railway line to Field Shaft winding engine house (Site 150/4) and then into the side of the embankment railway line (150/1). At this location there is a localised collapse measuring 1.0m in depth but the ground above is undercut to the north and west to a depth of approximately 0.5m, giving a total length of approximately 2.5m.

At a location 10.0m east of the intersection with the railway line, the leat measures 0.5m across its base, its banks varying in height from 0.5m to 0.75m from surrounding ground level and from 0.5 to 1.0m in depth. The leat continues around the hill in a relatively good condition, especially through the woods.

At a location east of Hawkmoor House (SX 43356 73464), the leat is plainly defined as it runs across the south sloping hillside in mature woodland. The downslope bank is 0.6m in height and 0.7m in width at its base. The leat itself is quite wide at this point being 1.8m, across its base.

Site 162/1 is a connecting leat from SX 43250 73451 to the older leat (shown on Symons 1848 map) at SX 42901 73441 (just prior to a leat tunnel under the waste railway line (Site 166). The leat measures 0.4m in width at ground level and is 0.4m in depth on its downward (south) side. The downslope bank measures 0.7m in width.

Recommendations

The overgrowth could be removed to reveal the course of the leat.

Site 163 Adit portal SX 42934 73585

163/1 Leat settling tank SX 42934 73585 to SX 42826 73587

Background

This feature is not shown on the 1867 map, although it is shown on the 1884 OS map (Fig 15). Presumably that is a shallow mine water outlet (perhaps from a shaft Site 149), and the wide adjoining 'leat' or 'tank', was used to settle out the contaminated water before it flowed into the parallel leat below (see Site 162 above).

Survey

The leat to the adit outflow is shallower and wider than a standard leat. It measures 2.5m in width with banks measuring 0.75m in height along its northern and southern sides. The adit portal is visible and open. It measures 1.0m in width and 1.0m in depth. The base of the adit is approximately 3.5m below ground level, although there has been a collapse of ground at the floor of the portal.

Recommendations

If members of the public are able to access this part of the site, the adit portal will need to be made safe and may require fencing. Trees growing either in or on the banks of the leat should be removed and the stumps treated.

Site 164 Site of mine building SX 42880 73519

Background

This building is shown on the 1867 and 1884 maps. It is sited next to a loop off the main line with a single line shown going through the building. This site has been interpreted as probably being a weighbridge, or perhaps alternatively a repair workshop for the engine or trucks.

Survey

There is no surface evidence of this building.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 165 Hedge/field remnant SX 42874 73519 to SX 42856 73507

Background

The 1843 Tithe Map (Fig 4a), Symons 1848 map and the 1857 maps all show narrow fields similar to post-medieval strip field systems to the south of the east - west road down to Wheal Maria. These narrow fields extended from the road down to a hedge line along the side of the hill to Shillacleave Wood. This boundary can be seen on both the 1848 and 1857 maps, but by 1867 was mapped. It appears to be that for the most part the hedges were dismantled, and the stone reused. At this site however, a small remnant of a narrow field boundary that ran towards Wheal Anna Maria's foundry.

Survey

There is a 10m length of hedge and a possible return against a high embankment of rubble that sited a railway route to the massive mine waste tip. The hedge is built of local stone, narrower at the top (0.5m) than the bottom (1.5m) and having a height of 0.75m.

Recommendations

None.

Site 166 'Upper' waste rock railway line

SX 42636 73531 to SX 42881 73406

166/1 'Lower' railway line

SX 42641 73499 to SX 42881 73406 (Site 175)

Background

The 1867 map shows (by a dotted line) not only the route of the line to the large spoil dump, but also the outline of the dump itself (Figs 15 and 16). The OS 1884 map shows both railway lines (the upper on a high embankment). Both lines originate near the 'upper' dressing floors of Wheal Anna Maria near the cottages, and meet at a point on a stone bridge over the main railway line.

Survey

Site 166 is built up of a wide, high, linear finger dump of waste rock. The OS 1884 map (Figs 9 and 15), show a shorter finger dump (4.5m above ground level) along its western side (with remnants of revetment support timbers). This main long dump is approximately 6.0m high at its south end near the bridge (Site 179). The revetment walls running along the foot of the linear heap vary from 0.5 to 1.5m in height. However the sides of this feature consist of very loose rock that has collapsed in places. Mineralogists have removed some smaller sections of the top of both finger dumps, possibly.

Site 166/1 (the 'lower' line), is not as well defined as the 'upper' route, although can be plainly seen in the woodland to the south of Wheal Anna Maria cottage gardens. In the woodland south of the cottages the track bed of the line can be seen in better detail, where it measures 2.7m wide and is built on a platform of ground approximately 0.75m in height above ground level. In many places the platform has been excavated, presumably for hardcore. At the east end of this line (near Site 175), there are two sets of east - west oriented revetment walls (either side of a 1.0m wide tram route), that may relate to a smaller tramline not shown on the 1884 OS map. At the end of this feature (at SX 42855 73449) rubble from the higher embankment (Site 166) has cascaded down the slope and covered it over. This appears to have been a later addition and probably dates to a period when the main copper ore lode had been worked out and the mine was re-processing older spoil heaps to remove the arsenic sulphides that previously had been rejected as waste.

Recommendations

It would not be appropriate to permit members of the public to access these sites. They are partially stabilised, although their height and instability has created a dangerous and unstable site.

Site 167 Mine building SX 42756 73505
167/1 Outbuilding SX42753 73493

Background

These buildings are shown on the 1867 map as mine buildings. The 1884 OS map shows a similar layout although they appear to have been connected by a wall, creating a yard. They appear to have been accessed by a track from around the west and south sides of the nearby cottage gardens. The function of these buildings are not known.

Survey

The east gable wall is extant to its full height (approximately 4.3m) although its counterpart to the west has partly collapsed recently. A length of approximately 2.5m of the roof is still just attached to the east side of the building on 'A' frame trusses. The upper floor does not appear to very high and was perhaps used for storage. The north and south walls are extant to their full height at their east ends, but have been progressively reduced in height by the collapsing roof and west gable end. The entrance to the building appears to have been on the northern end of the west wall. This building appears to have been re-used since the demise of the mine, perhaps as a house.

The small outbuilding to the south of the main building is extant and looks like two ground level 'ore bins' or small storage areas. The walls of the eastern feature are constructed of stone and cut into the south facing ground slope. The rear walls measure 0.7m in height, 2.2m in length and 3.7m in width. Its smaller counterpart measures 0.4m in height, 2.8m in width and 2.2m in length.

Recommendations

The building is very unstable and needs immediate structural attention. It is advisable to inform the landowners that in the short term, it could collapse further and that the site should be fenced for safety reasons.

This is one of the few upstanding buildings of Devon Consols Mine. In the long term it would be preferable to rebuild the west (front) wall and re-roof the building.

Site 168 Wheal Anna Maria dressing floor reservoir
SX 42552 73313

Background

This feature is first shown on the 1857 Lease Map (Fig 7) and appears on all later maps. It provided water for the copper dressing floor below it as well as for the large (late 1840's) water wheel, and, in the late 1850's, the 30" steam engine that powered the copper crusher (Site 202). The long leat (Site 106) can be seen from the southern side of this reservoir pond to a quarry to the south, (shown on the 1857 map and in detail on the 1867 map). Presumably the main feed for this pond was originally via the section of leat from Agnes Shaft (shown on the 1848 and 1857 maps), but this is not shown clearly on later maps.

Survey

The reservoir is in a good condition and still retains water. Trees are growing out of its relatively wide banks. There is a gap in the bank at the western end of the southern side that measures 0.5m in width and 1.25m in depth which may have been the site of a sluice.

Recommendations

Trees should be felled from the banks and thinned from the interior of the pond.

Site 169 Site of small reservoir/settling pond SX 42583 73357

Background

This rectangular feature on the OS 1884 map has been interpreted as a small reservoir/settling pond. It was not shown on the 1867 map.

Survey

The site of the feature has been covered with a spoil mound and its southern side has been built over by the later 1920's arsenic condenser (which itself now barely survives).

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 170 Timber (launder/tramline) supports SX 42619 73432 to SX 42599 73409

Background

There is a confusing confluence of railway/tramway lines in this location as shown on the OS 1884 map, most of which are not shown on the 1867 map. These timbers may relate to the railway line (Site 138/2), but it is possible that these timbers relate to the 1920's works. The close proximity of the possible adit portal and lobby may suggest that they relate to copper precipitation.

Survey

There are four timber tramline/railway supports or perhaps supports for a timber launder at this site which measure from 0.4 to 0.7m in height.

Recommendations

The features should be preserved in situ and not disturbed.

Site 171 Adit portal SX 42618 73435

Background

This site may be a shallow adit portal but it is not marked on any map that has been identified, nor was it noted in Sherrell's Geotechnical field survey.

Survey

North of the site above is a linear depression that has the appearance of an adit lobby. This measures 2.0m in width and runs for a length of approximately 12.0m.

Recommendations

This site may need to be assessed by a Geotechnical consultant to confirm its function and recommend an appropriate long term strategy for its management.

Site 172 Quarry SX 41521 73471

Background

The quarry is shown on the 3rd Edition OS map (and late maps). Presumably it provided stone for the construction of the nearby house (Weir Cottage) at the turn of the century.

Survey

The small quarry measures 10m in length and 5.0m in depth, its back wall measuring 4.0m in height. The area is used as car parking space for the nearby house.

Recommendations

A geological and safety inspection will need to be carried out of the back and side walls of the quarry, if the public are to use the nearby track as an access route through this part of the mine.

Site 173 Stone quarry pits SX 42697 73452 (centered)

Background

There is no map evidence for this site, which is close to the lower mine waste railway line (Site 166/1) and south of some mine buildings (Site 174 below).

Survey

These features may well be small linear stone quarry pits, but they resemble shallow costean trenches. They are located approximately 10.0m south of the Wheal Anna Maria cottages southern garden boundary. The trenches are oriented in a north - south direction. On the upslope (north) side they measure approximately 1.5m in depth with spoil heaps either side (but greater on the east side, where they measure 0.5m in height and 2.0m in width). The downslope end of the excavations measures approximately 0.75m in depth and have a length of 6.0m. There are two running north - south (at a spacing of 6.0m and one trench running east - west). These trenches may well have been a source for shallow bedrock to build up the adjacent railway line platform (Site 166/1).

Recommendations

Although these linear pits are relatively deep at their north end, they are sited in open woodland. The pits have not been infilled with cut branches to the same degree as other sites and so are visible safety hazards, which do not need fencing.

Site 174 Site of mine buildings SX 42711 73470

Background

A small complex of mine buildings were shown on the 1867 and 1884 maps immediately south of Wheal Anna Maria cottage gardens. Their function is not known.

Survey

The buildings have not survived and have left no evidence at ground level.

Recommendations

None. It is recommended that there is no ground disturbance of this site.

Site 175 Site of mine building SX 42566 73617

Background

Due to the absence of specific labelling for each building on the mine plans examined for this report, it is difficult to hypothesise about the function of this rectangular building (shown on the 1857 Lease map, and in detail on the 1867 and 1884 maps). It may be related to copper dressing floor processes or be a service building.

Survey

There is no surface evidence for this building. The ground is covered with heather and other vegetation that would mask subtle changes in ground level or low surface masonry remnants.

Recommendations

None. It is recommended that there is no surface ground disturbance of this site.

Site 176 Large mine spoil dump SX 42874 73405 (centered)

Background

This feature is shown in outline on the 1867 map and on the OS 1884 map. The creation of the upper (Site 166) and lower (Site 166/1) railway lines from Wheal Anna Maria dressing floors and copper crusher houses used tons of mine waste to form high waste rock embankments, and it was necessary to cross the Devon Consols Railway via a bridge (Site 180/2), to allow the ore trucks to tip their waste rock from the railway terminus, creating the massive tip shown on the 1884 OS map (Figs 9 and 16).

Survey

The waste rock tip measures approximately 100m x 100m in plan and in places is steeply sided. It consists of waste rock measuring up to approximately 0.5m x 0.5m in size. Its original height would have been approximately 20m above ground level (which slopes steeply to the south). In recent years, thousands of tons of waste rock have been removed from the tip, reducing its height to only a few metres above ground level. The lower railway track (Site 180/1) has been used for lorry access to remove this material and a track excavated on the south and western side of the feature to provide access to the its southern end. This extraction may have occurred as far back in time as the 1880's, when the mine was re-processing its own spoil heaps for arsenic production, and continued until perhaps fifty years ago, when other mines in the Tamar valley processed its mine waste.

Recommendations

In some areas the waste rock slopes are quite steep and the nature of the material is such that any movement brings more material down. It is recommended that there is no public access to this site.

Site 177 Prospecting pits SX 41586 73506 to SX 41807 73503

Background

These pits are not shown on archive maps. Site 102 is a drainage adit for a lode that extends eastwards through Blanchdown Wood. It may well pre-date the mid-19th century. There is documentary evidence for copper mining during the 18th century (in the first and last quarters) at many sites in the Tamar Valley (Tamar Journal Vol. 5, 35-42), the copper

being dressed and crushed/stamped locally, then exported from Impham Quay. There may well be other adits higher up the hill amongst these pits.

Survey

The pits are small and sparsely distributed (in the areas that have been surveyed), an average measurement being 2.5m in length, 1.0m in width and from 0.6 to 1.2m in depth. The elliptical shaped spoil heaps measure approximately 0.7 to 1.5m in height (downslope) along the lower edge of the pit. The pits are aligned across the lode.

Recommendations

Obscuring the pits by throwing branches into them creates a Health and Safety hazard.

Site 178 Lode back pits SX 41624 73403 to SX 41845 73396

Background

Refer to the background section above. Site 99 is a drainage adit for a lode that extends eastwards through Blanchdown Wood.

Survey

These pits are larger and set closer together (in the areas that have been surveyed). In places (i.e. at SX 41678 73398), the east - west lode has been removed as an openwork with deep pits and subdividing north - south oriented banks or dry-stone walls. An average measurement is 4.0m across the top of the spoil heaps (either side of the openwork-2.0m high above ground level) and 2.0m across the base of the heaps (which measures approximately 2.0m in depth). These pits measure approximately 3.0 to 4.0m in length. In areas where the lode itself has not been removed, the pits are smaller, and similar in size to those described above.

Recommendations

Refer to the recommendation section above.

Site 179 Adit Portal SX 41722 73177

Background

This adit portal is not shown on archive maps and was discovered during fieldwork. The lode back pits above (and Site 180 below), were discovered by analysing aerial photographs (as part of the National Mapping Programme), (see the 1947 aerial photograph reproduced as Fig 36 - when the site was not heavily wooded). It is likely that this adit drained the mine and provided a means of removing ore from the lode.

Survey

This blocked adit has a lobby that measures 4.0m in length and 1.8m in width. This section may well have originally been the adit, but the roof has collapsed. The adit portal opening has 0.5m of ground above its opening and measures 1.3m in width and 1.2m in height. It opens close to a track (or possibly a leat). There is a spoil mound either side of the lobby (3.5m in length) that measures 4.0m in height (above ground level on the downslope end), and 2.0m in width across the tops of the banks.

Recommendations

None.

Site 180 Devon Consols Railway:

SX 42557 73261 (Arsenic Refinery) to SX 44081 72888 (A390 Tunnel)

180/1 Lower arsenic refinery route

SX 42832 73421 to SX 42586 73130

180/2 Mine waste dump tunnel SX 42875 73429 (centered)

180/3 Agnes embankment and cutting

SX 43543 73687 to SX 43652 73575

180/4 Wheal Emma Bridge SX 43651 73578

Background

'The railway system at Devon Great Consols was a direct reflection of the productivity and wealth of these mines. Consols claimed the only standard gauge railway line to be entirely owned and worked by a specific mining concern within the West Country. It was built to connect the various parts of the Consols Sett with the Tamar and the port of Morwellham. Construction over the 4½ mile route began early in 1857, work being completed in November 1858. Transport costs by road had been considerable and when the new line opened it was found that expenditure (transporting the copper ore to the ore quay), could be cut from 5 shillings a ton to 1 shilling a ton by rail' (Bennett 1992, 22).

'The line of the railway from the mines to the Morwellham Quays, where the ores are sampled and all the goods for the mines imported, runs along the high ground on the east bank of the Tamar, the last half-mile down to the quays being a steep incline, up and down which the wagons are drawn and lowered by a 22". Stationary engine and a 4" wire rope. The gauge is 4ft. 8½" (the ordinary narrow gauge), but the rails are, like those of the Great Western lines, laid on longitudinal sleepers, their weight being 39 lbs. to the yard. The ore wagons weigh 2 tons Scwts. Each and carry 3½ tons of dry ore... A train generally consists of eight or ten wagons'. (Hall 2000, 110 quoting an 1860 account of the mine).

The cutting of the main railway line (labelled on the 1867 map) is one of the mine's most enduring features where it enters the conifer woodland east of the arsenic complex and negotiates its route along the sides of the Tamar Valley. The first lease was drawn up on 4th November 1857 for a railway track from Agnes Shaft to Morwellham, the 1857 Lease map (Fig 7) shows a section of line already built between Anna Maria 'upper' dressing floor and Agnes Shaft. This section therefore, appears to predate the main railway. The 1867 map labels the line to the 'lower' Anna Maria dressing floor as 'Devon Consols Railway'.

In a newspaper article (Tavistock Gazette, 18th June 1986) by George Cloke states, *'Along the railway line ... Was a quite long tunnel carrying part of the rock waste dump over and beyond the line. Recently large quantities of this rock was sold for infilling as a result of which that beautifully built tunnel has been completely destroyed and we have lost a piece of history... just thought-less destruction'.*

Note:

With the exception of the earlier railway line (Site No. 150), from Agnes Shaft to Anna Maria 'upper' dressing floors and Wheal Josiah mine spurs, additional features associated directly with the railway (i.e. bridges/spurs/tunnels/junctions and landscape management features) have been given sub-set numbers (i.e. 180/1, 180/2 etc).

Survey

Site number 180 is the railway route from Anna Maria 'upper line' (from the mine waste tip tunnel to the higher side of the arsenic complex shown on the OS 1884 map), east to Agnes Shaft then to Bedford United Mine. The route then goes from this junction to Bedford Mines south along the side of the River Tamar to Morwellham (via Wheal Impham and Wheal Russell). The section of the railway from the A390 tunnel southwards is the subject of a separate but related archaeological assessment report (*Bedford Mines*, Buck 2003)).

Site 180: SX 42657 73360 (north-east of the copper crusher), the OS 1884 map shows two close parallel lines either side of the railway, resembling either a revetment/retaining wall on both sides of the railway or a short siding to the south. This can still be seen in an area covered by trees and undergrowth. On the north side of the track there appears to be a small platform measuring 2.5 to 3.0m in width and 1.2m above ground level on its lower south side (where there is retaining wall), and 0.75m above ground level to the north. Its bank is retained by a dry stone wall measuring 0.5m in height. A 15m section of the railway line track-bed east of this location has been lost to a north - south access track (as well as the parallel leat (Site 106), until the woodland to the east is encountered. The railway section from the start of the woodland to the tunnel is overgrown with low vegetation (gorse etc) and runs parallel with the lower track (Site 180/1), measuring 3.0m in width. There is a low 0.5m high wall running parallel but to the south of this line at the edge of the cutting for the lower track.

Site 180/1: The route of the lower arsenic refinery track is visible at the arsenic complex although ground levels appear to have changed in places. For a distance of approximately 200m lorries have accessed the tip along this track bed to remove waste rock (Site 176). This line is approximately 1.5m to 2.0m lower than the higher track described above and 3.5m in width. The line east of the railway bridge/tunnel retains its distinctive character, in many places its original timber fence posts and wire along the sides of the line survive.

Site 180/2: A railway tunnel has been built under the two parallel mine waste railway lines (Sites 166 and 166/1) before the main waste tip. The tunnel (or bridge) is constructed of stone and founded on two supporting walls measuring 0.9m in width and 2.0m in height. The original length of the tunnel measured approximately 25m; however only approximately 5.0m survives (at its eastern side), and an uncertain length behind the roof collapse. The eastern face of the stone arched tunnel opening measures 3.0m in width and 4.0m in height.

There is a revetment wall on the west side of the tunnel between the north side of the railway line and the higher aqueduct (Site 106/1). This higher dry stone revetment wall is constructed of mine waste rubble, whilst its base is built next to a lower mortared wall that measures 2.0m in height and 1.0m in width. This wall measures approximately 15m in length and was the north wall of the tunnel. Its southern counterpart is extant although its roof has been completely removed.

Site 180/3: The head of Rubbytown Wood valley was built up to a height of approximately 5.0m above ground level to take the railway around to the east side of the valley (the embankment being approximately 4.0m in width) and to Wheal Emma. Spring and other water sources were taken under the embankment (and the nearby reservoir/settling ponds) to emerge further down the valley. The Agnes Shaft railway cutting to the east of the embankment at SX 43602 73681 is unstable in many places. Loose rock has already fallen

from the near vertical (northern and eastern) sides (6.0m in height), and other boulders may soon fall. East of this there has been a collapse of loose shillet and subsoil from the higher ground above the cutting. The surface of the cutting is flooded in places. However, some of the low revetment walling along the edge of the railway line measuring 1.5m in height is in relatively good condition.

Site 180/4: The bridge that goes over the railway line at SX 43651 73578 (Wheal Emma Bridge in this report), is not in a good condition. Both outer faces have collapsed, requiring total rebuilds in many places. The north face has lost approximately 1.0m of its outer face, and the south face has lost approximately 1.1m of its outer face. The round arch measures 2.7m in height (from its crown to ground level) and the track is 2.9m in width under the bridge. There is a pile of stone (perhaps from the bridge) near the south face measuring 0.45m in height, distributed across the track bed. South of this, the track bed widens to approximately 6.0m, but there are deep ponds of standing water making this area inaccessible.

Recommendations

If members of the public are to use the existing railway line (from the arsenic works) major structural and consolidation works need to be carried out to the large mine waste railway bridge (Site 180/2) and Wheal Emma bridge (Site 180/4). Structural surveys will be necessary and an appropriate remediation strategy agreed with the Devon County Archaeologist.

Geotechnical works to the railway cutting (Site 180/3) and flooded railway bed need to be carried out. If the railway route from Devon Great Consols to Morwellham is to be utilised as a multi-use public access track, the tunnel under the A390 road from Tavistock will need to be re-built, or an alternative route provided. Sherrells Report No. 1915/2 has already prepared a preliminary risk assessment report in relation to the proposed public access along the railway line.

Site 181 Lode back pits SX 41781 73171 to SX 42097 73194

Background

This site was discovered through analysing a 1947 aerial photograph of the mine (when there was little woodland cover). The extent of the site (shown on the inventory map) was confirmed during field survey. The background section of Site 177 is relevant to this site.

Survey

The lode back pits stretch in a long line up the hillside from a point some metres from the adit (Site 179 above). Typically the pits measure from 3.0m to 4.0m in diameter across the top of the banks, and 0.7 to 1.5m across the base of the depression, which is from 1.2 to 1.8m in depth. Most of the pits are covered with low vegetation in a conifer woodland setting.

At SX 41799 73178 there is an open gunnis. This is fenced with timber posts that measure 1.2m in height and carries three strands of plain wire. The base of the gunnis is flooded, although bedrock is visible at a depth of 2.0m below ground level (and the water surface to a depth of 3.0m). The spoil tip on the north side of the gunnis measures 2.5m in height and 3.0m across the top width of the opening. The top of the stope measures 1.2m in width and 6.0m in length, although the higher ground has collapsed at its east end, resulting in a depression measuring 1.2m in depth and 2.5m in diameter.

Recommendations

The public are unlikely to be allowed into parts of the wood that are being worked by Tavistock Woodlands. However, obscuring the pits by throwing branches etc into them creates a Health and Safety hazard for woodland operatives. It may be prudent to re-fence the gunnis.

Site 182 Adit SX 42232 72549

Background

Refer to Site 179 above.

Survey

The adit portal measures 1.0m in width, although the opening itself is not visible. There is 0.5m of earth overlying the interior of the lobby that measures 1.2m wide and 1.8m high. The adit roof may well have collapsed, causing an earth and rubble build up on the lobby floor. It is possible that this is not an adit, but rather an exploratory working. However, the relatively close proximity of a long line of lode back pits (see Site 193), may suggest that this is the site of an adit.

Recommendations

Given the proximity of this feature to the track it may be prudent to fence the front and sides of the lobby.

Site 183 Houses/mine offices SX 42660 73335

Background

This building is shown on the 1867 map as one of two buildings shaded red (see Fig 16), on the 'lower' Anna Maria dressing floor. This has been interpreted as being either an office or accommodation. The building is also shown on the OS 1884 map. It appears to have been built as two separate units.

Survey

The single storey building has partially extant walls (to a maximum height of 2.5m above ground level) but is roofless. There is a fireplace opening in the centre of the eastern gable wall with a rusting iron lintel. The window locations are visible and splayed. There is a doorway in the eastern end of the northern wall (which has partially collapsed), and another splayed window in the western end of the southern wall, a further chimney is set in the western gable wall. Some of the windows are intact and have intact lintels. The buildings appear to be asymmetrical.

Recommendations

For the long-term preservation of the building it should be consolidated where necessary and repointed. Some internal wall sections will need to be lime plastered to reflect the original style. Specific remediation details will need to be agreed with the County Archaeologist.

Site 184 Wagon/engine Shed SX 42708 73349

Background

This building is shown on the 1867 and 1884 maps and has been interpreted as being related to the maintenance of either the steam engines or wagons. A single line comes off the lower track (Site 180/1) to go into the building, through the other side loops back into a siding that went up to the copper crusher engine and waterwheel.

Survey

The building has been reduced to ground level, although its plan can be seen. At its south side where the ground slopes away, its stone foundation can be seen. The wall measures 1.0m in height (above the lower ground level to the south) for a length of 3.0m, although its front face has partially collapsed.

Recommendations

A small amount of consolidation is necessary to consolidate the collapsed sections of foundation walling. It is recommended that there is no surface ground disturbance at this site.

Site 185 Hedge/leat aqueduct SX 42703 73316

Background

This feature, which resembles a section of hedge may be part of an aqueduct to bring water down to the eighteen slime tanks or jigging tanks (as shown on the 1867 map-Fig 16. Presumably, this area of the 'new' or 'lower' dressing floors (refer to the general descriptions given in Site 187) marked one of the last dressing phases. Waste water from these tanks appears to go downhill via a leat to infill a large waste settling pond (to allow suspended material to settle before the water reached the River Tamar).

Survey

The hedge measures 0.75m in height and 0.5m in width across its top edge (1.3m across its base), for a length of 10.0m.

Recommendations

None.

Site 186 Leat remnant SX 42703 73311 to SX 42738 73323

Background

This feature, which resembles a leat, may have transported waste water from (or to) the long line of eighteen slime tanks (see Site 187). It may be that shown on the 1867 map as a thin blue line.

Survey

This feature has the appearance of a leat. It measures 0.75m in width at its base and has a bank on its downslope side measuring 0.8m high and 0.7m wide.

Recommendations

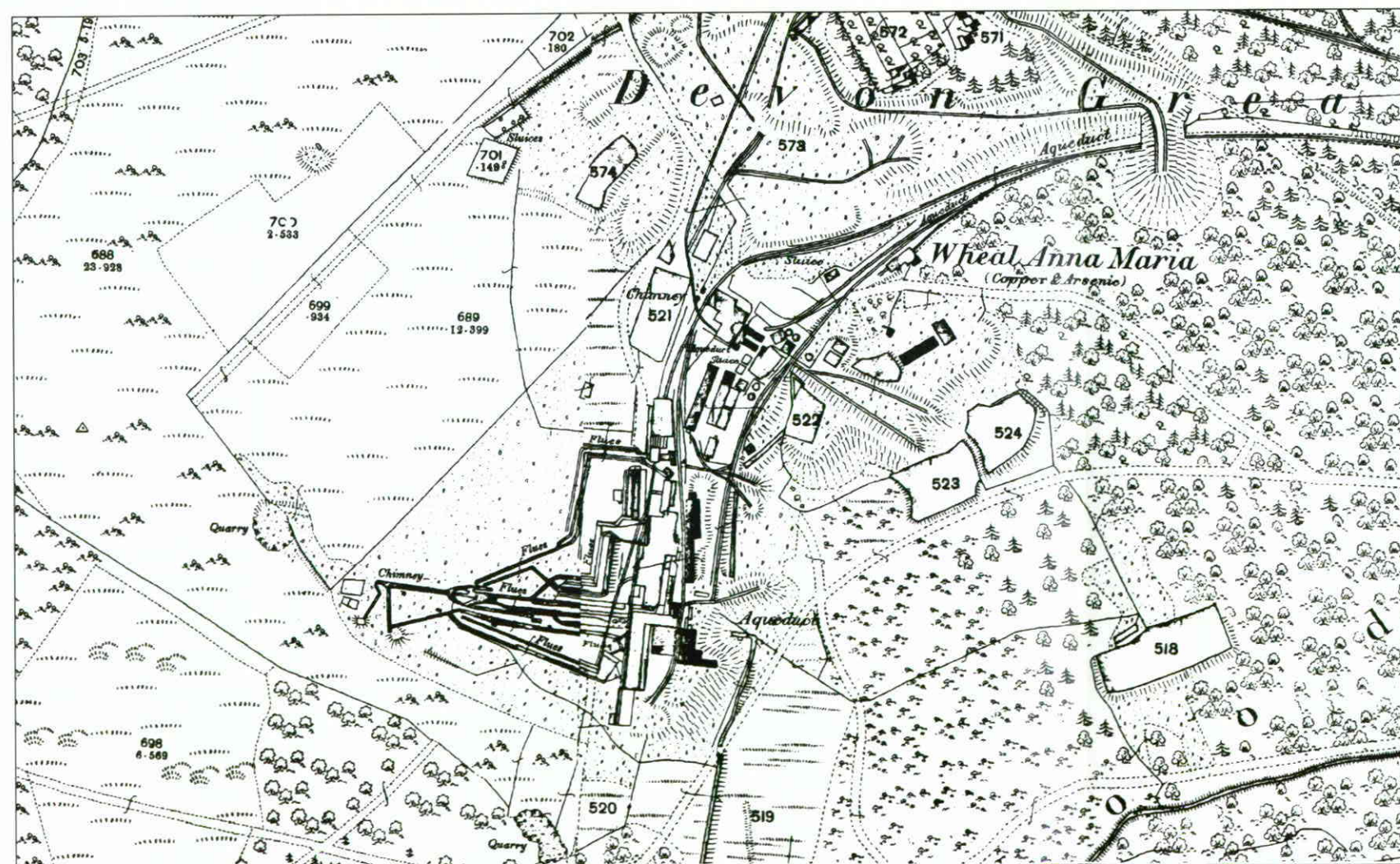
None.



Figure 16 *The southern section of Wheal Anna Maria as shown on the surface plan 'Tavistock Parish (Div. No.1)' 1867*

(Tavistock Parish (Div. No. 1) - DRO/T1258WE11 - 3 chains - 1 inch)

0 25 50 75 Metres



The southern section of Wheal Anna Maria as shown on the Ordnance Survey plan 1884

(OS 1884 - © Crown copyright and Landmark Information Group
CCC licence No. LA076538.)

0 25 50 75 Metres

Site 187 Site of Wheal Anna Maria 'lower' dressing floor SX 4268 7327

Background

'During the same period (1850), a large water wheel 50 feet by 4 feet was also erected at Anna Maria to work the new crusher and stamps there' Bennett (1992, 22). The 1857 Lease Map (Fig 7), shows the large reservoir pond and the water-wheel (or more likely by this date, steam engine) powered copper crusher/grinder house below, although the other dressing floor buildings are not shown.

Hall (2000, 108-110) describes the latter in more detail (quoting an 1860 mine survey): *'There are two crushing or grinding engines on the mines ... and the new grinder, at the new floors, worked by a 30" double engine, which has two crushers – one for the crop ore and the other for the old halvans from the burrows'. The same source also describes in detail the dressing floor process; 'The work that goes through the two first 1-20th " sizing sieves ... passes to a slime separator ... the slimes go to the slime-pits, and thence to Brunton's frames ... The roughs go to the round buddles, from whence the work is ... buddled again and again. There are altogether eleven round buddles on these floors. The final processes of cleaning here are various, depending on the nature of the work. Some, from the round buddles, is separated in a shaking cistern and then tyed and buddled clean ... The last process of cleaning is usually done by jigging in perforated copper hand-sieves, or by tozing in kieves. These floors are certainly among the most elaborate and perfect copper ore floors in the world... The average return of halvan ores from these floors is 250 tons per month'.* The 1867 map (Fig 16), shows the buildings (and buddles) within which these processes took place.

However the OS 1884 map (Figs 9 and 16), shows a much different site. By this date the mine had finished working the 'old halvans' and 'crop ore', and was focussing on arsenic production. The arsenic works had expanded and a new east - west railway line to the lower side of the works had cut the old dressing floor site in two. A new large spoil dump had been started south of the dressing floors fed by two north - south tramways on finger dumps. In later years this dump would dramatically expand to become the largest dominant landscape feature of the mine, to be seen for miles around.

Collins (1912, 264), writing from personal observations at Devon Consols (from 1873 to 1903) stated: *'As the produce changed gradually, from mainly copper to mainly arsenic, the necessary modifications were made in the surface arrangements for treating the ores... The fines were screened from the roughs for jigging, while the roughs were washed with a stream of water and spalled with heavy sledges when necessary. The roughly broken product was then skilfully selected as follows:*

- 1. Best copper ore ... put through crusher, when it was ready for sampling and sale*
- 2. Best arsenic ore - for crushing and calcination*
- 3. Dredge copper ore - for crushing and jigging ... added to sale piles*
- 4. Dredge arsenic - for crushing, jigging and calcination*
- 5. Waste rock - for the dump'*

Note: This site has not been shown on the site inventory plan (Fig 38) as a large polygon, due to the number of sites already shown in the same location. Refer to the 1867 mine plan for the extent of the site (Fig 16).

Survey

There is very little left of this primary phase of the 'lower' Anna Maria dressing floor. As described above, the later 19th century change in focus of the mine altered this site from copper dressing to arsenic dressing.

In the 1920's, a renewed interest in arsenic processing again changed the site through the construction of new arsenic refinery buildings and a large spoil heap (known as 'White Sands') was created over the site of the earlier settling ponds. There are also remnants of the 1970's works at this location that added to the mine waste tailings dump.

Most of the dressing floor features shown on the 1867 map have gone (except for Sites 188 and 190), as have the dressing floor buildings. The site of the water wheel (Site 205) is not visible, but the copper crusher building base is extant (Site 204), as are other very small remnants.

Recommendations

None. It is recommended that there is no surface ground disturbance at this site.

Site 188 Twin buddles plinth (upper) SX 42638 73301

188/1 Twin buddles plinth (lower) SX 42649 73286

Background

It is clear that the dressing floor layout had changed dramatically over time when the 1867 and 1884 maps are compared (see Fig 16). See detailed comments for Site 187 above. It may be the case that one or two buddles from the earlier layout had been retained for use in later years.

Survey

Features identified during the field survey in this area appear to be small remnants of the layout shown on the OS 1884 map (Figs 9 and 16). The upper twin buddle plinth measures 1.6m above ground level and was 5.0m in width and length. There is little evidence of features on the plinth.

The lower twin buddle plinth measures 2.0m above ground level. It is partially constructed of stone and also has sections of timber launders (east and west sides) coming out of the side of the plinth (draining the slimes from the buddles). These measure between 0.1m to 0.15m in height and 0.08m to 0.1m in width. The eastern pair of launders is oriented to the south-east to probably feed into two holding tanks shown on the OS 1884 map (now lost, like the small tailings pond downslope).

Recommendations

If members of the public access this part of the site, it would be appropriate to consolidate these features, although they are in a relatively stable condition. A degree of excavation and conservation might reveal these features to a greater level of detail.

Site 189 Possible water wheel pit SX 42646 73297

Background

This 'lower' dressing floor (from documentary evidence) appears to have sited a water wheel to power the grinder. Its dimensions are given as 50ft by 4ft by Hall (2000, 107). It is

not certain if the water wheel and the 30 in. cylinder steam engine (which is also documented as powering the grinder), both worked together (one may have replaced the other). Although power must have been necessary for the dressing floor machinery, a large water wheel may well have provided this. The site of the water wheel referred to above may have been in the location shown in the Exeter Archaeological Field Unit report (1989, Fig 4a). There is no cartographic evidence for this site being a water wheel pit.

Survey

This feature has the appearance of a partially infilled wheelpit, or alternatively a long, thin sub-surface feature—possibly a railway wagon maintenance pit. The opening measures 1.8m wide, 6.0m long and its rubble filled interior is 0.75m in deep. Along the vertical stone face of the feature (below ground level) are vertical timbers set at 2.0m intervals along the north face of the wall. There is a slot which might be the possible location of the water wheel shaft bearing.

Recommendations

If members of the public access this part of the site, this feature may need to be fenced off, or alternatively infilled to a higher level to minimise the hazard it may be perceived as presenting.

Site 190 Reservoir pond SX 42645 73246

Background

A rectangular feature resembling a pond is shown on the 1884 OS map. This map shows a flat area and scarp built on the sloping ground, upon which this feature is built. The platform appears to have sited the buildings shown on the 1867 map, which seem to have been roofed dressing floor buildings, one of which is broadly rectangular and on a similar location as the later 'reservoir pond'. The eastern part of the 1867 dressing floor site had, by 1884, been replaced by two parallel railway lines, dumping waste products north of two slime settling reservoir ponds (see Fig 16), but these too have disappeared.

Survey

The surface remnants consists of the outline either of the platform and scarp of the 1867 dressing floor or the later probable reservoir shown on the 1884 map. The south and west banks are partially visible although they are obscured by gorse.

Recommendations

None.

Site 191 Walled yard SX 42619 73283

Background

The 1884 OS map appears to show a walled yard to the south of the water wheel (Site 189). This had replaced buddles shown on the 1867 map.

Survey

The west side of the yard shows as a bank measuring approximately 0.75m in high and 0.3m wide across its top edge. The remainder of the yard can no longer be seen at ground level.

Recommendations

None.

Site 192 1920's-70's Timber ore bin SX 42633 73266 192/1 Iron water tank SX 42624 73225

Background

This part of Devon Consols was intensively used for well over a century. Copper dressing floors were constructed in the late 1850's, arsenic refining and processing 'buildings' constructed in the late 1860's were adapted until the turn of the century. The 1920's arsenic works entailed rebuilding and reuse of some of the late 19th century buildings, as well as new build (see site descriptions below). Throughout the period between the turn of the century and the mid 1960's, accounts of the mine mention copper precipitation works at locations near the River Tamar. However from the late 1960's to the early 1980's a succession of companies treated ore that had been dumped in previous years. This site is likely to belong to one of these 20th century companies (refer to detailed account given below).

Survey

The timber feature appears to have been a wooden ore bin with a centrally located sluice slot. It measures 2.3m in height on the front (south) face, constructed of re-used vertical timbers and horizontal planking. The planking extends back from the front for a distance of 1.75m. The bin is full of a material that may be ore awaiting processing. There is a flat area below the timber bin that may be a small dressing floor next to which is a large rusty water tank.

Recommendations

None.

Site 193 Lode back pits SX 42307 72645 to SX 42284 72793

Background

Refer to Site 179 above.

Survey

A long line of lode back pits extends up the hillside, following the route of the Cross-course shown on Symons 1848 map (Fig 4) from Wheal Frementor to Wheal Maria. At the southern end of the line, the pits are either sparsely distributed or sited in pairs across the lode. These typically measure 1.3m deep, 1.5m long and 1.0m wide at their bases. The spoil heaps are usually located downslope of each pit and measure 1.0m wide (at the top), 3.0m long and 1.3m in high. The pits that are located in pairs are sited approximately 1.2m apart.

At SX 42305 72760 there is a small gunnis. This is not fenced but the opening measures 3.2m wide across the top of the banks and 2.0m across the base, which is 2.0m below ground level. The gunnis is approximately 20.0m in length and has spoil heaps either side of the opening varying from 0.5 to 2.0m above ground level.

Recommendations

The public are unlikely to be allowed access to parts of the wood that are being worked. Obscuring the pits by throwing branches into them creates a Health and Safety hazard. It may be prudent to re-fence the gunnis described above.

Site 194 Prospecting pits SX 42378 72695 to SX 42506 72711

Background

Refer to Site 179 above. The alignment of the prospecting pits is 150m south of (but parallel to) South Fanny Lode.

Survey

The pits are small and sparsely distributed (in the areas that have been surveyed). An average measurement is 2.5m long, 1.0m wide and from 0.6 to 1.2m deep. The elliptical shaped downslope spoil heaps measure approximately 0.7 to 1.5m in height. The pits are sited across the lode outcrop.

Recommendations

None.

1920's Arsenic refinery SX 4257 7328

Note:

The Exeter Archaeological Field Unit produced a detailed historical and survey report (Pye and Dixon 1989, 89.08), with respect to all of the 1920's arsenic processing buildings. It is not the intention of this report to duplicate that work. Summaries of the background and survey sections are reproduced below. For detailed survey and historical evidence, reference should be made to the Exeter City Unit report.

Summary of historical background

'Mining activity on the site largely ceased after the closure and levelling of the 19th century workings in 1902-3, with the exception of the copper precipitation works, which seem to have remained in operation until about 1940 (in fact intermittently until the mid-1960's). However in 1915 the decision was made to re-open the upper levels of Wheal Fanny for the mining of arsenic, and Wheal Frementor for tin and wolfram. ... in 1921 (to 1922 – closed in mid 1925), a small arsenic works was built at Wheal Anna Maria, just to the north of its 19th century predecessor. After 1921 mining continued at Wheals Fanny and Frementor, and by 1923 work had also begun at Wheal Maria, and at South Wheal Fanny for arsenic and tin. However due to slumps in the prices of arsenic and tin, mining was suspended (in late 1924) and only Frementor re-opened later in 1925, continuing in production until its final closure in 1930' (Pye and Dixon 1989, 3).

Site 195 1920's Arsenic condenser SX 42568 73295

Background

These two long rectangular buildings (set back to back), provided a large cool surface area on which the hot arsenious gases from the reverberatory furnace and calciners condensed. It was built in late 1921 and is probably the most photographed site at Devon Great Consols.

Survey

This site was described in detail and surveyed (by Pye and Dixon 1989, 17 - Site 5.9 and Fig 4). Unfortunately, photographs show through time (since Ordish in the 1940's), the degree to which the building is increasingly collapsing.

'Flues from the furnace, calciners and the refiner enter its southern end, and two flues exit from its northern end (soon merging into one), carrying the remaining arsenic and sulphur towards the stack... There was also another condenser located (in late 1922) immediately to the north of the surviving one, ... although now demolished (only patches of its firebrick floor now being visible), it was fed solely by a flue from the refiner, and was thus built purely for the precipitation of refined arsenic... The surviving condenser is constructed of local slate with brick quoins and brick-arched doorways. It consists of two separate sets of interconnecting vaulted brick (baffle) chambers, arranged back to back... each individual chamber has a separate doorway, providing access for workmen to clear out the precipitated arsenic' (Pye and Dixon 1989, 17-Site 5.9).

The structural condition of the building is not good. Much of the roof has collapsed inwards (even more since the 1989 survey), making it dangerous to enter. This is increasingly causing the front wall to be unstable as the thin-chambered walls collapse. There is evidence within the building of door hinges, iron shutters and timber sleepers. The arsenic flues into the south end of the building are obscured by rubble.

Recommendations

The County Archaeologist should agree remediation recommendations by a structural engineer (following a structural survey), if health and safety risk assessment recommendations for consolidating this building (with a very high content of arsenic), can be met. If this cannot be achieved the building will need to be fully recorded and securely fenced.

Site 196 1920's flues (calciners and furnace to condenser) SX 42569 73276

Background

The Exeter Archaeological Field Unit survey (Pye and Dixon 1989, 10 and Fig 4), gives a detailed account, survey and structural sequence of the structural phases of the flues leading to the condensers from the calciners, furnace and refiner.

Survey

The line of calciners, refiner, arsenic mill, boiler/engine house crusher base and bottle furnace are set at a lower level than the condenser described above. However the connecting flues from the two calciners and furnace at the southern end of this line of buildings bridge this gap and the height differential between these buildings and the southern end of the extant condenser. Generally the width of the flues and walls are similar (internally 0.5m in width and 0.6m in depth), with the walls 0.45m thick.

Recommendations

A conservation problem is that the flues have generally lost their brick arched roofs and are continually being walked over by members of the public viewing these buildings. The tops of the flue walls should be consolidated, but it may be necessary to bridge the gap by 'capping' the flues. The consolidation of the tops of the flue walls may need to utilise a weak cement mix to provide long-term strength and the ability to withstand the wear and

tear of walking members of the public. Specialist advice is needed for the conservation of this site, and should be sought from English Heritage.

Site 197 1920's Reverberatory furnace SX 42572 73258

Background

The Exeter survey report describes this basic type of furnace; *'The earliest type was the flat bed reverberatory furnace. This had developed in the 18th century as a means of ... smelting out the copper and tin at the same time as burning off the arsenic. They were rectangular in plan (up to 25' long by 5' wide), and had a firebox at one end and an access door at the other ... The gases were emitted from the roof at the opposite end from the firebox. As arsenic began to be produced commercially, so the furnaces were adapted (by the addition of flues) to accommodate its collection... the (early 1923) furnace to the south of Brunton Calciner No. 1 is probably of this type, since it is of suitable size and dimensions, and moreover seems to possess a firebrick floor at waist or shoulder height'* (Pye and Dixon 1989, 6 and Fig 4).

Survey

This site is located approximately 5.0m south of the earliest calciner and consists of a partially collapsed rectangular shaped feature. However most of the building is covered with rubble obscuring many other details apart from the firebrick floor revealed in section. *'Initially its flue probably fed into that leading from Calciner No 1, but at some point before the closure of the works in 1925 the system was remodelled'* (resulting in a new separate flue being constructed to the condenser - Pye and Dixon 1989, 11 and Fig 4).

Recommendations

To aid interpretation, the floor of the furnace could be cleared of debris to reveal the firebricks, if health and safety constraints can be met, although the public may need to be kept away from this site, due to its high degree of contamination.

Site 198 1920's Brunton calciner (No 1) SX 42574 73266

Background

The Brunton calciner was first used in Cornwall in 1835 and was in common use throughout the south west for the remainder of the 19th century, with a handful working up to the mid 20th century. This was the most reliable and efficient arsenic calcining furnace developed. A detailed description of the calciner is not necessary (see Earle 1983), but it operated on the same principle as the reverberatory furnace above but was automatic in operation, needing less operatives to produce the same product. The power sources for both of the 1920's calciners were small waterwheels, (no longer extant - Richardson 1979)

'Brunton Calciner No 2 seems to have been built and in operation by January 1922, together with the original condenser, flue and stack. By the middle of that year Brunton Calciner No 1 was in operation, together with the refiner, mill, steam engine and crusher... Jiggers, powered by a large waterwheel (no longer extant), were also provided at this time. This was followed early in 1923 by the provision of buddles, and late that same year of additional processing plant, including tables, a classifier, and a pulveriser. These were all probably sited alongside the large waterwheel and no longer survive' (Pye and Dixon 1989, 11 and Fig 4).

Survey

This building survives to its full height and retains a relatively good structural stability. The brick arched power vault is intact (although small localised collapse to the vaulted brick chamber has developed). The main drive shaft from the floor of the vault to the circulating hearth is extant. Unfortunately there is rubble across this entrance and on the floor of the

vault. There is a smaller brick arched opening above the power vault arch which may have been a stoke hole (mirrored by another in the north wall). In the centre of the north wall there are two small brick arched openings (the upper one may be an ore chute, the lower a stoke hole).

At first floor level there is an opening in the east wall, whilst the centre section of the top of the west wall has been partially demolished although its opening is evidenced by the timber lintel that is still *in-situ*. The location of the circular iron hearth can be seen.

Recommendations

It is recommended that this building is consolidated for future preservation. It is one of the best preserved buildings in the 1920's arsenic complex and is likely to have been of the same style and design as others that were built in the late 1880's on the adjacent arsenic processing site. It is not likely that members of the public will be permitted inside the building, but exterior repointing would preserve it for several generations.

Site 199 1920's Brunton calciner (No 2) SX 42580 73280

Background

Refer to the background section of Site No 198 above.

Survey

This building also survives to its full height and retains a relatively good structural stability, except for the south-eastern wall, which has been partially demolished. A brick arched power vault opening in the southern wall may have been infilled and two smaller openings built, perhaps to remove calcined ore. These still retain their iron gate jambs and the iron rails used as lintels. A later brick built extension has been added to the eastern wall of the ground floor although its function is unknown. There is another brick arched power vault opening in the north wall and the main drive shaft from the floor of the vault to the rotating hearth is also extant. This vault is in a better state of preservation than the adjacent calciner (in terms of the state of the roof and absence of rubble). The east wall is of a lower height than its western counterpart.

The front (or west) wall is extant although again there is a collapsed opening at its centre. There is a retaining wall running along the west (front) side of the calciner as it has been built into the side of the east facing slope, and a partition wall parallel to the south wall of the building (in front of calciner No. 1 north wall). The upper interior of the calciner is filled with rubble that obscures the circular hearth area.

Recommendations

Refer to recommendations for Calciner No 1 above.

Site 200 1920's Arsenic refiner bed SX 42585 73288

Background

Another type of flat bed reverberatory furnace (sometimes circular), was used to re-calcine (i.e. further refine) crude arsenic that had already been calcined. 'Clean' smokeless fuel (usually coke or anthracite) was used to fire the furnace, which had a tiled floor and walls. The pure arsenic was precipitated in the flues and condensers in the same way as the first process, although these flues (and condensers) were kept separate from the primary

condensers that produced crude arsenic. There was a flue from this refiner to a separate condenser at Devon Great Consols sited to the north of the main condenser described above (Site 195) (this has been demolished-see Pye and Dixon 1989, 8 and Fig 4).

Survey

Most of the building above ground level has been demolished. However, the circular outline of the flat-bed refining furnace can be seen. Sections of its firebrick floor and holes running under the floor (presumably air channels for fireboxes can be seen). The original course of the exhaust flue to the condenser can be seen by the bricks set into the 3.0m high brick retaining wall to the west.

Recommendations

For interpretation reasons the floor of the furnace could be cleared of debris to reveal the firebricks, if health and safety constraints can be met, although it will be impractical to fence the site.

Site 201 1920's Arsenic grinding mill SX 42591 73299

Background

'After refining, the white arsenic crystals were cleared out from the condensers, milled to a fine powder, and then packed in 4cwt barrels. The mill at Devon Great Consols was of granite, and according to Earl (1983, 22), was powered by a large waterwheel located to the south-east' (Pye and Dixon 1989, 8 and Fig 4a). Refer to Figure 20, an archive photograph of the Devon Consols arsenic grinder (located within the main complex).

Survey

The timber and granite structure seems originally to have been built within a killas building. Most of its walls have gone although the south wall is extant for a length of 4.0m (on the west side of a doorway). The north wall is more substantial and marks the junction between the boiler and steam engine house.

At the ground floor the interior of the building sites a substantial wooden frame of vertical posts supporting horizontal beams and planking, founded on killas plinth walls. Again, it is possible that this was powered by the large water wheel (no longer extant) to the east or alternatively by the adjacent steam engine.

The granite mill floor joists run east-west and for added support have been inserted into the west wall of the building, whilst the upper beams of the floor are inserted into the north wall. In the centre of the floor a complete millstone survives *in-situ*. The upper millstone has an iron band around its edge, with the lower stone is set into the timber floor.

Recommendations

The timber structure that supports the heavy granite millstones has been open to the elements for at least half a century. The timber almost certainly needs to be preserved and the site fenced off to restrict further damage to the timber surface. It will be necessary to commission a structural survey of the supporting timber components to ensure that it will survive.

Site 202 Copper Crusher Engine and boiler house plinths SX 42602 73305

Background

The general background history given in the site description for 187 ('Lower' dressing floors), describes first (in 1850) the construction of a new water wheel to power the crusher, and then by 1860 a new copper crusher steam engine. The 1867 map (Fig 16) for this site shows a large building east of the reservoir pond (Site 68) and above the dressing floor. This seems to be the likely location for both sets of machinery, the grinder being next to a railway for coal and ore and the water wheel to power the dressing floor. A detached chimney is shown on the 1867, 1884 and 1904 maps, although it appears to have been removed when the 1920's arsenic complex was built.

The feature identified by (Pye and Dixon 1989, 16, Site 5.6 and Fig 4) as a boiler and steam engine base appears to be the site of the 1860's copper crusher engine (described as 'a 30" double engine, that has two crushers-one for the crop ore, and the other for the old halvans from the burrows' - Hall 2000, 108). It is equally likely that the site of the water wheel (now gone), described by Richardson (1979) is that of the original water wheel described in 1850.

Survey

Pye and Dixon (1989, 16, Site 5.6) states: *'These consist of large granite blocks on foundations of local slate (killas). The boiler base has lost its eastern side, and is mostly covered in gravel. The steam engine has lost its north-eastern corner and in its centre there is a rectangular area with brick subdivisions. Iron bolts protrude from both bases'*. It is not certain if the granite blocks are the original foundation masonry for the 1860's engine or were brought in afresh in the 1920's. The copper crusher base visible slots that may well have been for the flywheels slots, the crankshaft powering the copper crusher adjacent to the north. The evidence consists of granite stones on a killas plinth, set against the same retaining wall that runs along the 'back' of the calciners. Again it seems likely that this section of retaining wall was a remnant of the 1860's engine site.

Recommendations

If the public are permitted access to this part of the site, walking on top of the engine house plinth may cause problems. If this continues, the top and sides of the plinth will need to be consolidated.

Site 203 Copper crusher plinth SX 42593 73313

Background

See comments given to Sites 187 and 202 above. As the documentary accounts above show, this copper crusher may well have been in existence since the 1850's, its power source changed from water wheel (1850's) to a steam engine (1860's), then a later steam engine in early 1922. The 1860 account of the mine given in Hall (2000, 108) describes in detail the specifications of this building.

Survey

It is not known how much of the site was left in 1902 when the entire mine (and specifically the arsenic refinery) was dismantled, sold for scrap and reduced to ground level. The 1920's works might have built on the same site if there had been enough of the original plinth and structure remaining.

The features that survive consist of three timber beams (with iron bolts protruding), on killas plinths (oriented perpendicular to the north-east/south-west retaining wall). The beams originate from the 1920's period although the masonry plinths appear to predate them.

Recommendations

The timber is rotting and needs to be preserved as an immediate priority. The masonry plinths need to be repointed and the related masonry features consolidated. It is not recommended that this area is accessible to the public.

Site 204 1920's Shaft kiln (bottle) furnace SX 42601 73317

Background

The function of this feature is broadly described in Site 200 (arsenic refiner). Shaft kilns were used to refine crude arsenic by burning layers of anthracite and arsenic in a 'bottle' or 'shaft' shaped kiln. The numbers of kilns varied from site to site. Here this structure contained a pair (whereas at Okel Tor (Calstock), there were eleven - although smaller in diameter). Flues from this site merge and run to an adjacent condenser (used only to condense refined arsenic). The feature is dated to late 1923 (Richardson 1979, 102).

Survey

The furnace contains two small furnaces within a single rectangular build. *Each has a brick-arched opening at the base of the eastern wall, through which the burnt ore and spent fuel was removed after calcining. A flue issued from the back (west) of each furnace at a high level ... at the top the firebrick hopper or shute for loading ore into the northern of the two furnaces survives, together with its iron fire door ... the southern has been removed however* (Pye and Dixon (1989, 16, Site 5.8). The walls are built of killas, with evidence of brick infills. In the east wall are a row of three timber-lined holes, within which there are iron bolts that have been cut off. On the same wall, but at a higher level are two further bolts.

The top opening of the hopper is exposed and has been damaged by people climbing it. Although the walls are in a relatively good condition, eighty years of weathering has caused general degradation of the masonry and mortar.

Recommendations

This is one of relatively few Shaft kilns that survive in the south-west. The walls need to be repointed and the top layer of stones rebbed in lime mortar.

Site 205 Site of waterwheel SX 42611 73297

Background

See background history of these dressing floors above (Site 182). It is difficult to differentiate the site of the waterwheel from other features on the 1867 map, although it may be sited just below the copper crusher and engine/boiler house complex. It appears from documentary sources that the water wheel that originally powered the copper crusher was retained to power the other dressing floor machinery (buddles/jiggers/sieving machines etc). It may well have been sited at the location given by Richardson (1995, 97, Fig 18 and photographed Plate XLIV).

Survey

The site is no longer extant above ground, and the wheelpit has been infilled to ground level, masking its surface dimensions.

Recommendations

None. The location of the wheelpit could be marked out at ground level, if members of the public are to access the site.

Site 206 Site of house/office SX 42605 73267

Background

The 1867 and 1884 maps show this small rectangular site. It is shaded red on the earlier map indicating its use as either accommodation or an office.

Survey

The building is not extant nor is its building platform visible. Such surface remains may survive, however.

Recommendations

None. Disturbance to this site should not be allowed.

Site 207 Site of one long mine building SX 42582 73261 (centered) 207/1 Site of two mine buildings SX 42592 73256 (centered)

Background

One long mine building is shown on the 1867 map, whilst the OS 1884 map shows an additional building sited south, but parallel, to the first building. Below this latter building, the 1893 arsenic complex lease map shows two small rectangular reservoir ponds here. The function of the buildings are not certain, but the earlier building may originally have been related to copper ore dressing, possibly a 'spalling' or 'jigger house'. By the early 1880's primary ore dressing was not carried out, but only the dressing of previously dumped material. Alternatively the function of these buildings may well have been related to arsenic or a related dressing activity.

Survey

The northern end of the 1867 building has been overbuilt by the 1920's Brunton calciner (Site No 198), but the location of the site of the southern end of the building is shown approximately by a surviving section of dry stone retaining wall. The wall measures 1.8m in length and 1.1m in height at SX 42578 73261. The remainder of this building and that of the later buildings shown on the 1884 map to the east) are not visible, since the ground has been overdumped.

Recommendations

None.

Site 208 Small reservoir tank SX 42533 73252

Background

This pond is not shown on any archive map seen during the production of this report. The feature appears to have been either a small reservoir pond or a contaminated water settling pond.

Survey

This small rectangular pond is sited just inside the conifer woodland fringing the western side of the later arsenic complex. It is cut into the side of the south facing hillslope and has fully extant well defined banks, although part of the east bank has been removed by the adjacent track. The flat interior of the pond against the west (rear) bank measures 2.0m in depth below ground level, with the south side wall is 0.25 m below ground level at its eastern end. Trees are growing out of the banks and interior of the pond floor.

Recommendations

Removal of the trees from the banks and floor of the pond would reduce any further damage to the feature caused by tree roots.

Site 209 Small reservoir tank SX 42505 73264

Background

This pond is shown on the OS 1884 map and the 1893 Arsenic complex lease map (Fig 18). It also appears to have functioned as either a small reservoir pond or a contaminated water settling pond.

Survey

This is a similar pond to that described above, although is sited further upslope in the woods. The interior dimensions of the pond are approximately 5.0m x 5.0m and 0.75m deep below its rear bank. The sluice appears to have been in the centre of the east bank.

Recommendations

Refer to recommendations made to the site above.

Site 210 Mid C19th Arsenic Refinery SX 4250 7312 (centered)

Background

'The decision to produce arsenic at Devon Great Consols was taken in 1864 as reported in the Mining Journal of December 1864, but the lease was not endorsed until September 1866. The Annual General Meeting was told in May 1867 that the directors had decided to erect a reduction works, that permission had been granted by the Duke and the buildings estimated to cost £2000; 'they will be completed by the end of the year' (pers comm. J. Goodridge). 'They were ... producing 50 tons a month by December 1868, when it was decided to enlarge them further to deal with 150 tons a month' (Goodridge 1964, 242).

'By 1868, after twenty years of intensive working, the great main lode which in places had been 40ft or more thick was nearly exhausted of ore. At Wheal Fanny and Wheal Maria the reserves were rapidly diminishing, while the south lode at Wheal Josiah which had yielded nearly £600,000 was ending in barren ground at 144 fathoms... a marked fall in the price of copper ... led to less ore being raised ... In turning to arsenic production to bolster falling receipts, the

company sought to utilise its large dumps of low-grade ore as well as the 'mundic' or mispickel left standing on the walls of the lodes after the copper had been extracted. This was in places nearly 5ft thick and contained 30% of arsenic' (Booker 1971, 162).

Cartographic analysis of the development of the arsenic complex appears to show three phases of development (of a gradually evolving complex):

1. The 1866 Lease map (Fig 17), shows the arsenic complex in its first phase at the date the lease for the site was agreed with the Duke of Bedford (see Appendix II).
2. The '1867' shafts/lodes mine plan (T1258M/E14b-Fig 8) appears to show the arsenic complex after its first phase, with the basic calcining furnaces and single flue to the chimney (with water shower). This design reflects the original lease for the works dating to 24th September 1866 (SS/MC/L1258/1), which has been reproduced in part in Appendix II.
3. The slightly later '1867' surface plan map (Fig 16), shows a slightly larger plan with two additional flues and buildings either side of the original main flue. This suggests that arsenic was being further refined from its crude state (necessitating the use of separate flues and refining capabilities – shaft kilns etc, or that different products were being produced, perhaps sulphuric acid.

The final stage of development can be seen by reference to the 1893 Lease map (Fig 18). More flues have been added either side of the main flue and the calcining plant appears to have been expanded. It appears another water tower may have been added and an extra water reservoir pond built.

'By 1868, two years after its production had begun ...The Wheal (Anna) Maria arsenic works were then the largest in Devon and Cornwall, consisting of five calcining furnaces, three refining furnaces and 4,645 ft of flues. By the summer of 1869 production had been stepped up to 160 tons per month-half the world's arsenic supply. Sales of refined arsenic were by 1871 making up 20% of the mine's receipts...(they were) successively enlarged until they finally covered 8 acres and were capable of producing 3,500 tons a month, with seven calciners and 5,429 ft of flues. A steam engine powered the arsenic grinding mill and the casks were made in the mine's cooperages at Blanchdown and Morwellham' (Booker 1971, 164). 'The capacity of these works was 2,500 tons a year in 1871, but this was increased to 3,000 tons a year in 1884 and 3,500 tons a year in 1891' (Goodridge 1964, 243).

In 1903 Devon Great Consols, the biggest arsenic refining complex in South West England (if not Europe), was reduced to ground level. The 1904 OS map (see Fig 11), graphically shows the result of the mass demolition. All of the flues, the chimney and virtually all of the refineries have gone. Only two rectangular buildings were shown, and it is remnants of these that are described below.

Survey

In general terms the arsenic complex has been cleared of any useful building material that was left after the site was reduced to ground level. Some of the bricks that remain were made by 'Westlake', produced in brickworks at either Gunnislake in Cornwall or Rumleigh (Devon). During the past decade the site formerly occupied by the arsenic flues has been excavated to bedrock and the material formed into two long north - south mounds of material (2.5m high and 2.5m wide with an opening in their centres measuring 4.0m wide across the top and 2.0m at ground level). To the south of the southern bank, there are some low, walled, remnants of the calciner/furnace structures but these are scattered and fragmentary. However clearance down to ground level has ensured that some tiled floor areas still survive (presumably from the furnaces - the tiles measure 0.23m x 0.23m x 0.03m

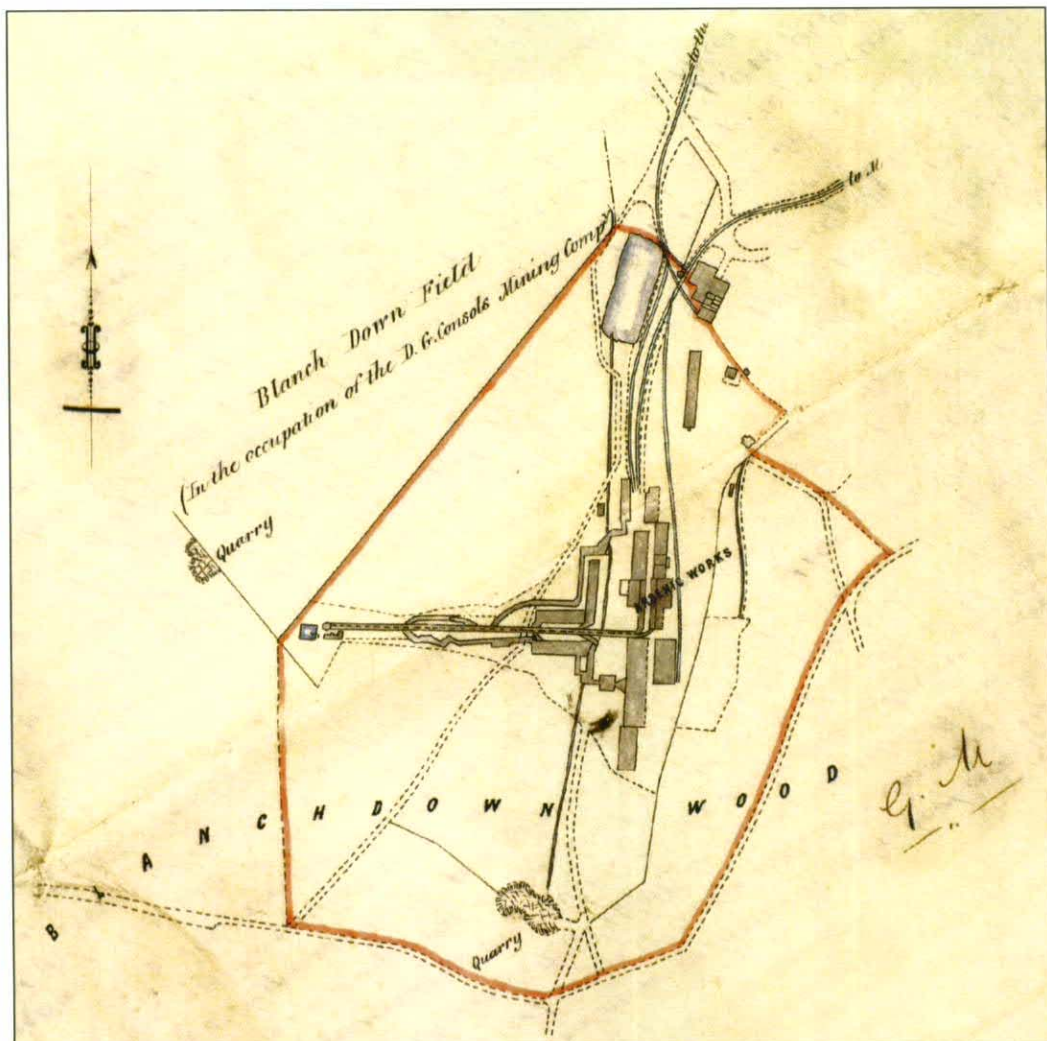


Figure 17 1866 Lease
Map of Arsenic Works

(DRO/1258M/SS/MC1/Leases
Arsenic - dated 24/9/1866)

0 25 50 75 100 Metres

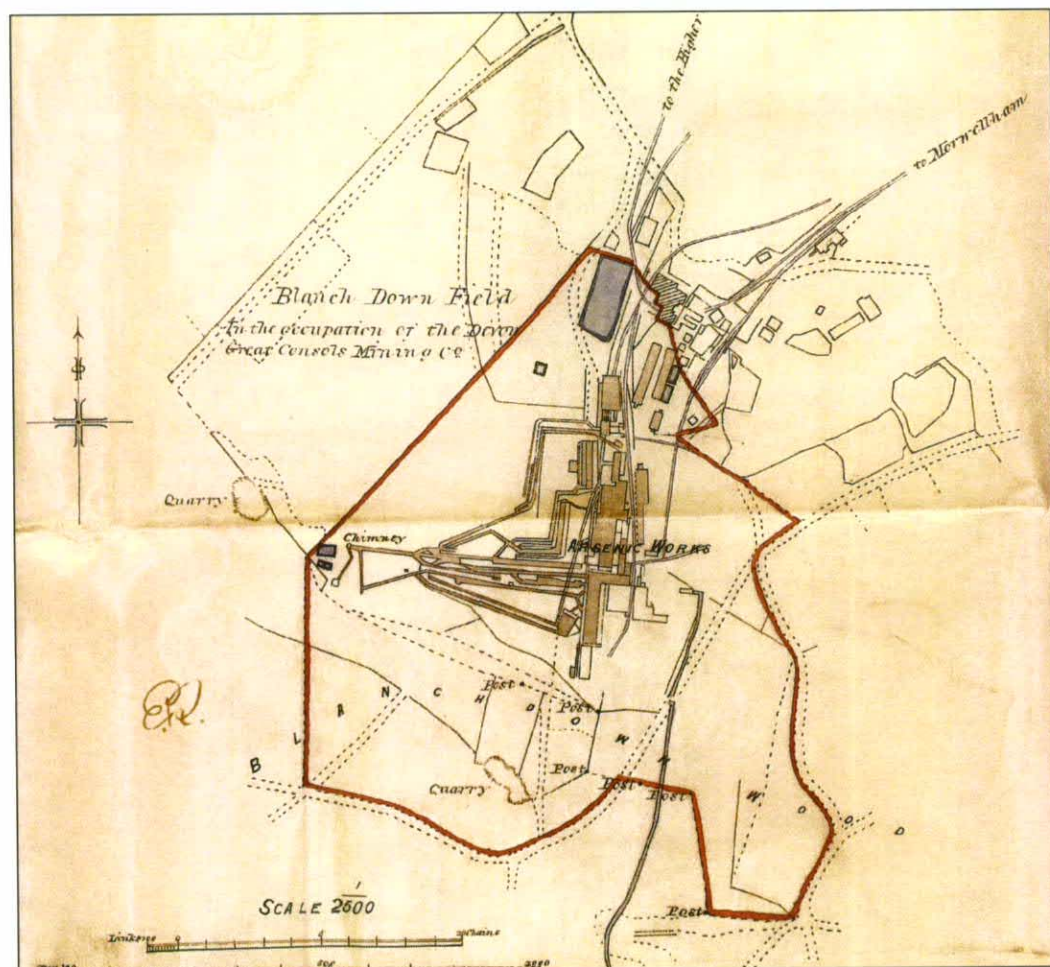


Figure 18 1893 Lease
Map of Arsenic Works

(DRO/1258M/SS/MC1/Leases
Arsenic - dated 22/11/1893)

0 25 50 75 100 Metres

thick), and some shallow flues (that may be either water channels or arsenic exhaust flues). Surface damage has also been caused by BMX bikes and motorcycles being ridden up and down the piles of rubble covering some areas of the site.

Note: The following sites were discovered during the field survey. Their NGR was determined by a small portable GPS, and are given as accurately as possible.

210/1: The 1893 Lease map (Fig 18), shows a long rectangular building at the northern end of the complex, with a railway line entering it. There is a dip in the ground at this location that measures 0.75m in depth for a length of 10.0m. There is no evidence of the walls of the building although there is a 3.0m high spoil dump on the western side of the linear depression. At SX 42552 73234 there are the remnants of an east - west wall that may be the southern end of the building (or an adjacent building). It measures 3.5m long (back into the slope) and approximately 0.5m high (surrounded by rubble), with timber-lined launders coming out of the adjacent rubble debris in a southerly direction.

210/2: At SX 42559 73227 there is the remnant of a blocked up flue (oriented east - west). The feature measures 1.25m long and 0.55m deep. The bricked up opening measures 0.4m wide and 0.47m deep.

210/3: At SX 42563 73168 there is a square building that has intact north, south and west walls varying in height from 0.5m to a maximum of approximately 1.0m (internally). On the northern end of the building there is a long low wall/plinth oriented north - south and measuring 12.0m long and 0.2m high. Timber appears to have been located on (and across) the wall, which is obscured in many places by piles of rubble. (SX 42566 73173 to SX 42568 73189).

210/4: At SX 42548 73142 there is another small section of east - west section of masonry wall measuring 0.6m high over a length of 1.5m. Rubble lying either side of the wall must derive from its original build.

210/5: Approximately 5.0m east of Site 210/4 above are remnants of a brick lined floor surface near the site of a railway line. The area is approximately 3.0 to 4.0m wide with a length of 20.0m (from SX 42576 73181 to 42576 73144).

210/6: This site (SX 42540 73128) marks a small area of extant arsenic floor tiles, its area measuring 3.0m long and 0.5m wide. The feature is oriented to the west (up to the arsenic flues leading to the chimney). This may well be an original section of flue floor.

210/7: This site is an extant open arsenic flue. It measures 0.9m wide and 1.5m high (with a brick arched roof), from the crown of the roof to ground level. It is blocked by rubble at a distance of 7.0m from the opening.

210/8: There is a small hollow at this location (SX 42557 73114) that appears to be the site of a short section of collapsed flue. The depression measures 2.0m long, 1.5m wide and 0.75m deep with evidence of masonry on its south side.

210/9: This site (SX 42535 73121) is the east wall of a building in the arsenic complex. This fragmentary wall measures 4.0m long, but there is an opening in the wall that measures 0.45m high, it has an internal length of 0.5m and depth of 0.25m. The wall measures 0.5m high with 0.5m of rubble banked up behind it.

210/10: There is a small hollow at this location (SX 42532 73117) that appears to be the site of a short section of collapsed arsenic flue. The depression measures 2.0m long, 1.5m wide and 0.75m deep. At its northern end the flue is open and meets up with the open and larger flue (Site 210/7) at a distance of 1.5m inside the opening on its southern side.

210/11: This is another site that contains fragmentary evidence of brick walling and undulating rubble mounds making the sites of approximately three buildings (centered SX 42539 73089). The buildings appear to be approximately 3.0m wide and 5.0m long and may have sited calcining furnaces (perhaps the Oxland reverberatory furnaces as shown in Fig 19).

210/12: There are low-lying remnants of the main arsenic flue from a location (SX 42432 73144) west of the northern pair of west/east banks (formed by scraping the ground to bedrock and forming the material into a high bank). The evidence is in the form of two linear piles of brick and stone rubble, each measuring 0.5 to 0.7m wide, the eastern pile being longer.

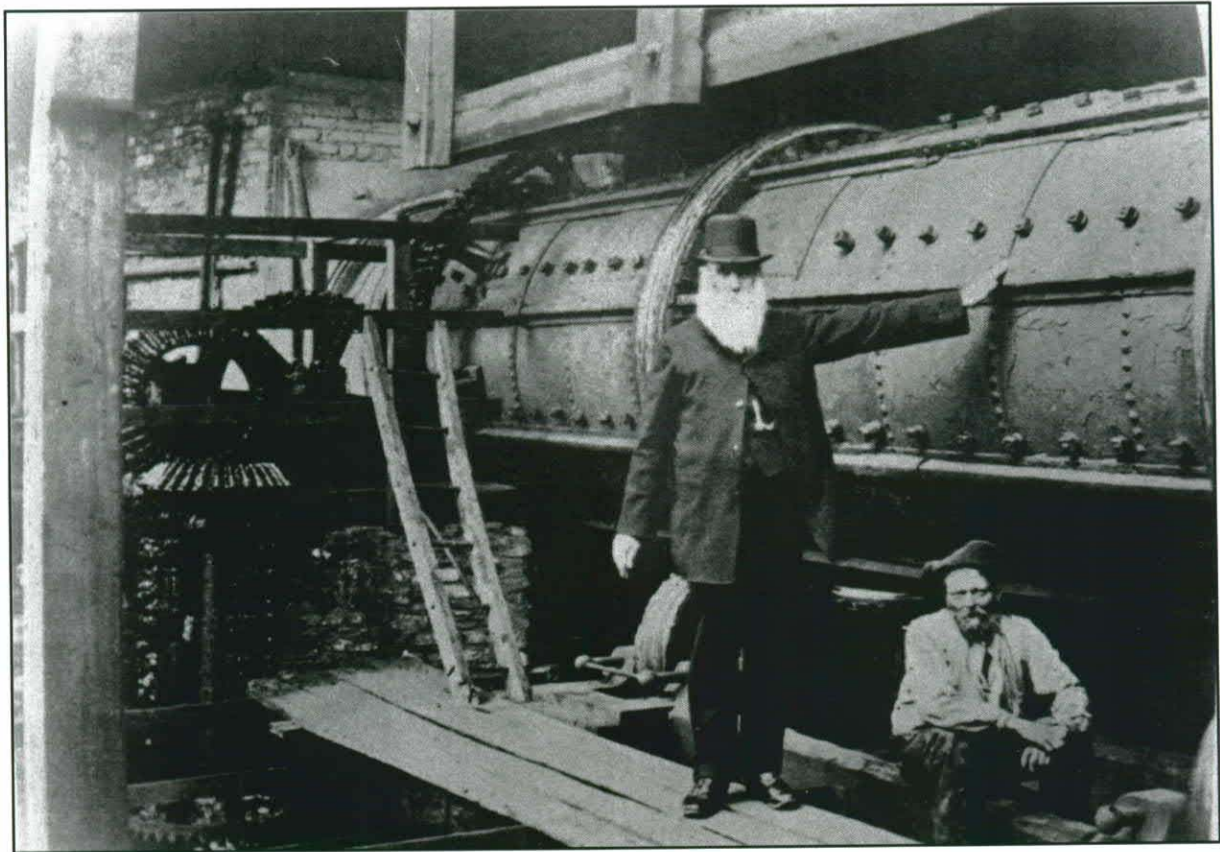
210/13: The best surviving evidence on the site for arsenic flues from the 1880's arsenic complex can be seen on the northern side of the arsenic complex. Fig 18 shows a pair of flues (probably from a calciner) running in a westerly then southerly direction, and then oriented to join the main flue up to the arsenic chimney. Although these parallel flues have lost their brick arched roofs, they measure 0.6m below ground level and 0.5m wide internally. Low piles of rubble lie either side of the flues. The area and features are overgrown with dense gorse that effectively camouflages them. The flues change direction and appear to run parallel to a track, whose construction has infilled the interior of the flue at SX 42481 73163.

210/14: Adjacent to the eastern side of the lower railway track (at SX 42603 73203) are remnants of vertical masonry retaining walls and core material, measuring from 0.5 to 2.0m high and of variable length. Above these are waste tips measuring 3-5.0m high that appear to consist of coal and slag. Further to the south of the NGR given above, the retaining wall is in a better condition and measures 8.0m long and varying from 1.5 to 3.0m high (SX 42602 73178).

210/15: There is an open water tunnel portal at SX 42595 73171. The opening measures 0.6m wide and 0.7m high and is built of stone 1.25m high, with loose ground 0.5m above its arched head.

210/16: At SX 42565 73083 there is a masonry wall lying parallel to the end of the lower railway track. It measures 3.25m long before a collapse of 2.0m before the wall resumes for a further length of 2.5m before rubble obscures the remainder of the feature. It measures between 0.6 and 0.8m high and has timbers set in its wall.

210/17: At SX 42529 73057 this may be the location of the refining section of the arsenic works. To the east of fragmentary rectangular shaped remains of walls measuring 1.0m high is a pile of bricks and stone. This may have been the site of the reverberatory furnace. There is a large heap of coal slag and waste products nearby.



*Figure 19 Oxland Tube Calciner with Captain Isaac Richards (centre) c 1890
(RIC VMdgc 007)*



*Figure 20 Arsenic grinder at work c 1890
(RIC VMdgc 003)*

Recommendations

Demolition of the site has covered over many water tunnels and flues. These appear to collect water and in the winter water flows from the east facing side of the hill, particularly below the arsenic complex (SX 42617 73120).

Site 211 Mid C 19th Arsenic Chimney SX 42368 73139

211/1 Site of mid C19th Waterfall chamber SX 42379 73107

Background

'The precipitation of the arsenic sulphur gases and volatile substances which shall pass beyond the main flue and chambers shall be effected by means of water falls or water showers as shown in the said plans ... That (regard being had to the frequent and dense fogs which rise to a great height from the Tamar Valley and to the risk of damage from the rapid condensation so occasioned and with a view to obviate such risk by the abundant dilution of the smoke with the atmosphere before it comes into contact with the said fogs) the stack shall be of a height of at least 120 ft' (Arsenic works Lease agreement 24th September 1866 DRO SS/MC/L1258/1).

The location of the arsenic chimney is shown on the 1867, 1884 and 1893 maps (Figures 16 and 18 respectively). The possible location of the waterfall chamber (Site 211/1) and presumably a small pumping engine to pump water up from the reservoir pond to the top of the waterfall are shown next to the chimney on the 1867 map. The later 1893 arsenic works lease map does not appear to show this feature. It may be the case that a separate flue system (to the south) was set up for precipitation purposes by this date. This may be located at the end of a small flue leading off the chimney to the south (at either SX 42377 73107 or SX 42358 73114).

The site appears to have been demolished nearly to ground level in 1903 (see the 1947 RAF aerial photos – Fig 36), but again more comprehensively in recent times (probably by the present owners). There is a lot of building stone and especially brick lying on the ground, much of it likely to be contaminated with arsenic.

Survey

The maximum height of the chimney is 1.0m above ground level. The northern half of the internal base of the chimney is visible (at a diameter of 1.2m) as well as its outer north side. The chimney walls measure 1.0m in thickness. A mound measuring 1.0m in height on the north side obscures the remaining outer face.

211/1: There is no evidence at ground level for the site of either of the possible sites of the waterfall chamber/small steam engine, apart from two spoil mounds, near and to the east of the chimney. Both mounds measure 1.7m in height above ground level and are 4.0m in length and width. The route to the possible later site of the waterfall chamber/steam engine can be distinguished from the mounds of rubble.

Recommendations

There is no doubt that the site retains significant levels of arsenic, even though it has for the most part been removed to bedrock level. It is likely that in times of heavy rain, water will run-off this site and travel in an easterly direction across the track from the later 1920's arsenic refinery. If this (north - south) track is to be used for public access drainage will need to be considered to channel contaminated water run-off.

Site 212 Reservoir ponds SX 42351 73137 and SX 42350 73127

Background

A single square pond was shown on the 1867 map, but two smaller ponds were shown on the 1884 and 1893 maps. It is likely that these ponds supplied water-mainly to the waterfall chamber(s).

Survey

The site is difficult to make out given the amount of demolition rubble and grass over the site. However the south, west and part of the eastern banks of the larger pond appear to be visible. The banks measure approximately 1.6m high and 1.2m across the top of each bank. Their lengths can be measured from the reproduction of the archive maps.

Recommendations

Any small trees growing on the banks of the ponds should be cut down.

Site 213 Adit Shaft SX 42386 73104 Grade C 213/1 Adit portal and lobby SX 42398 73095 to SX 42432 73080

Background

The OS 1884 map shows a depression next to the convergence of two flues. The field assessment is that the depression is the site of an adit shaft and not related to the arsenic refinery. The map also shows an adit outflow emerging from a cutting south of the adit shaft. This passed down the lobby and then meets a leat (Site 71). These features are not shown on the 1867 or other mine maps.

213/1: The 1893 Lease map (Fig 18) shows a separate set of flues on the south side of the main flue that culminates at a junction whose detail is omitted. This junction appears to be close to the site of the possible adit shaft.

Survey

The feature strongly resembles a shaft. The circular depression measures 2.0m in diameter at ground level; its encircling earth bank measures 2.0m high (downslope), and 1.0m high upslope. The diameter across the top of the opening is approximately 4.5m, and the banks are 1.0m wide. The adit lobby portal entrance is approximately 10.0m south of the shaft.

213/1: The vertical end of the adit lobby shows no evidence for the portal; the ground simply sloping down to the floor of the adit. The banks measure 2.0m to 3.0m high, and 5.0m wide across the top of the cutting (2.0m across the adit bed). At a length of approximately 20.0m the adit lobby sides reduce in height and a waste rock finger dump starts. This continues along the level for 20.0m, the dump measuring 3.0m high and 0.8m wide.

The cartographic and field evidence shows that this feature carried a tramline for waste rock disposal as well as an adit outflow. The shaft – like feature (Site 213) is highly likely to be an air shaft.

Recommendations

The adit portal appears to be stable, which could be fenced if required, as with the shaft.

Site 214 Quarry SX 42303 73178 (centered)

Background

This stone quarry is shown on the 1867 map and later maps and it presumably provided stone for the construction of the upper parts of the arsenic complex (and later additions and modifications) from 1866 onwards.

Survey

The quarry is accessed from the south-east and east (the latter is shown on the OS 1884 map). The quarry has a vertical wall on its west side; its east side has partially collapsed in places leaving slopes of earth and rock, now vegetated. The vertical face measures from 4.0 to 5.0m high, with trees and vegetation growing out of its sides. In the centre of the quarry floor there is a small mound of earth and stone measuring 1.5m high, 3.0m wide and 4.0m long.

Recommendations

Refer to general recommendations made below to quarries (Site 218).

Site 215 Large spoil heap with tramway supports SX 4256 7302

Background

The long heap extends downslope (east) of the arsenic complex. Its southern end is partly shown on the OS 1884 map, although it is now much larger than it was in the late 19th century. This may well suggest that the late processing of the halvans used this site as a waste dump.

Survey

The constituents of the steep waste heaps change as they extend northwards. Coal and burnt products are visible downslope from the site of the refineries and below the probable site of the calciners. Demolition and later bulldozing of the remnants have also caused brick and stone to be pushed over the top of the heaps.

Most of the contents of the large heap to the south (at SX 4255 7299) appear to be calciner waste, a mixture of coal and slag. There is relatively little vegetation cover over the site particularly on its steep south and east sides. The heap is approximately 2.0m above ground level on its western side, but the steeply sloping south facing hill has resulted in the east face of the dump being approximately 20.0m high. Weathering and water gulleying has eroded the sides of the mound, and BMX and trial bikes have also had an effect. There is a line of wooden supports for either a launder or dump tramline on the top of the dump.

Recommendations

If the north - south track that runs through the old arsenic complex is to be used as a route, the lower side of the heap next to the track might need to be fenced to restrict public access. It is likely that slope stability analysis will need to be carried out as well as toxicity tests to evaluate the content of the heap and the likely effects of surface run-off downslope.

Site 216 Small Quarry SX 42552 72904

Background

This small stone quarry is shown for the first time on the OS 1884 map.

Survey

The quarry measures approximately 12.0m long (north - south) and 8.0m wide. The rear wall is 2.5m high although the slope is negligible. The bank may well have collapsed into the middle of the quarry.

Recommendations

None.

Site 217 Lode back/costean pits

SX 42537 72866 to SX 42451 72866

Background

The sites of South Fanny and Watson's (or Jack Thomas) Mines are marked by the surface workings that removed the upper copper ore from South Lode. This site marked the western end of workings on the lode and its intersection with a lode running up to Wheal Anna Maria (See Symons map Fig 4). The lode may well have been relatively shallow and these deep pits were used to work the upper levels.

Survey

The deepest pits are located west of the mid 1920's track (Site 106), in the steep, south facing conifer woodland. The sides of the deepest shaft are vertical and this measures up to 6.0m deep and 5.0m in diameter. The smaller pits measure 1.0m wide from east - west, 2.0m north - south and 1.5m deep. Costean trenches can also be seen higher up the sides of the valley to the north. There are numerous deep and shallow pits in the area shown on the inventory map (Fig 38).

Recommendations

These pits and possible shallow shafts are a potential danger to members of the public. Conifer branches have fallen over their mouths, obscuring their location, size and depth. There may be a need to fence where direct access from the track is possible.

Site 218 Quarry SX 42467 72983 (centered)

Background

This stone quarry is shown on mine plans and maps dating from 1866 onwards (the date of the original lease from the Duke of Bedford, to construct the arsenic works). It appears to have provided some or all of the stone to build the arsenic refinery.

Survey

The rear of the quarry varies from 4.0m to 6.0m high. It is not very stable and has collapsed in places. The quarry has not been used for some time and is quite overgrown with trees and vegetation. The dimensions can be gained by referring to the relevant map (either the arsenic complex lease maps (Figs 17 and 18) or the OS 1884 map).

Recommendations

If it is desirable for members of the public to access the quarry, vegetation clearance and scaling of loose rock from the rear and side walls may be necessary.

Site 219 Site of Aqueduct/wheelpit SX 42598 73105

Background

The OS 1884 map (Fig 9 and 16) labels an aqueduct at the NGR given. However the feature shown at this site appears to resemble a water wheel. Water appears to have come out of a tunnel that may well have originated at the arsenic refinery complex. This location is also the source of a long leat (Site 71) that went to Wheal Fanny around the side of Blanchdown Wood prior to 1866. The leat appears to have started slightly further to the north (east of the Anna Maria lower dressing floors).

Survey

The site is no longer extant, although water has been seen to emanate from the side of the hill below (east) of the arsenic complex at numerous locations possibly indicating the sites of sub surface channels or blocked drain portals. In wet weather many of these sub-surface outlets have water welling out of the ground, that then runs downhill into the woods. One such site is at SX 42632 73174.

Recommendations

Locating and treating the covered or collapsed water outlets may be problematic. The water may well need to be tested for toxicity.

Site 220 South Lode (Engine) Shaft SX 42546 72864 Grade A*

Background

'Engine Shaft is sunk on the underlie, 48 fms. E. of deep adit, to 25 fms. below Shallow Adit...down to the 37 fm. level' (Dines 1956, 660).

South Lode Shaft (as named on the 1867 maps, but named Engine Shaft by Dines and Sherrell), is an extension of the original South Lode workings started in the mid 1850's (using South Fanny Shaft and a water wheel with flat rods for pumping). It seems the flat rods that originally went from the Wheelpit (Site 330) to South Fanny Shaft (Site 226), as shown on the 1857 map and were extended further westwards to this shaft to enable further workings to be pumped out to adit level.

Survey

This deep and nearly vertical shaft is located only 3.0m from the 1920's track (Site 71). Although the shaft is choked, this is approximately 9.0m below track level. The shaft opening is approximately 12.0m wide, with the ground on the eastern side removed to a depth of 8.0m to form the flat rod cutting, where the flat rod connected to an angle bob and the pump rods. There are two curved walls on the north and south sides of the shaft. The latter wall measures approximately 6.0m long and 4.0m high, although part of its western end has collapsed. Similar dimensions are found in the northern wall. There is no evidence of a shaft marker.

The shaft's spoil tip is located on the southern and south-eastern sides of the shaft as shown on the OS 1884 map. It measures approximately 2.5m above track level, but

compared to the ground level east of the dump, it is approximately 10m above ground level.

The 1867 map (Fig 26) shows a capstan located to the south-west of the shaft. An eroded platform (0.4m high), was located 5.0m from the shaft that measured 4.0m long and 2.0m wide.

Recommendations

The shaft will need to be fenced.

Site 221 South Fanny flat rod cutting SX 42554 72864 to SX 42578 72867 (embankment from cutting) SX 42578 72867 to 42615 72868

Background

In order to support the flat rod's timber parts were set up in the cutting and on the embankment. These have now gone, leaving only earthwork evidence.

Survey

At a distance of approximately 4.0m from the eastern edge of the shaft throat there are two low long walls forming the flat rod slot. These measure approximately 1.4m high and the slot 1.8m wide. The slot has, not surprisingly, become partially filled with leaves and fallen branches, with a few trees taking root as well.

Running parallel to the flat rod cutting on its northern side, are further costean and lode back pits. The pits measure 2.0 to 3.0m deep and 2.0 to 2.5m in diameter. At SX 42578 72867 the cutting ends and an embankment starts. This measures approximately 1.5 to 2.0m high and has a top surface width of 4.0m. The embankment ends at SX 42615 72868.

Recommendations

To aid presentation, the interior of the flat rod cutting could be cleared of branches and leaves; trees growing in its centre should be removed.

Site 222 Shallow Adit and lobby SX 42649 72873

Background

Dines describes this feature as being Shallow Adit, sited 110 yards east of Engine Shaft.

Survey

The adit portal is overgrown and no water appears to be flowing from it. It measures approximately 1.8m deep and at its widest point is 2.0m wide over a length of approximately 40.0m.

Approximately 10m to the north of the adit portal there is a 10cm diameter steel pipe (SX 42648 72898) which water issues from. This may be taking the water from the shallow adit.

Recommendations

The adit portal should be cleared of vegetation. It may be necessary to fence the adit, as the tracks nearby to the east are likely to be publicly accessible.

Site 223 Possible shaft SX42648 72890

Grade C

Background

This feature may be a flooded choked shaft. It is not shown on any archive maps, although documentary evidence has commented upon the mines attempts to search for new lodes.

Survey

The possible shaft measures 3.0m from north to south and 4.0m from east to west, has a 0.5m depression in its centre was flooded to surface level at the time of the field survey.

Recommendations

If a programme of evaluative drilling is to be carried out on suspect sites near proposed public access routes, then this site should be investigated. If this proves to be a shaft, or collapsed shallow working, it should be fenced.

Site 224 Site of mine building SX 42643 72857

Background

A small mine building is shown on the 1867 map at this NGR. Its function is unknown.

Survey

A pile of rubble mimics the plan size of the feature at this site and there may well be low walls buried by the rubble. The feature measures 4.0 to 5.0m long, 3.0m wide and 1.5m high.

Recommendations

None.

Site 225 Tramway/water pipe SX 42606 72997 to 42614 72903

225/1 Leat SX42661 72944 to 42661 72891

Background

The OS 1884 map shows a linear cutting (or embankment) at the NGR's given. It is not certain if the feature was a leat, an incline tramway/a flat rod cutting or the site of a pipe to pump water up to the dressing floor. The 1867 maps (Fig 26) do not show this feature.

The second and parallel site is a small leat that appears to go south of South Fanny Shaft.

Survey

The main linear feature measures 0.75m deep and 1.5m wide, but the dimensions and quality of preservation vary considerably along its length. Branches and other vegetation also obscure it.

The leat to the east (Site 225/1) measures 0.5m deep and wide, with a 0.3m wide bank either side of the excavation.

Recommendations

None.

Site 226 South Fanny Shaft SX 42720 72866

Grade A

Background

This shaft is shown on the 1857 lease map. The 1867 map does not show its outline but a building adjacent to it. The 1884 OS map shows the flat rod angle bob location next to the shaft, whilst a large spoil tip north of the shaft can also be seen.

Survey

Four well preserved finger dumps can be seen on top of the spoil dump. Each measures 0.5m in height and 0.25m in width (across the top), with 2.0m spacing. The spoil tip measures 1.5m high above ground level to the south and 2.0m above ground level to the north. Presumably the flat rod went from the angle bob, over the shaft and up to South Lode Shaft.

The shaft is choked and measures 6.0m in diameter to a depth of 1.8m below ground level. There are rubble remnants of a structure around the shaft. The shaft is sited in a linear depression measuring 10.0m wide and 2.5m deep. There was no sign of a shaft marker. At a distance of 6.0m from the centre of the shaft to the east there is a small localised collapse. This measures 0.5m wide and 0.75m deep, within which there are remnants of shallow masonry walls (that may be part of the flat rod housing).

Recommendations

The shaft and linear depression within which this shaft is sited should be fenced. A small excavation of the localised collapse may reveal part of a small flat rod slot. If so, this could be revealed, consolidated and a route to the shaft cleared.

Site 227 Site of mine building (powder magazine?) SX 43016 73777

Background

Symons 1848 map (Fig 4), labels a 'powder house' at SX 43033 73761. However by 1867 the site had been overbuilt by the large saw mills complex. There is no 'magazine' labelled on the 1867 map (Fig 21). The building appears to have had an opening on its west side with a surrounding wall around the entire magazine.

Survey

No evidence of the building survives.

Recommendations

None, although the site itself should not be disturbed as there may well be sub-surface evidence of the plan of the building.

Site 228 Wheal Josiah powder magazine SX 43207 73806

Background

By 1884, a new magazine is shown at this location (see Figs 9 and 21). It is possible that changed Health and Safety regulations demanded that these buildings be sited further away from the workings of the mine.

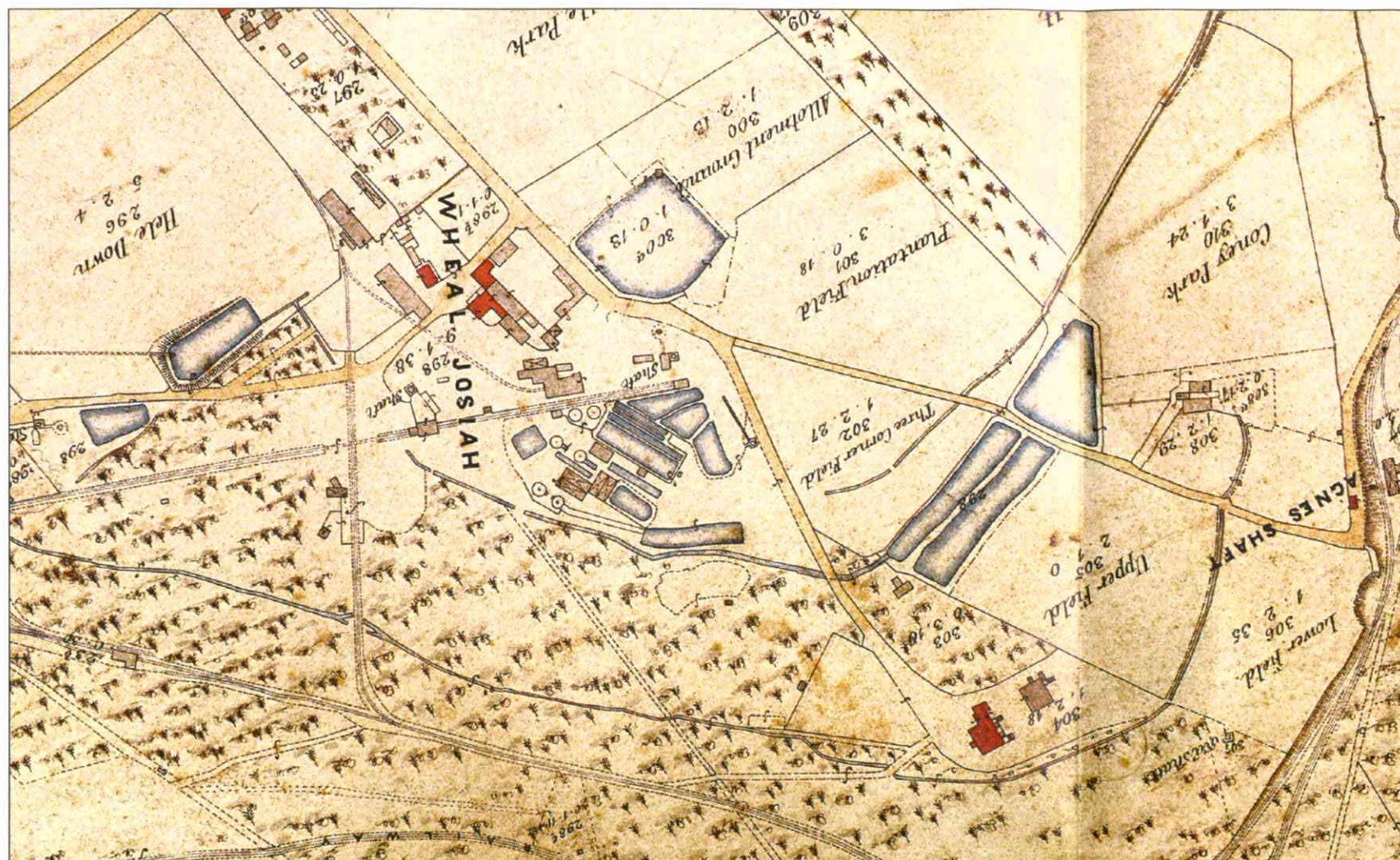
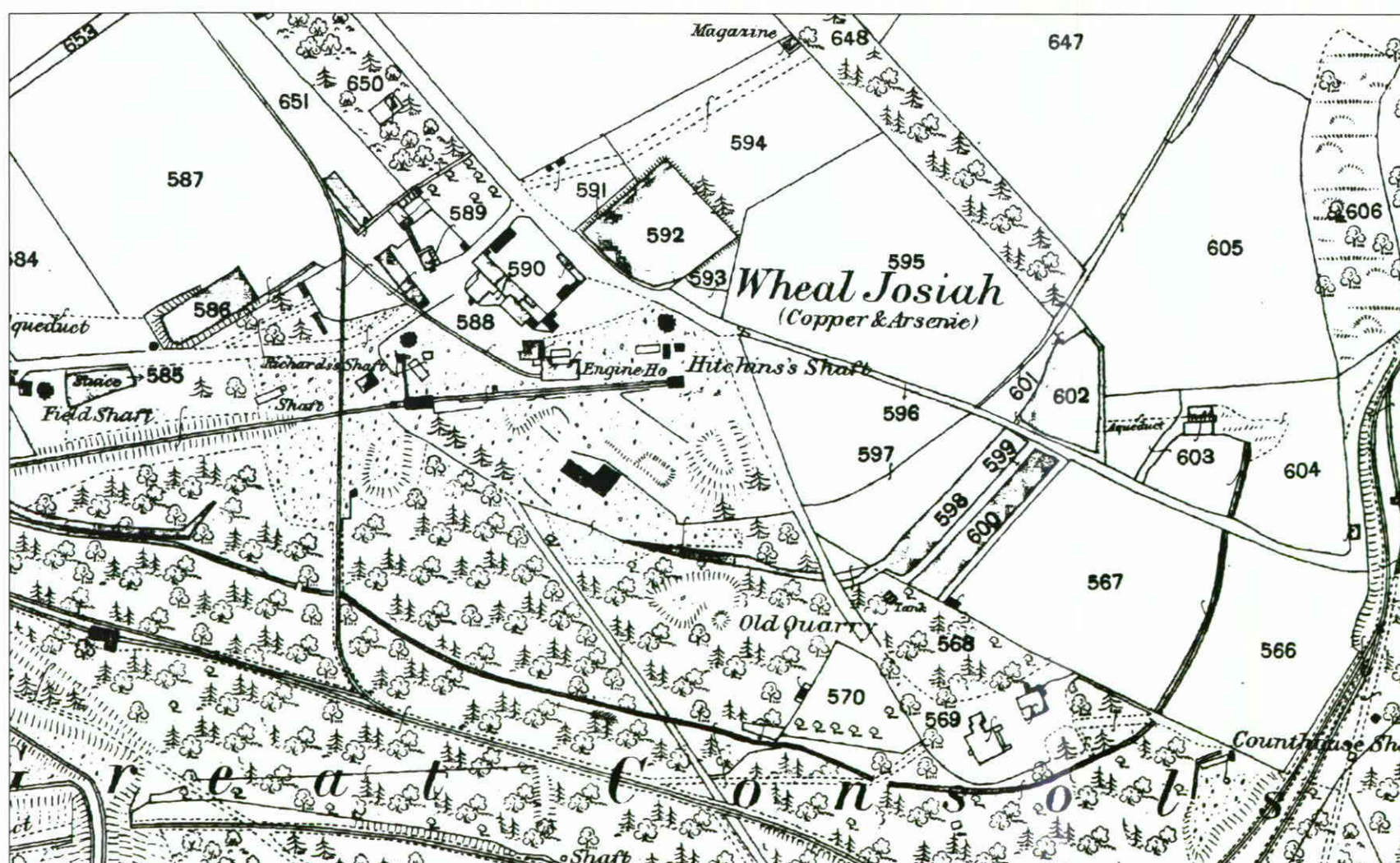


Figure 21 *Wheal Josiah as shown on the surface plan 'Tavistock Parish (Div. No.1)' 1867*

(Tavistock Parish (Div. No. 1) - DRO/T1258M/E11 - 3 chains - 1 inch)

0 25 50 75 Metres



Wheal Josiah as shown on the Ordnance Survey plan 1884

(OS 1884 - © Crown copyright and Landmark Information Group. CCC licence No. LA076538.)

0 25 50 75 Metres

Survey

The building is in relatively good condition. It has three walls varying from 1.5 to 2.0m in height. The entrance to the building is in the south-east corner. There is a protective (blast) wall encircling the building that measures 1.0m high with an access gap of 1.0m. A length of 1.5m on the west side of the hedge has partially collapsed. The interior of the magazine was subdivided with remnants of a partition visible. At a height of 0.65m above ground level is the remnant of a horizontal piece of timber set in the wall, measuring 0.04m in thickness around the walls (except the southern side). At a height of 1.1m above the strip there is another timber strip that has become compressed with the weight of masonry movement above as the timber rotted. Both timbers possibly were the fixing points for timber shelves, upon which the powder fuses were kept, or alternatively, the whole of the interior of the magazine was boarded with the boards being nailed to the horizontal timbers. Health and Safety Inspectors regulated construction and operation of these buildings.

The wall on the southern side originally contained a doorway and window, but the supporting lintel went long ago, causing most of the wall to collapse. There is a small collapse at the northern end of the west wall that appears to be the result of stone robbing.

Recommendations

The building should be consolidated following English Heritage guidelines for historic building conservation. However, public access to this site may be problematic as the field may be under cultivation in the future.

Site 229 Reservoir pond SX 43142 73718 (centered)

Background

This feature is shown on the 1857 Lease map (Fig 7) and all later maps. This was the largest pond at Wheal Josiah and may well have also supplied water to refill other reservoirs further to the west for both Wheal Anna Maria (mainly dressing floors) and Wheal Fanny. The site occupies the highest ground at Wheal Josiah.

Survey

This pond is in a good state of preservation and still contains water (to an unknown depth). The water surface is approximately 4.0m below ground level. There are trees growing along the steep sides of the pond. There has been some fly-tipping at the north-east corner of the site.

Recommendations

To preserve the near vertical (earth) sides of the pond, trees growing around the edges should be cut down.

Site 230 Site of buildings around courtyard SX 43077 73695 230/1 Devon Great Consols School SX 43059 73687

Background

This complex of buildings around a central courtyard (accessed at its northern corner by a pierced gate), must have housed Wheal Josiah's smithy, carpenter's shop etc (the mine's Count House and office admin was at Hawkmoor House to the south). The 1848 map (Fig 4) shows these buildings and yard, and they are shown in greater detail on both the 1867

and 1884 maps (Fig 21). Shading of the former map indicates that two of the buildings were inhabited – the western building seems to have been the mine school.

230/1: The 1864 newspaper account of the mine states: *'There is a school well fitted up at the mine, with an efficient schoolmistress paid by the company; and the children of the employees attend at small charges'*. The standard historical text for this mine (Goodridge 1964, 240) when describing the school states: *'Those who were not old enough to work on the dressing floors were taken to the school built on the mine. This had been set up in 1862 A small fee was paid by each of the 60 children who attended'*. An 1868 report by Gilson Martin (the Bedford Estates manager) stated: *'I believe this is chiefly intended for children too small to walk to the Galworthy School – during this year there has been an average attendance of 45, 17 of whom were agent's children and 28 mining labourers'*. Although there is no map labelling on either the 1867 or 1884 maps, the OS 1904 map labels the school.

Survey

There is no obvious evidence for any of these buildings at surface level. There are some piles of rubble but there are no recognisable patterns to their distribution. The site is now occupied by a mixed woodland copse.

Recommendations

None, although the site itself should not be disturbed as there may well be sub-surface evidence for the buildings and yard.

Site 231 House, outbuildings and yard SX 43035 73713 (centered)

Background

This small complex of buildings from the 1867 map, appears to consist of a house or cottage, some outbuildings and a yard. The house may have been accommodation for the manager of the Saw Mill.

Survey

The house is occupied. The householder owns the land to the west of the house (including Richard's Shaft). The smaller outhouse buildings to the north have been converted for domestic use.

Recommendations

None.

Site 232 Site of Saw Mill SX 42995 73730 (centered)

232/1 Site of Timber store? SX 43020 73693 (centered)

Background

'I should also observe that the ground mostly so soft and the lode so large, being sometimes as wide as 40ft ... that great quantities of timber were consumed for timbering the mine... (Timber imports for ... 1847 totalled £7,628)' Bennett (1992, 19 – quoting a Mining journal article of 1850). Hall 2000, 111 quoting a similar 1860 survey states: *'The Devon Consols Company being, to a great extent, their own merchants, importing most materials themselves directly (regular shiploads of timber were purchased from America and the Baltic) ... the timber – red and yellow pine and Norway – is really splendid, such, in fact, as cannot be had from ordinary merchant's stocks... The annual consumption of timber is about 2,500 loads... The*

timber is brought up by the railway (delivered to Morwellham by large rafts floated up the River Tamar) in regular timber trucks into the timber yards and to the saw mill. The latter consists of one circular and eighteen perpendicular saws, worked by the 32ft x 4ft water wheel'.

The saw mill was not shown on the 1857 map, but was on the 1867 and later maps. Presumably it was built in the late 1850's, after the railway link had been built (Site 150/2). The water wheel may be the feature shown on the 1867 map on the western side of the building (or alternatively may have been inside it). The second building in this site (232/1) may be a large timber store. It is aligned with the saw mill building and has a plan suited to the storage of large quantities and sizes of timber.

Survey

There are no standing remnants of either of these buildings, but the platform for the possible saw mill site can be seen in the side of the gently sloping hill. This site is now occupied by woodland: the southern building has an open setting.

Recommendations

With the exception of the waterwheel pit, there are not likely to be sub-surface remains of these buildings (which probably had timber walls). It is recommended that the sites of these buildings are not disturbed.

Site 233 Hitchins Engine Shaft SX 43154 73659

Grade A

Background

This shaft is shown on all of the maps (including the 1848 map) and was one of the earliest on Wheal Josiah. The 1857 map shows the route of the flat rod cutting from the 'Josiah' water wheel to Richards Shaft (described in Site 237 below). By 1860 the Josiah water wheel was pumping both of the Wheal Josiah shafts. Flat rods from Richards Shaft at the 144 level were connected to pumps in Hitchins' Shaft to pump water from the 170fm. level up to the 144fm. level and from there to an adit. The 1867 map shows the location of a building on the west side of the shaft, whilst the OS 1884 map also shows the site of the capstan (described in 1860 as being steam powered) on the northern side of the shaft. This shaft also was a principal winding shaft, powered by the nearby whim engine (See Fig 10 - a reproduction of a longitudinal section of main lode, showing the amount of stoping that has taken place).

The 1850 survey (reproduced in Bennett 1992, 19) makes the following observations with respect to Hitchins' Shaft. '*... the new water wheel (1849) which also drains the two shafts at Wheal Josiah....It drains Richards', Hitchins and Anna Maria's Shafts...*'. See the background history for Wh. Anna Maria Engine Shaft given above (Site 141).

The later 1860 survey (reproduced in Hall 2000, 101), states: '*Hitchin's Engine Shaft is down to the 170 - 50fms. perpendicular, and below on the line of the lode. At this shaft the water is lifted from the 170 to the 144 by two 7in. drawing lifts, worked by the same big wheel (as that pumping Richard's Shaft)*'.

Survey

The shaft is visible as a circular depression in the ground with a depth of 1.5m. Fly-tipping and large pieces of tree have been thrown into the shaft obscuring any features on its sides. The shaft opening measures approximately 5.0m from north to south and 7.0m from east to west. Approximately 6.0m to the north of the shaft is a shallow depression that

measures 0.5m deep and 3.0m in diameter, which appears to be the capstan shown on the 1867 and 1884 maps.

Recommendations

This shaft is approximately 10m from the nearby road access to Hawkmoor House. Its subsidence and its recent re-filling may suggest that the shaft blockage is moving and that further collapse may occur. It is advisable to ascertain the nature and extent of the shaft chokage by probe drilling and, if necessary, to fence it at an appropriate distance from its edges.

Site 234 Site of Hitchins engine/boiler house SX 43093 73653

Background

'At Wheal Josiah, also, in addition to the machinery, expensive buildings, workshop premises and surface arrangements generally, a most perfect and powerful steam engine was erected' (Bennett 1992, 19 quoting an 1850 survey of the mine). This winding engine house was described in 1860: *'At Josiah, one of Sim's combined (30 and 16-in) which is reported by Mr. Wm. Matthews to have done splendid work since erected, and giving no trouble whatever'* (Hall 2000, 107). The 1864 Western Morning News account of the mine describes this engine as being of 54 horse power. The 1867 map shows the engine and boiler house. Its siting was virtually equidistant between Richard's and Hitchins' Shafts (See the Longitudinal Section of Main Lode showing some sketch surface detail – Fig 10), and the power of the engine suggest that it may well have wound from both shafts. It is likely, given the importance of these shafts and the amount of stoping that occurred in this area (particularly along South Lode which is displaced from Main Lode at Wheal Josiah), that the later Man-engine (installed in approximately 1864), was also powered by this engine house. Although the precise shaft is not certain, Richards appears to be the likely candidate.

Survey

There is no evidence of the location of this engine house. As with all of the engine houses on the site, they have been reduced to ground level. However, some below ground masonry appears to have survived. At SX 43082 73664 there is a corner return of a section of masonry wall that measures 2.0m long, 0.75m high and 0.75m thick. A small localised ground collapse has occurred against the outside of the wall.

Recommendations

The small area of collapse may warrant further investigation.

Site 235 Localised surface collapse SX 43070 73653

Background

There is no map evidence for the cause of this small collapse.

Survey

A small open hole has opened up in part of an area characterised by spoil heaps on the northern side of the railway line from Hitchin's Shaft to Wheal Anna Maria. The opening measures 1.0m wide and deep, 0.75m long and is orientated north-west/south-east. The northern corner is deeper and is undercut below spoil material. This small collapse may well be spoil material that has not been compacted sufficiently.

Recommendations

Refer to recommendations made to Site 234 above.

Site 236 Site of Leat SX 43420 73823 to SX 43089 73621

Background

This leat is shown on the 1867 and 1884 maps. The 1884 map shows the leat continuing further to the west than that shown on the earlier map.

Survey

There is no evidence of the leat in the fields named 'Plantation Field' and 'Three Corner Field' on the 1867 map. Evidence of the leat continuing through Wheal Josiah dressing floor was also difficult to find, although it was plainly shown on the OS 1884 map (Fig 21), possibly leading to a reservoir pond (Site 241/3).

Recommendations

None.

Site 237 Wheal Josiah (Richards's Shaft) flat rod cutting

SX 43025 73655 to SX 43439 73067

237/1: Flat rod bridge SX 43170 73451

237/2: Flat rod bridge SX 43324 73226

Background

This site relates to the earthwork cutting only, within which the flat rod and its timber supports were sited. The dating of the feature would be contemporary with the construction of the water wheel in approximately 1849 (Site 318). *'the new water wheel (1849) ... is connected ... by means of very strong flat rods working upon rollers on the top of very substantial (timber) supports'* (Bennett 1992, 19). The 1857 map (Fig 7) shows the flat rod route from the water wheel to Richard's Shaft and the connecting rod to Field Shaft. However, *'The demand for power outran the capacity of this wheel, and a second similar wheel was constructed in the 1850's in order to cope with the development of Wheal Josiah'* (Goodridge 1964, 232). This second wheel utilised the same flat rod cutting but only powered Richards's and Hitchin's Shafts, as they had deepened considerably and were pumping from South Lode, which was being developed. Ore was brought to surface via these shafts.

Survey

Generally, the flat rod cuttings are in relatively good condition, though, they are overgrown with trees and low-lying vegetation. The entire route from the water wheel site to the shaft has not been surveyed, although accessible sections have been walked. Depending on site topography, stone facing (of variable height and width) has been built to retain high banks either side of the flat rod bed.

The flat rod cutting at SX 43075 73585 ends at this location (as the ground topography matches the slope of the flat rod). The route, as it cuts through the woodland, can be seen from the top of the hill to excellent effect. The flat rod measures 1.5m wide at ground level (3.5m across the top of the cutting) and 1.0m deep.

237/1: A small masonry round arched footbridge has been built over the flat rod cutting (at the NGR given) where a track leads from Hawkmoor House westwards to the railway line from Anna Maria to Agnes Shaft. The bridge is in a relatively good condition. The flat rod opening measures 1.4m wide and 1.5m high. The sides of the bridge measure 2.0m high. It has parapet walls (0.85m high above track level), both of which have collapsed.

237/2: At the NGR given (west of the Blanchdown ochre 'tanks'), there is a flat rod bridge. The flat rod bed is set in a gully that measures 1.6m deep below ground level (with a 0.7m high stone retaining wall), and is 2.6m wide. The gully leading to the south side and the opening of the track bridge are very overgrown, but access was possible, and it could be seen that the flat rod tunnel was blocked. The stonework facing is in relatively good condition. The parapet wall measures 0.5m above ground level on its western side, whilst the eastern side has collapsed into the flat rod gully. The flat rod opening (on its south side), measures approximately 1.2m high and 1.6m in width. There is no evidence of the north facing side of the tunnel, although earth and vegetation may well cover it.

Recommendations

See general management recommendations made for Site 159, with regard to the earthwork cutting. Sites 237/1 and 237/2 are both in need of consolidation and repair to their parapet walls, as well as general repointing. A measured survey of both sites will be necessary prior to repair works being carried out. The County Archaeologist should be consulted and an archaeological watching brief should be included in design works.

Site 238 Leat SX 43247 73553 to SX 42973 73689 (Site 146).

Background

This leat connects the reservoir above Hawkmoor House with the ponds at Wheal Josiah, and appear to have also fed the 'upper' dressing floors at Anna Maria. The leat is quite wide and seems to have been an important centralised feed to these reservoirs. The 1857 map labels the route 'Forcing pumps' (from Plunger Shaft – Site 320) and shows the outlet location (Site 244) near the start of the leat and the reservoir ponds (Site 245). It is likely that water from the River Tamar fed directly into the leat, or into the reservoir and then into the leat. The 1867 map (Fig 21), shows the leat in detail. Its route seems to have gone underneath the flat rod cutting and then underneath the railway embankment (Site 150/1), before it reappeared to the south-east of a pond.

Survey

At SX 42972 73687 there is a small section of this leat east of the foundry reservoir pond (Site 146) and adjacent to the private boundary fence of a house near the Wheal Josiah administrative buildings. The leat ditch is extant and measures 0.4m deep and 0.3m across its base for a length of 5.0m on the northern side of the track.

At SX 43109 73575 the leat measures 0.75m wide across its base and is cut into the ground to a depth of 0.5m with earth banked up on the south (or lower) side. The leat is in a relatively good condition, although in places it has been filled with branches.

At SX 43229 73549 the leat goes under the road access to Hawkmoor House. A small stone arched and lined leat tunnel here measures 0.5m wide. Its depth cannot be seen as the leat tunnel has been filled with branches and leaves, but the crown of the arch is 1.1m below the parapet wall of the small bridge.

Recommendations

Refer to general recommendations regarding long-term management of leats.

Site 239 Wheal Josiah dressing floor buddles SX 43092 73592

239/1 Buddles SX 43103 73613

239/2 Buddles SX 43106 73634

Background

There appears to be little documentary evidence for this dressing floor complex. It is shown in detail on the 1867 map (as circles with dots in their centre), but only as vague earthworks on the later OS 1884 map (see Fig 21). Presumably the ore from the adjacent two shafts, needed prior dressing before being transported to Anna Maria for crushing and dressing. There does not appear to be a copper crusher in the vicinity, although the dressing floor buildings (see Site 242 below), may have housed the jiggers.

An alternative explanation is that this is a tin dressing floor. By this date, attempts had been made to deepen Richards Shaft, hopefully to encounter a tin lode (as at Dolcoath) running under the copper lode. This dressing floor may have been constructed in anticipation of finding tin under Main and South Copper Lodes in the mid 1860's. Unfortunately there appears to be no documentary mention of tin stamps, although presumably these could have been powered by the whim engine.

Survey

A pair of buddles is shown on a platform on the 1867 map at the NGR given, immediately north of the leat described above. There is a stone retaining wall that measures 0.75m high for a length that can be determined from the relevant maps (Fig 21). The buddles are set on a platform of made up ground; their sides are hidden by leaf mould.

239/1: These buddles (near the railway line) are not visible although the platform on which they sat can be seen (4.0m from east to west and 6.0m from north to south). A spoil dump is located on the northern side of this feature measuring 0.75m high, 2.0m from north to south and 3.0m from east to west. It is likely that they are extant but under a large amount of leaf mould/mulch and vegetation that has accumulated on the ground under the dense tree canopy.

239/2: These buddles are also covered in leaf mould and years of vegetation growth. The platforms upon which the buddles were built can be seen; shallow excavation might reveal buried features.

Recommendations

Clearance of leaf mould and surface vegetation may reveal the buddles. If there is to be access to this dressing floor, limited consolidation of the buddles would preserve and present them.

Given the close proximity of all of these features to each other, it is recommended that earth/large machinery movement is not allowed within the entire dressing floor site. If this is not possible (due to woodland maintenance/clearance), it is recommended that the County Archaeologist be consulted to advise on a suitable access or mitigation strategy.

Site 240 Wheal Josiah dressing floor reservoir pond (upper)

SX 43145 73633

240/1 Reservoir pond SX 43162 73627

240/2 Reservoir pond SX 43176 73605

Background

Refer to general background comments made in Site 239 above. The dressing floor reservoirs have been divided into upper and lower sections. The upper sections appear to have provided a head of water to fill the lower ponds.

Survey

The first two triangular ponds are quite shallow but in a good condition and clearly visible at ground level. The banks measure only 0.3m high and 0.5m wide across their tops.

Reservoir 240/2 is much deeper (2.0 to 2.5m) and larger in plan. A large amount of spoil (presumably waste from Hitchen's Shaft), has been formed, to create a pond whose outlet is at the same level as the nearby 'upper' ponds. The south and west sides of the pond are approximately 6.0m above ground level. The banks are quite wide (up to 1.5m across their tops). At the northern end of the western side, there has been a collapse of these, revealing the character of the spoil from which then was created. A leat shown to the east of this pond on the 1867 map does not survive (see Fig 21).

Recommendations

Refer to general recommendations made in Site 239 above. Trees growing in the ponds should be removed, both to reduce tree root damage and reveal the sites.

Site 241 Wheal Josiah dressing floor reservoir ponds (lower)

SX 43144 73600

241/1 Reservoir pond SX 43130 73584

241/2 Reservoir pond SX 43077 73624

241/3 Reservoir pond SX 43175 73568

Background

Refer to general background comments made in Site 239 above. The long thin reservoirs appear to have been settling ponds worked with the adjacent buddles (and perhaps square frames), to produce ore from the waste material. See the 1867 map (Fig 21).

Survey

241/1: This site consists of three long thin reservoirs and a rectangular larger reservoir. The three long ponds have been reformed into a larger shallow pond to the west and a slightly deeper pond to the east (0.5m deep). The larger pond to the south is both deeper and wider than its neighbours and is in a good condition. The earth bank covering hides a stone wall (approximately 1.25m high externally). The south walls are 1.0m wide and 0.8m high internally.

241/2: This pond is rounded at its north and south ends (internally) with a relatively wide surrounding bank. The internal south bank measures 0.7m high and has an exterior bank that measures approximately 1.25 to 1.5m high for three-quarters of its length. The interior

and remainder of the banks are in a good condition, although trees are growing within the pond.

241/3: This square shaped pond is in a relatively good condition although it is sited in dense bushes and woodland. The southern bank measures 1.0m above ground level and is 0.5m wide. The east side of the pond's bank is not visible, although most of its other banks can be seen.

241/4: The reservoir platform has been cut into the hillside to the north, creating a steep earth bank, which has collapsed in places. There are two sections of the south wall; the first to the west measures 2.5m long and 0.5m high; there is another smaller section 1.25m long and 0.3m high. Internally the pond has a flat surface, mirroring the plan shown on the 1867 map.

Recommendations

See general recommendations made in Site 239 above. Some of the ponds' exterior walls are more collapsed in places. These need to be repaired to retain the structural integrity of the features.

Site 242 Site of Wheal Josiah dressing floor mine buildings SX 43115 73594

Background

These three buildings are shown in detail on the 1867 map. If this was a copper dressing floor these may have been jigger or spalling houses. Alternatively the buildings may have contained square frames to separate tin from waste products.

Survey

There is no surface evidence for any of these structures (which presumably were of timber). The platforms upon which they were sited survive.

Recommendations

Refer to general recommendations made in Site 239 above.

Site 243 Quarry SX 43165 73536

Background

This quarry is shown on the 1867 and later maps (Figs 9 and 11). Presumably it provided stone to build Hawkmoor House and stables (now separately occupied). Pond walls and other masonry features may also have utilised this source of stone.

Survey

The quarry has not been used for some time. It has steep sides to the west, north and south and is very overgrown. Some fly tipping has been dumped in its interior. There is access into the quarry from the eastern side. The assessment was carried out from the leat that runs along the quarry's northern (upper) side (Site 238).

Recommendations

If public access is allowed to this area, it may be prudent to fence off the steep northern side of the quarry. Dense vegetation around the other sides prevents easy access.

Site 244 Pheasant/fowl hanging structure SX 43255 73539

Background

This feature is shown on the 1867 and 1884 maps (labelled 'Tank' by the OS). According to the owner of nearby Hawkmoor House, the building was constructed to provide a structure for pheasant, grouse and fowl to be hung to tenderise the meat.

Survey

Three quarters of the structure's height is built underground, with its west and east walls open above ground level (presumably to provide ventilation). Set in the interior of the roof and sides of the wall are numerous rusty iron hooks and straps. The walls are brick lined and arched, with the lower internal section of wall is lined with cement render to a height of 1.5m. The structure measures 1.0m high from ground level to the lower edge of the brick arch, 1.7m in width, approximately 5.0m long and 1.32m deep from ground level to its floor. The floor appears to be of earth; brambles and weeds grow on the flat roof. On the northern side of the feature (as shown on the archive maps) there is a square-shaped, low stone-lined platform. This measures 3.25m from north to south and 2.0m wide. It is overgrown with brambles. The low wall measures 0.45m high and has tiles set onto its top surface. This may have been a platform upon which the pheasants or grouse were prepared

Recommendations

The occupant of the nearby house (previously the mine captain's house for Wheal Josiah), is likely to own this feature. If it is owned by the Duke of Bradford, the feature should be consolidated and the brambles removed to allow restoration of the tiles.

Site 245 Reservoir pond SX 43286 73585 (centered)

245/1 Reservoir pond SX 43302 73576 (centered)

Background

This pair of rhomboidal ponds are shown on the 1857 Lease Map (Fig 7) and later maps. They may have been filled by the adjacent reservoir to the east (Site 246), or perhaps by the 'Forcing Pumps' shown on the 1857 map (water pumped up from the River Tamar, via Plunger Shaft). Water from the northern pond fed a leat (Site 238) that took water to other ponds in Wheal Josiah and possibly down to Wheal Anna Maria and Wheal Fanny.

Survey

The northern pond (centered SX 43290 73587) is extant, with banks 0.75m high; its interior is overgrown with dense vegetation. The lower bank of the upper reservoir is shared with the upper bank of the lower reservoir (centered SX 43303 73577). The south bank of this reservoir pond measures 0.5m high.

Recommendations

Trees and vegetation should be cut down from the interior and sides of the pond to create lines of sight appropriate to the extent of the feature.

Site 246 Reservoir pond SX 43342 73639 (centered)

Background

This triangular shaped reservoir pond is shown on the 1857 Lease and later maps. It seems to have been filled by a spring supply to the north-east of this site, the leat continuing north of these ponds to the Wheal Josiah dressing floor area (Site 236). The pond may well also have fed the long pair of ponds sited to its west, but its main function appears to have been as a water source for the Agnes Shaft water wheel powered whim engine.

Survey

This pond is in a good state of repair. It has a dry-stone wall along its south-western and south-eastern sides that measures 2.0m high at its highest point. Internally the banked walls are 1.0m above ground level and 0.75m wide. Trees grow along these banks. The south-western wall next to the track measures from 0.6 to 1.6m high. The south-eastern wall measures from 1.0 to 2.4m high.

Recommendations

Refer to recommendations made in Site 245 above.

Site 247 Site of Wheelpit SX 43403 73625

Background

Hall (2000, 107) quoting an 1860 survey, states: '*Drawing-wheel at Agnes Shaft, 32 ft. by 4 ft., wrought-iron shaft*'. This site is near the edge of the Wheal Josiah Sett (which ends at Agnes' Shaft). This feature is shown on the 1857 map but not the 1848 map. Presumably Agnes 'old' Shaft was cut in the late 1840's (following Main Lode eastwards-see Figs 6 and 8) and the water wheel wound ore up the shaft) to which it is clearly aligned. It is likely that when Agnes 'new' shaft was cut a few years later, the same mechanism was used. This site is out of the project area.

Survey

A linear broken area of ground measuring 1.0m wide may follow the aqueduct route from the reservoir above (Site 246) down to the waterwheel. All that remains is a mound of grassed earth surmounted by trees. It measures 1.0m above ground level on its north side and 1.8m on its south side. The wheelpit has been infilled and the site of the buildings (or winding drums) shown on either side of the wheelpit have left no trace.

Recommendations

It is likely that the site is privately owned and it is unlikely that the field will be accessible to the general public.

Site 248 Site of House/office SX 43476 73569

Background

This building is shown on the 1867 and 1884 maps. It is shaded red, suggesting the building was habitable. East of the small building are steps that lead down to track level from the site of the building (overlooking Agnes Shaft and the valley).

Survey

A mine track from the three reservoirs described above led down to this building and then down to track level before going around the head of the valley and up to Wheal Emma. There is a pile of rubble measuring 1.2m high and 7.0m long at the site shown on the map.

Recommendations

None.

Site 249 Agnes's Shaft ponds (centered)

249/1 Pond SX 43539 73657

249/2 Pond SX 43552 73592

249/3 Pond SX 43561 73542

249/4 Pond SX 43564 73524

Background

These ponds are not shown on the 1857 map but are shown in detail on the 1867 map (Fig 22). The earliest ponds appear to have been created from the northern end of the valley, and to have been used as settling ponds for mine water that drains from Wheal Emma mine. Clean water from springs north of the site was culverted beneath the ponds.

Survey

249/1: The reservoir pond (if this was ever one), was formed by the creation of an embankment across the head of the valley at the height and gradient needed for the railway line. On its south side the 1867 map shows a raised route that by 1848 was created (possibly pre-dating these ponds) to site the Rubbystown Leat (Site 106) that took water from the east side of the valley (as shown on the later OS 1884 map) around Blanchdown Wood to Wheal Fanny. A small pond is shown on the 1867 map, but there appeared to be no other visible features here during the site survey. The pond is deeper at its centre as shown on the archive maps.

249/2: Wheal Emma adits (Site numbers 252 to 256 and 257) drain into this pond and into a culvert. The area is flat and overgrown with trees, gorse and other vegetation. The main area where the adits feed into the site is not overgrown but the remainder of the surface to the south has a covering of vegetation that masks the slimes material. The 1867 map shows a triangular shaped pond. There is a low-lying bank (0.15m high) marking the eastern side of this pond, this has a rounded profile.

249/3: This 'settling' pond consists of large white/light grey and orangey clayey silty dumps. Water has eroded the surface material forming deep gulleys (which themselves form sections into the different deposited layers). There is a change of slope between this and the fourth pond, which has been gulleyed to a depth of 3.0m in depth. There is little vegetation on this southern part of the pond.

249/4: This, the lowest pond has partly vegetated with a greyish covering of mosses and gorse. The southern edge of this feature is a high vertical dry-stone wall that goes across the valley (at the bottom of which the stream emerges from a stone lined tunnel). The dry stone retaining wall measures approximately 4.8m high (at its highest point). The stream opening is stone arched and measures 0.9m wide and high.

Recommendations

Given the lack of vegetation on the third and fourth ponds it is assumed that the ground is high in metal concentrates and copper salts. The other ponds now have a covering of vegetation making them safer. It is recommended that the sites that have not vegetated are left alone to naturally vegetate through time.

Site 250 Track drain portal SX 43559 73680

Background

This feature may be relatively late in date and functions as a drain portal to remove water from the railway cutting to the east. The site is located above the mine track that having crossed the railway a little further back from this point, turns sharply to the south running inside and to the west of the railway.

Survey

The portal drain opening is stone faced and measures 0.2m wide and 0.48m high. The stone face measures 4.0m wide and 1.2m high. Water has issued from this in the past.

Recommendations

None, it seems to be operating normally.

Site 251 Adit portal SX 43569 73660

Background

This appears to have been one of the shallow northern adits of Wheal Emma.

Survey

The portal is not visible but water has issued from the area below the trackway embankment. The area of visible collapse measures 2.0m x 2.0m and has started to undercut the steep slope by 0.5m.

Recommendations

Members of the public will be walking along the railway and possibly the mine track. It may be prudent to investigate the cause of the collapse and for a geotechnical engineer to put forward a specification to restrict further erosion and perhaps formalise the opening.

Site 252 Adit Shaft SX 43590 73640

Grade C*

Background

It is common practice to site air shafts near adit portals or where adits turn or meet shallow soft ground. This shallow adit is on Main Lode at Wheal Emma.

Survey

The shaft is open to a depth of approximately 3.5m, before it is visibly choked. The opening measures 2.5m in diameter and is fenced (to a height of 0.7m) with wooden posts and a single rail with three strands of barbed wire.

Upslope of the shaft (presumably following the course of the adit), there are frequent collapses of the ground to varying depths. Some of these are 0.5m deep, some of them

1.0m deep over an area of 0.7m. The adit roof appears to have collapsed for a distance of approximately 10m and over a width of 0.45m.

Recommendations

The shaft and the route of the adit roof collapse should be fenced at an appropriate distance from the opening and the collapses.

Site 253 Shaft/water culvert SX 43537 73626

Background

The 1867 map shows a single adit outflow from the eastern side of the valley flowing to the west. Two other adits from Agnes Shaft also appear to flow to the east - all meeting at a central point. This site appears to be the point where the water disappears.

Survey

Approximately 6.0m north of the railway embankment (that has been built up across the head of the valley and stream), there appears to be a vertical sump 'shaft' measuring approximately 0.75m in diameter. Fast running clear water appears at this location out of a stone lined water culvert and then disappears into a stone lined 'shaft/vertical tunnel'. The shaft measures 1.0m in width and is 1.75m long with a vertical stone wall on its southern side. The water comes out of the northern end of a masonry wall and a tunnel to the west of the shaft. The opening measures 0.5m wide and 0.7m high. Above the water outflow, is a retaining wall measuring 1.25m high and 2.5m long. The water outflow is partially blocked by fallen branches. An ineffective wooden post and five-strand barbed wire fence surrounds both of these features.

Recommendations

The vertical feature does not appear to be a shaft, rather an opening into a tunnel to take water through the reservoirs to Site 284 (SX 43567 73508). It is recommended that the blockages to the water route are cleared and the site is fenced at an appropriate distance from the vertical opening.

Site 254 Adit portal SX 43553 73633

Background

There are a number of adits in this small area of the site. This adit may be that shown on the 1867 map next to a small pool of water (Fig 22), and may possibly be the shallow adit outflow from Main Lode (See Site 252 above or alternatively Site 255 below).

Survey

Water issues from a small opening which has a stone arch measuring 0.5m wide and 0.4m high. Leaves and silt have blocked up the lower half of the opening, and there may have been a collapse further back in the tunnel.

Recommendations

Clearance of the blockage to the adit outflow would appear to be warranted. A geotechnical engineer should survey the portal opening to ensure its long-term stability.

Site 255 Possible adit lobby/cutting SX 43569 73628

Background

The 1867 map shows a single adit outflow from the eastern side of the valley flowing to the west. This may be the outflow for the adit shaft described above (Site 252).

Survey

There is a cutting in the side of the hillslope at the same approximate location as that described above. This is 7.0m south of the adit (Site 254). The cutting (possible adit lobby), is 2.0m deep, 2.5m wide (at the top of the cutting) and is 2.0m wide at ground level. It may be that the adit portal has collapsed or that there is another portal higher up the valley on the same lode line as this cutting.

Recommendations

The desktop mining survey and later risk assessment report by Sherrell did not locate this feature. It is recommended that an evaluation of this site is carried out to ascertain if this site includes a major (collapsed) adit portal.

Site 256 Dressing floor SX 43530 73627

Background

Agnes Shaft was used to raise ore from Main Lode. The ore appears to have been taken by railway (See the 1857 map) to the Anna Maria 'upper' dressing floors (Site 140). This feature resembles a small processing floor that may have been used to break up the ore to smaller pieces, or to separate the larger pieces of waste rock from the higher-grade ore.

Survey

This feature (5.5m south-west of Site 253) consists of a rectangular flat working area (4.0m wide and 5.5m long), founded on a dry stone rubble wall. The latter measures 0.15m high and 0.4m wide along its southern and western lengths.

Recommendations

None. There should be no disturbance to this site.

Site 257 Adit portal SX 43515 73587

Background

This feature is located north-east of Agnes Shaft. It may have been used as a shallow adit from (or footway access to) the shaft, or alternatively another part of Main Lode. One of the reasons for the number of adits that outflow into the upper part of this valley is that Main Lode crosses this area and the ground level is relatively low (see Fig 10 - Section of Main Lode).

Survey

The adit is open (1.0m deep), and has timber lined lintels and vertical timber supports (adit setts) still extant within the feature (at intervals of 0.8m). It is 0.45m wide across the top of the opening but only 0.2m deep at this point, due to earth and rubble build up.

Recommendations

Given the amount of earth/rubble build up obscuring most of the adit, and the good condition of the outer supporting timber, apart from the use of timber preservative, there seems to be no other relevant recommendations. A fence does not appear to be necessary.

Site 258 Agnes's (new) Shaft, balance/angle bob box, and capstan SX 43508 73585 Grade A*

Background

Refer to the background section of Site 260 below (Agnes 'old' shaft). *'Agnes' new shaft is perpendicular to the 115, and below down 3 fms. under the 170, on the course of the lode now sinking. This shaft is drained by 10-in. pitwork, worked by Agnes' big wheel'* (Hall, 2000, 101). Dines (1956, 658) describes the shaft as, *'down to the 184 fm. level'*.

When comparing the two shafts, the later shaft is deeper and sited in better ground. It was also a better site to be served by flat rods from the large water wheel sited next to the River Tamar (Site 322/1).

Survey

A lime mortared masonry wall is located north-east of the shaft. This measures 1.25m high and is approximately 6.0m long with a return at its south end for a distance of 1.0m. This is either the east wall of a building or a retaining wall, although the link to the capstan (sited over 10.0m away would have been on the same alignment. Alternatively, this may have been the masonry support for a skipway that came out of the shaft.

Agnes Shaft is choked at a depth of 1.0m below ground level, and measures 4.0m across from north to south and 4.5m from east to west. There is no shaft marker nor is it fenced. Ground overhangs the shaft by 0.5m and a length of 2.0, on its western side.

South-west of the shaft is a rectangular feature that has been interpreted as a balance (or angle) bob box. This is the direction the timber flat rods came up from the flat rod water wheel and connected to the pump rods via the kingpin over the top of the balance bob. The box (constructed of granite stone) measures 3.0m long, 0.5m deep (on the downslope side but is 0.3m above ground level on its upslope west side) and is 1.8m wide. The front of this feature is located 3.5m from the edge of the shaft. Some iron pivot mounting bolts (0.3m in height) are still *in-situ*.

Between the balance bob box and the shaft is the balance bob mounting, built on a plinth and measuring 0.6m high over a length of 3.5m on its south face; the slot between the walls has been infilled.

The capstan shown on the 1867 and OS 1884 maps are still visible at ground level. It has a circular bank encircling most of its inner flat area (4.0m in diameter), which measures 0.5m high and wide (although the southern and eastern sides have been damaged). The site is overgrown with trees and is located at SX 43515 73616.

Recommendations

This shaft has interesting features that can easily be seen from the railway line. The overhang over the western side of the shaft will need to be stabilised and the shaft fenced. The other masonry features could be consolidated and the overgrowth and vegetation removed.

Site 259 Site of mine buildings SX 43500 73585 (centered)

Background

These buildings can be seen on both the 1867 and 1884 maps (see Fig 22), although more buildings were shown on the earlier map. Their function presumably was related to either storing, dressing or moving the ore from the shaft to railway wagons to be taken up to Anna Maria dressing floors for further dressing.

Survey

There is no evidence for these buildings at surface.

Recommendations

The ground upon which these buildings were sited should not be disturbed, as there may be intact below ground masonry.

Site 260 Agnes's (old) Shaft SX 43513 73631 Grade A 260/1 Mine building SX 43517 73637

Background

'At Agnes' old shaft the ground was so bad that it could not be sunk, and the new shaft of the same name had to be commenced' (Hall 2000, 105 – quoting an 1860 survey of the mine). *'Agnes' old shaft is down to the 115, on the course of the lode all the way'* (op cit, 101).

This shaft was probably sunk in the late 1840's as Main Lode was followed eastwards (although it is not shown on Symons 1848 map). It was probably out of use by 1851 as a pumping shaft, although it may continue to have been used as a footway shaft.

Survey

A granite post, sited within a 0.3m deep depression marks the shaft. The shaft diameter is 2.0m x 2.0m and is located within a large spoil mound that has a steep eastern side down to the lower ground level where the reservoir ponds were formed. There is no sign of a capstan either on site or on archive maps, although a small building appears to be shown next to the shaft on the 1867 map.

260/1: At the bottom of the steep slope (immediately east of the shaft's eastern edge-approximately 5.0m below shaft level), is the single walled remnant of a mine building. This measures 0.45m wide, 1.5m high over a length of 3.0m, and is oriented east - west. There are no other visible remains or clues as to its function.

Recommendations

The shaft should be fenced. If the public are permitted access to the site of the mine building, it should be consolidated.

Site 261 Small Quarry SX 43486 73538

Background

A small quarry or cutting is shown on the 1867 map, although it is not labelled as such on the later 1884 OS map.

Survey

This measures approximately 7.0m wide (north - south) and is approximately 15.0m long. The rear wall measures approximately 4.0m high and in places appears to be rather unstable. There are many trees growing out of the sides of the quarry that also adds to its general instability.

Recommendations

The quarry should be made safer by removing some of the trees growing on its sides.

Site 262 Mine building SX 43487 73481

Background

The OS 1884 map shows a small square building at this location. Its function is uncertain although its siting next to the flat rod may give a clue. Site 284 is a masonry tower that appears to have supported flat rods (via swinging arms) as they traversed the valley from a junction near this site with the flat rods to Agnes Shaft running eastwards to Railway Shaft (Site 273). This mechanism may have extended from the same junction with the main flat rods westwards to Counthouse Shaft. This building therefore may be related to a flat rod intersection with smaller flat rods to pump one or two other shafts.

Survey

The building has been reduced to ground level, but the eastern facing hillside is so steep that walling remains on this and the north and south sides. The building measures 3.0m wide and 2.75m long. It has three timbers (0.2m x 0.15m) set in the wall at a height of 0.6m above ground level running along the building underneath a longer timber and two other shorter timbers set in the east and west walls. This face of the building measures 2.0m high with the gable wall running north-south. It is likely that the timber sections provided a little flexibility and as lintels onto which tighten up mounting bolts for the flat rod junction.

Recommendations

The feature can be seen from the flat rod cutting (and main railway line), which will be an access route through the mine. It merits consolidation and repair to the stonework and timber replacement or treatment where necessary.

Site 263 Counthouse Shaft and building SX 43418 73463 Grade B

Background

New South Lode (the fourth lode worked by Wheal Josiah), appears to be shown on Symons 1848 map (Fig 4), and passes through this and Railway Shaft to the east. It '*has been opened up from Counthouse Shaft ...sunk on the underlie (20° S.) to the 160 fm. level below surface. The lode, coursing E. 120 N., has been fairly well developed between Adit Level (60 fms.) and the 160-fm. for 40 fms. E. and 50 fms. W. of the shaft*' (Dines 1956, 659). This shaft is not shown on the 1857 Lease Map but is shown in detail on the 1867 maps (labelled as 'Old Engine Shaft' on Fig 22). Documentary evidence (Goodridge 1964, 238) suggests this lode was cut in 1864. This site is on private land (held by the owner of Hawkmoor House).

Survey

The shaft is located at the eastern end of a linear depression. There is a granite marker post in the choked shaft depression which measures 0.4m below ground level and is 3.0m in

diameter at ground level and 6.0m across the top of a bank that goes partially around the shaft (at a height of 1.0m above ground level).

Recommendations

It is unlikely that members of the public will be permitted access to this shaft. It is recommended that the owner securely fence the shaft.

Site 264 Spoil finger dumps, tramway and building SX 43400 73434

Background

A building is shown on the 1884 map to the south-west of the shaft. This may be on the route of a skip road from the shaft. The 1884 map shows a spoil heap to the south of the shaft up to the adjacent hedge boundary.

Survey

The field remains consist of part of a wall on the northern side of this feature. This measures 1.9m high, 3.0m long and 0.42m wide. Evidence for the southern side of the walling is in the form of a linear pile of rubble. There is a flat area of ground to the south-west of the shaft that may be the site of the capstan, but this is not shown on any archive maps.

There is a large spoil mound fanning out between the shaft and the earlier railway line from Anna Maria to Agnes Shaft. Along its western edge there are two finger dumps (0.5m high and 0.25m wide across their tops). In between are the remnants of either a deeply set tramway or a partially collapsed leat tunnel.

There is a small rectangular building located at SX 43415 73464 (south of the long building). It measures approximately 4.0m x 3.0m. The inside is full of rubble and there is a tree growing out of its interior.

Recommendations

The linear collapse between the finger dumps should be investigated if people are to access this site.

Site 265 Agnes' Shaft flat rod cutting

SX 43318 72874 to SX 43506 73585

Background

This site relates to the earthwork cutting only, within which the flat rod and its timber supports were sited. The dating of the feature would be contemporary with the construction of the water wheel (in approximately 1851 - Site 322/1). *The two next important wheels, also worked by Tamar water, are lower down the river, they are called Agnes' wheel and ...works 10-in poles in Agnes' Shaft. by a line of 9-in. square wooden flat-rods.* The 1857 map (Fig 7) shows the flat rod route from the water wheel to Agnes's Shaft.

Survey

Generally, the flat rod trenches are in a relatively good condition. However, they are overgrown with trees and low vegetation. The entire route from the water wheel site to the shaft has been walked and typically measures 3.0m wide.

At the top of the route of the flat rod trench (at SX 43461 73438, south of Agnes Shaft), a deep cutting has been made into the side of the hill to achieve the correct gradient for the flat rods. This measures 3.0m deep. Sections of retaining wall (maximum 1.0m high) were noted for lengths of up to 4.0m and at lower heights for up to lengths of 15.0m.

Recommendations

Refer to general management recommendations made for Site 159, with regard to the cutting.

Site 266 Small Quarry SX 43414 73398

Background

A small quarry or cutting is shown on the 1884 map (Fig 9), although it is not labelled as such.

Survey

This measures approximately 6.0m wide (north-south) and approximately 20.0m long. The rear wall measures approximately 3.0m high and in places appears to be rather unstable and has been undercut. There are many trees growing out of the sides of the quarry that also adds to its general instability.

Recommendations

The quarry should be made safer by removing some of the trees growing on its steep sides.

Site 267 Large Quarry and site of building SX 43370 73367

Background

A large square-shaped quarry is shown on both the 1867 and 1884 maps. It is presumably contemporary with the construction of the railway (1857-1858), and perhaps provided stone for this purpose. The 1884 OS map (Fig 9), appears to show a building at the western end of the feature, whilst the 1904 map shows two large buildings at its eastern side. The earlier building may have been a stonemason's shed, but the function of the later buildings are unknown.

Survey

The quarry measures approximately 10.0m wide (north-south) and approximately 35.0m long. The rear wall measures approximately 7.0m high, appears to be relatively unstable and has been undercut. The top edge of the near vertical rear wall is only 1.0m from the edge of the railway line but is bounded by a 0.5m high and 0.7m thick bank. The eastern face of the side of the quarry has collapsed and fallen into its centre. There is no evidence inside the quarry for the siting of a previous building. There are many trees growing out of its sides which also add to its general instability.

Recommendations

Some of the trees growing on its sides should be removed and a loose rock scaling undertaken. A fence or higher bank may need to be formed around the top edge of the quarry next to the railway line.

Site 268 Costean/Lode back pits SX 43290 73368 to SX 43290 73299

Background

Symons 1848 lodes map (Fig 4), shows a north - south lode (or Caunter lode) extending from Blanchdown through Wheal Josiah (east of Hitchins Engine Shaft). Path Shaft (Site 270) appears to be cut on this lode to the north of this location.

Survey

Lode back pits and costean trenches can be seen from the railway track downslope. The ground is steep and all the dumps are downslope of the pits, which measure approximately 3.0 to 4.0m long (from east to west) and 3.0m wide (north to south).

Recommendations

It is unlikely that members of the public will walk down these steep slopes in dense conifer plantations. The access route (a railway line), may well be fenced on either side. No other recommendations are made for this site.

Site 269 Track to Hawkmoor House

SX 43144 73451 to SX 43272 73468

Background

A track from Hawkmoor House leading to the railway from Anna Maria to Agnes Shaft is shown on the 1857 lease map and later maps. Given the direct link to the railway and the straight and wide line of the track, this may have been a short tramway branch to the house – perhaps in use during its construction. Not only was a small bridge (Site 237/1) built over the flat-rod cutting to Richard's Shaft, but also a leat (Site 162) goes under this track. However as Hawkmoor was the Count House for Wheal Josiah, a footpath link to the railway was probably imperative. *'..it was built as the company's new office and administration centre in 1864. A notice in the Tavistock Gazette in May speaks of the 'new Count House'. It had a large dining room in which public occasions such as concerts could be held. It had also at its eastern end on the upper storey a 'setting box or stand', ... from which the miners were invited to bid for their pitches .. by the captain. The 1927 lease states 'DGC Accounting House' now converted to a dwelling house' (pers comm. J. Goodridge).*

Survey

The track measures approximately 2.5m wide and goes directly up to the house at a constant gradient.

Recommendations

None.

Site 270 Path Shaft, horsewhim/capstan SX 43289 73430 Grade A 270/1 Working/preparation area SX 43289 73427

Background

This small shaft does not appear to be mentioned in any mining or historical texts. It is not shown on either the 1867 or 1884 maps but is labelled 'Old Shaft' on the 1904 OS map. It is sited on the same north-south lode identified by Symons on his 1848 map (see Site 268

above), and lies on the junction with New South Lode. This shaft is sited in private land held by the owner of Hawkmoor House.

Survey

The shaft is rectangular and has a 0.6m high masonry wall surrounding its opening (0.4m thick). The shaft measures 2.4m x 3.0m internally. The shaft is full of discarded bottles to an unknown depth. The inside of the shaft is visible to a depth of 1.5m from the top of the wall on its north face.

At a distance of 5.0m to the north of the shaft there is a depression in the ground measuring 2.0m in diameter and 0.5m deep, with a tree growing from its side. This may be the site of the capstan.

270/1: South of the shaft (approximately 4.0m away) is an east - west faced platform with a dry stone wall base measuring 0.5m high, extending for a length of 4.0m and curving round to meet up with the south side of the shaft wall. This may well have been a preparation area, used before the ore was loaded onto the tramway trucks (see Site 271 below).

Recommendations

For added safety the shaft wall could be raised to 1.2m above ground level, but discussions should be carried out with the landowner.

Site 271 Tramway SX 43282 73427 to SX 43237 73415)

Background

This short section of tramway is not shown on the 1904 OS map, but it connects Path Shaft to the railway line. Presumably ore raised from this shaft was trammed down to the railway to be taken to the main dressing floors.

Survey

Approximately 10.0m south-west of the shaft there is a track that has been cut into the ground to a depth of 0.5m. This goes down the side of the hill to meet the railway at the NGR given.

Recommendations

None.

Site 272 Agnes Shaft working/dressing area SX 43599 73524 272/1 Small stone lined opening SX 43595 73549

Background

These sites are not shown on archive maps. The first may have functioned as a preliminary ore-processing site, but the function of the second is unknown.

Survey

A rectangular platform has been set into the side of the hill. A dry stone retaining wall has been built on the east side of the feature, which measures 0.5m high. Downslope, the platform has been built up on a 0.6m high platform with an outer wall. The site is filled with decaying vegetation and small trees.

272/1: This is a small, square, stone-sided vertical opening measuring 1.2m wide and 2.0m long. Stonework is set on the sides of the feature to a height of 0.3m. Inside the feature there is a hole in its north-east corner that measures 0.9m deep. Internally the sides of the feature widen as it gets closer to the surface. This does not appear to be a shaft.

Recommendations

The first feature does not merit any consolidation works whilst the second may need to be fenced.

Site 273 Railway Shaft and capstan SX 43676 73530 Grade B

Background

This shaft is not shown on the 1857 map, but is on all subsequent maps. Dines (1956, 659) states: *'New South Lode has been worked from Railway Shaft ...and from New Shaft ...Both are sunk on the underlie, the former to the 260-fm. Level below surface and the latter to the 205-fm. The lode courses about E. 10° N., underlies 20° S. and has been developed by levels which connect the two shafts down to the 190-fm. ...but the 160-fm. Level extends westward to join Couthouse Shaft in Wheal Josiah section...Stoping occurs in a roughly circular area between the 60-fm. and 190-fm. levels, extending to its maximum for 40 fms. W. of Railway Shaft and 70 fms. E. of New Shaft, about half the area being removed'*.

This shaft (like Richard's Shaft) was deepened during the mine's desperate search for tin under its copper. By 1879 Railway Shaft was 220 fms. below surface level, but four years later was deepened to 260 fms and drives were made east and west, but to no avail. The winding engine house to the south-east (Site 280) wound the ore up the shaft, whilst it appears that flat rods (supported on high trestles across the Rubbytoun valley-Site 284), pumped the shaft. Refer to the 1867 shafts/lodes map (Fig 22).

Survey

A granite post stone marks the shaft site. The shaft is not well defined, the site being a combination of loose rubble and mine waste dumps. A rubble-constructed protective hedge may have enclosed a general area of approximately 8.0m, but this has collapsed in some places. Sections that remain measure 0.75m wide and length of 5.0m on the south side. Whilst on the north side the hedge measures approximately 0.9m high for a length of 7.0m.

The capstan was located to the north of the shaft as shown on the OS 1884 map (Figs 9 and 22). It appears to have been sited on a circular spoil mound measuring 0.75 to 1.0m above ground level and 4.0m in diameter.

Recommendations

This shaft is located between the incline railway to Wheal Emma and the main railway line. It is likely to be accessible to members of the public, and it is recommended that the shaft is fenced.

Site 274 Railway Shaft waste dump SX 43622 73551 (centered)

Background

The large spoil heap, tramway line and timber bridge (over the main railway line) can be seen in detail on the OS 1884 map (see Fig 22). These works were in use in 1867, but are

not shown on the 1867 map. Although Railway Shaft raised ore from Main Lode in its formative years, it was used to search for deeper tin lodes beneath the depleted copper lode and much waste material was generated. A tramline from the south side of the shaft ran over the railway line and onto a spoil between the railway line and the reservoir ponds.

Survey

The waste rock finger dump measures 4.0m high above ground level on its eastern side (near the mine track), but the western side of the heap is very high (as the valley topography steeply slopes down to stream level), approximately 12.0m above ground level. The top of the finger dump is flat and the location of the tramline can be seen (See the 1884 OS map).

Recommendations

None.

Site 275 Mine track and plinth feature SX 43647 73550

Background

This mine track is shown in detail on the 1867 map and links up Wheal Josiah with Wheal Emma. It probably did not exist before Wheal Emma started in 1850 (See Fig 4a, the 1843 Tithe map).

Survey

The mine track is quite wide and comes up the hill from the head of the embankment at a gentle gradient, before it goes over the bridge, and further to the south to meet the railway track. The gentleness of the track gradient and width of the track suggests that this section may have been an earlier railway route.

At a location of approximately 10.0m south of the bridge (and 6.0m from the junction of the track with the railway) the track has a 0.75m high revetment wall on both sides. At the NGR there is a masonry return of a feature set above the revetment wall. The stone wall is visible for a length of 1.3m from east to west and from north to south for approximately 0.4m, measuring 0.5m high. The function of this masonry wall is unknown.

Recommendations

None – the feature is stable.

Site 276 Masonry abutment for timber tramway bridge

SX 43658 73532

276/1 Waste heap tramway SX 43610 73565 to SX 43662 73531

Background

Refer to Site 274 above.

Survey

This site is a masonry remnant of the timber tramway bridge that spanned the main railway line. It is located on the east side of the main railway track cutting revetment wall. It measures 1.2m high at the south end, 0.75m at the north end and is 2.8m wide. Some rubble from this feature lies on the trackbed floor adjacent to the wall.

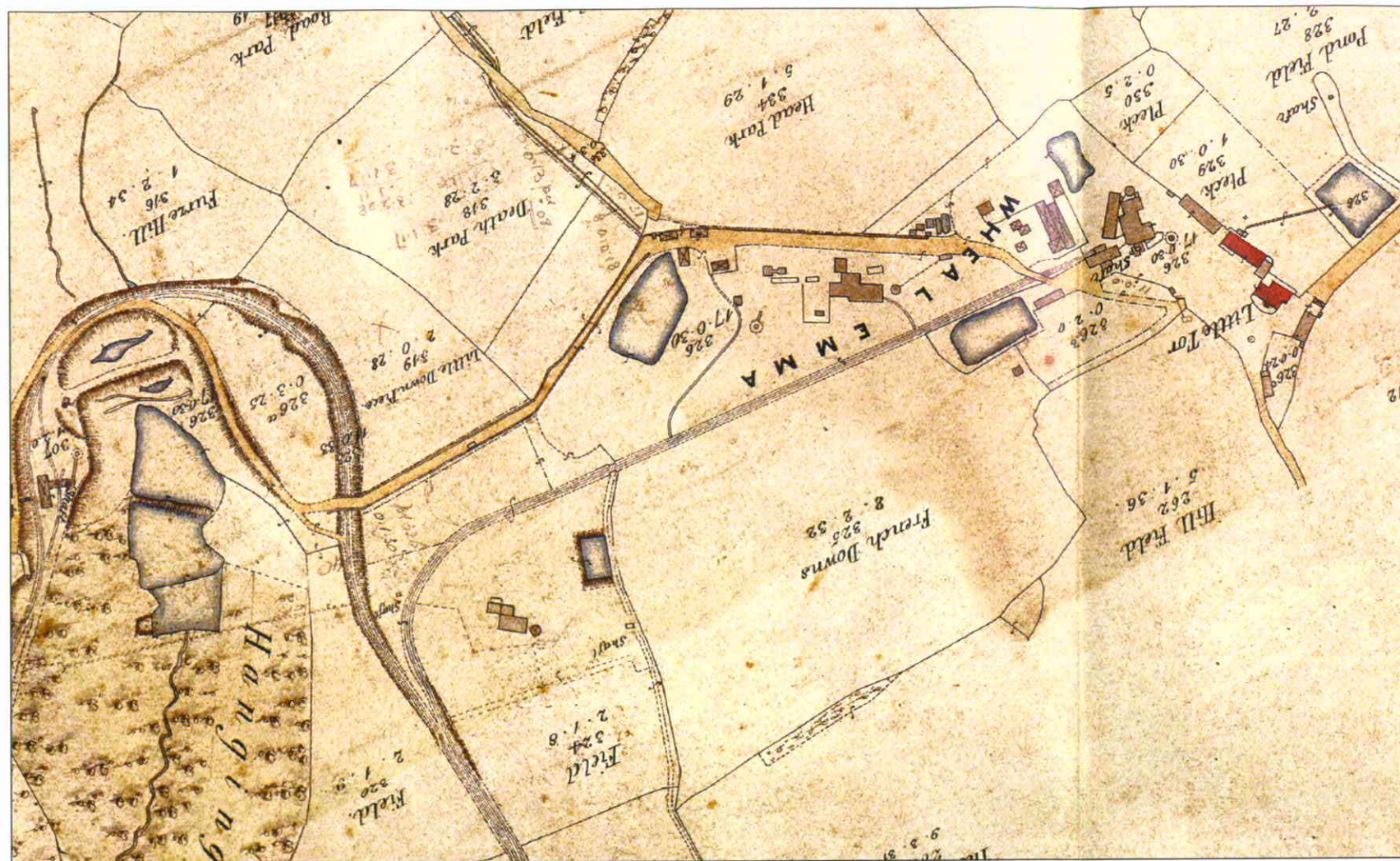
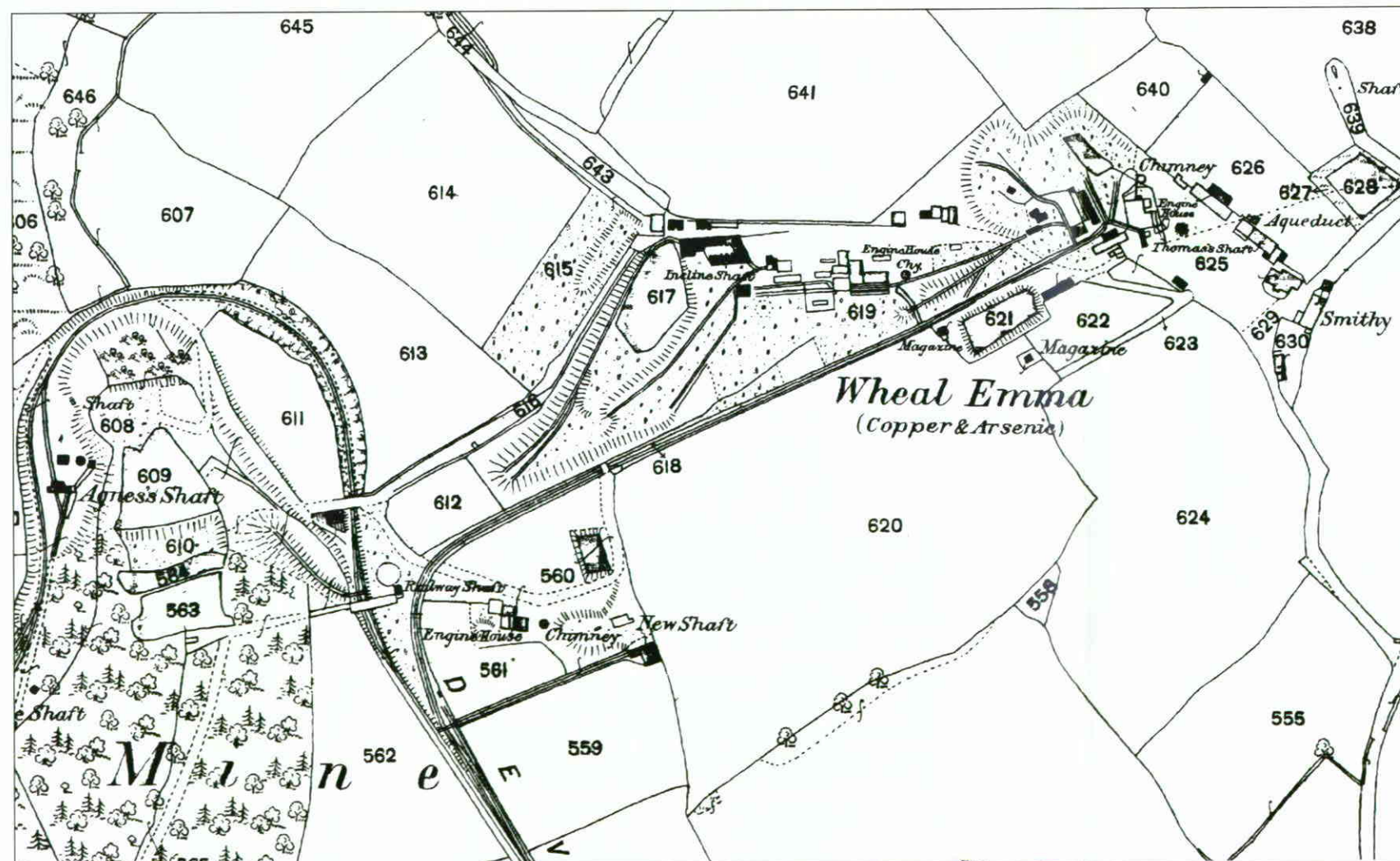


Figure 22 *Wheal Emma as shown on the surface plan 'Tavistock Parish (Div. No.1)' 1867*

(Tavistock Parish (Div. No. 1) - DRO/T1258ME11 - 3 chains - 1 inch)



Wheal Emma as shown on the Ordnance Survey plan 1884

(OS 1884 - © Crown copyright and Landmark Information Group. CCC licence No. LA076538.)

Recommendations

There is a need for urgent, though limited consolidation of this feature before any more collapses onto the railway track bed.

Site 277 New Shaft raised trackbed

SX 43705 73463 to SX 43794 73499

Background

A tram or railway link was built between the south side of New Shaft and the main railway line. Ore that was raised from the shaft was immediately tipped into trucks and taken by railway to Anna Maria for dressing. The 1884 map appears to show a building at the higher (east) end of the track bed. This may well have been a small steam engine powered winder to let down full trucks and wind them up when empty.

Survey

The track bed is slightly raised from field level to a height of 0.3 to 0.5m and 2.5m wide. The track consists of earth and stone, although a 5.0m length of this bed (at its western end) has been removed.

Recommendations

None, the land is privately owned.

Site 278 New Shaft, balance bob box and capstan SX 43791 73516

Grade B

Background

Refer to the section comments made for Railway Shaft (Site 273). The presence of the nearby winding engine house suggests that it may have wound from both this and Railway Shaft. However the presence of a balance bob box suggests that the shaft was also pumped (by flat rod) from the same engine house.

Survey

The shaft is choked, has a granite marker post and measures 3.0m x 2.0m and 0.9m in depth. On the western side of the shaft a stone collar can be seen to a depth in plan of 0.75m. The shaft is located at the eastern end of a long depression that measures approximately 10.0m in length. A balance bob box appears to have been sited at the western end of the depression with the balance bob slot measuring 0.55m in width. The balance box may well have been located in a depression behind a tree that is growing out of its centre. The depression measures 1.0m deep, 2.0m wide and has a length of 3.0m. The centre of the depression is 5.0m from the western side of the shaft.

The capstan appears to have been sited on the south side of the shaft. The centre of its depression is 6.0m from the centre of the shaft and 0.5m below ground level (the hollow extending over an area measuring 3.0m x 3.0m).

Recommendations

The land is privately owned and is not likely to be publicly accessible, although this shaft should be fenced.

Site 279 Shaft spoil mound SX 43773 73509 (centered)
279/1 Boiler house chimney SX 43751 73514

Background

The 1884 map shows a spoil mound to the west of the shaft up to the edge of the chimney, and retained by a low wall on its southern and western sides.

Survey

The lower sections of the spoil mound are retained by a 0.75 to 1.2m high wall (with facing stones set on edge). There are four finger dumps along the western side of the top of the spoil heap. These measure 0.5m high and 1.0m wide across their tops. The top of the heap measures approximately 4.0m high to the west. The western edge of the spoil tip is banked up against (and partially covers) the chimney, whose top is at the same height as the top of the retaining wall.

279/1: The chimney has a maximum height of 1.0m, with little remaining on the north side.

Recommendations

None. It is assumed there will be no public access to this area. The lower wall and spoil heap is in relatively good condition.

Site 280 New Shaft Engine and boiler house SX 43735 73518

Background

New South Lode was first cut in 1864. It is likely that this engine house and the two shafts it worked were both cut during this period. All of these features are shown on the 1867 map (Fig 22). The location of the engine house (nearly equidistant between the two shafts), gives a clue that both were wound by what must have been a rotative engine house. The presence of the balance bob box at New Shaft suggests that flat rods from the engine house pumped the shaft. However the much deeper Railway Shaft could not be pumped in a similar manner and needed to have either a separate pumping mechanism (e.g. from the larger Agnes Shaft wheel flat rods), or flat rods from this engine. The size of the steam cylinder is not known (although one may have been moved from another part of the mine).

Documentary evidence suggests that compressed air rock drills were used during the latter stages of deepening Railway Shaft (1883 to 1886) to speed up its sinking. It is likely that a small stationary steam engine linked to a compressed air tank was sited next to the engine house (utilising steam from the boiler house).

Survey

The basic layout (shown on the 1867 and 1884 maps) consists of a boiler house, engine house and loadings. The boiler house gable end east wall (near the chimney), surviving to a height of 0.15m above ground level, with other collapsed sections of higher masonry visible close by. The southern side of the wall is a pile of rubble (1.0m wide and 0.15m high). The south side of the engine house is visible for a maximum height of 2.5m and a length of approximately 4.8m. The north side of the engine house is not visible but the condenser housing is visible in front of the bob wall. Ten upright iron bolts can be seen along the condenser wall, which is 2.0m long and 1.8m wide.

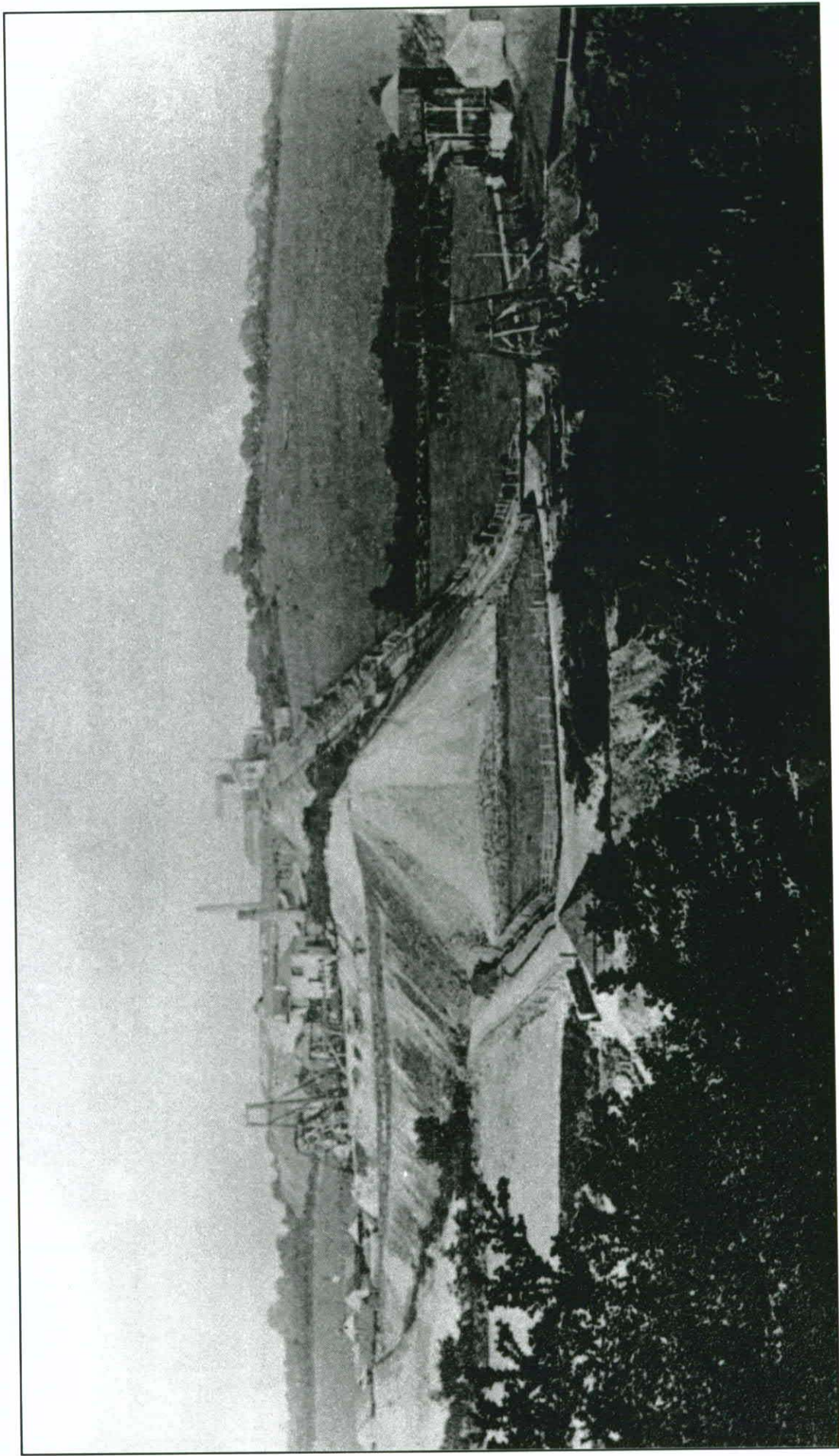


Figure 23 Wheel Emma c 1890
(RIC VMdgc 002)

The crankpit is not visible on the loadings although the front section of the flywheel slots can be seen. The winding drum appears to have been sited between two large sections of granite (1.6m wide), that appear originally to have been used at another site. The southern section of granite loadings measures 0.95m wide, 0.54m deep and 2.9m long and is sited on a stone wall (the west end of which is 1.0m above ground level). A 0.3m wide ledge runs along the northern side of the southern loading (i.e. inside the winding drum slot), for the full length of the loadings. The northern granite loading is higher (by 0.75m), than its counterpart, measuring 2.7m high, 0.5m wide and 3.6m long. The northern side of this loading is not very stable, as stone has been removed underneath the large granite capping stones. Holes (for hold - down bolts) are visible along the upper edge of the loadings as are the bolt tightening access openings at ground level.

Recommendations

This building is one of only two engine houses at Devon Great Consols that have above surviving remains (the other is Incline Shaft engine house, also at Wheal Emma). Consolidation and repointing is necessary to the sides of the loadings and the south side of the engine house. It is doubtful if the public will be able to access the engine house (as it is a small area within the centre of a field), although the building will be able to be seen from the main railway line or incline railway.

Site 281 Site of Reservoir pond SX 43775 73550 (centered)

Background

The (condensing) pond is shown on the 1867 and 1884 maps. It appears to have provided water to the nearby boiler house.

Survey

There is no evidence of this feature at ground level.

Recommendations

None. There should be no disturbance to this area.

Site 282 Leat SX 43618 73485 to SX 43597 73354

Background

This leat is not shown on any archive maps accessed during the preparation of this report.

Survey

The leat is located between a track (not shown on the 1867 map) running near the bottom of the valley and a field boundary west of the main railway line. The upslope side of the leat varies in height from 0.3m to 0.5m high and the downslope bank only 0.1m high. At this NGR given the width of the leat is 0.5m. Neither the source nor the destination of the leat were identified.

Recommendations

Refer to general recommendations for leats made for other sites given above.

Site 283 Possible Shaft SX 43592 73509

Grade C

Background

This feature has the physical characteristics of a choked shaft, and is labelled as such on the 1954 OS third edition map. It is on exactly the same alignment as Railway Shaft, Counthouse Shaft and Path Shaft – all worked New South Lode. This feature may well be an air shaft, sited between the two most distantly separated shafts – Railway and Counthouse Shafts. However it is also on the same alignment as the flat rods from south of Agnes Shaft to Railway Shaft (see Site 284 below), the depression perhaps being a large foundation excavation for timber supports.

Survey

The depression measures 3.0m deep (from its upslope eastern side) – the downslope depth being only 0.5m deep, and 5.0m in diameter.

Recommendations

If the track is to be used by members of the public, this possible shaft may need to be fenced.

Site 284 Flat rod tower SX 43567 73508

Background

The flat rod tower is not shown on the 1867 map but can be seen on the 1884 OS map (Fig 22). However the earlier map shows a dotted line across the valley – which has been interpreted as a flat rod traversing the valley at height to pump Railway Shaft. The power source for this may have been the flat rod from the Tamar water wheel to (new) Agnes Shaft. Site 262 may have been the junction point between the flat rods. Ken Brown suggests that there is a similar masonry tower in Ireland that stabilised the flat rods at their highest point above ground level and provided support for a pair of swinging arms that transferred the motion of the flat rods from one side of the tower to the other. The tower is sited at the bottom of the valley and is at the highest point of the flat rods above ground level. In support of this hypothesis, there are mounting bolt holes through the feature to support a swinging mechanism (see photographs of the site - Figs 24 and 25).

Survey

There is a stone arched opening through the centre of the two sections of masonry (measuring 0.9m wide and 1.5m high) through which water runs. These walls are 1.0m thick with a gap of 0.65m. On the inside of the gap there are two openings on each of the two supporting masonry sections. These measure 0.3m wide, 0.45 m high and provided access to the long bolts that held down the mechanism on top of the structure. There are timber lintels across the top of these openings and for the full length of the feature (1.6m). The north-east opening has remnants of an iron sleeve within which the long mounting tensioner bolt was set.

Part way up the feature there are timber lintels measuring 2.0m long and 0.5m wide. These are aligned north-south for the full width of the feature 1.35m, bridging the two lower stone walls. Above the lintel the stonework continues as a single structure. The overall height of the feature is approximately 6.5m and the base of the south elevation is 3.5m high. The distance of the north wall of the feature from the high retaining wall of the reservoir pond (Site 249/4) is 1.95m.



Figure 24 Flat rod tower (C. Buck CAU 2002)

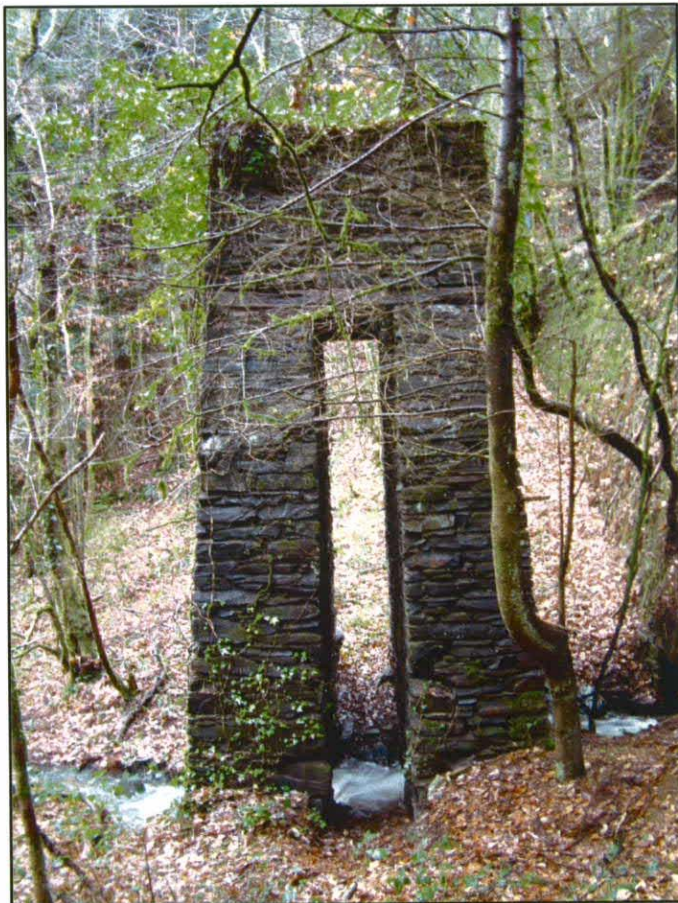


Figure 25 Flat rod tower (C. Buck CAU 2002)

Recommendations

This is possibly the only feature of its type in south-west Britain. It is important to ensure that it is preserved. In particular, the upper and lower south-western sides of the structure need to be consolidated and repointing is necessary for some other parts of this feature. The timber lintels should be treated with preservative.

Site 285 Reservoir pond SX 44174 73742 (centered)

Background

This reservoir pond appears to have played a dual role in providing water for the steam-pumping engine at Thomas's Shaft and helping to fill the other ponds at Wheal Emma (via the aqueduct shown on the 1867 and 1884 maps-Fig 22). There are unlikely to be springs at this location to fill the pond. The nearby shaft (Site 286 below), although set on the alignment of Main Lode may well have been pumped to fill the pond with mine water. This site is outside the project area.

Survey

The pond is extant and its banks are in a relatively good state of preservation. They measure 1.2m high and are 1.0m deep. There is an opening cut into its west corner that measures approximately 3.0m wide. The pond now sites conifers and other low-lying vegetation.

Recommendations

The site is on private property, but cutting down the conifers and vegetation would reveal the feature and reduce damage being caused to the earth/stone banks by tree roots.

Site 286 Shaft SX 44162 73797

Grade C

Background

This shaft is shown on the 1867 and later maps. It is sited on Main Lode, and was probably an air shaft (although it may also have been used as a water source for the nearby pond – Site 285). This site is out of the project area.

Survey

The shaft location can be seen as a slight dip in the field, now used for pasture.

Recommendations

It would be advisable to fence the shaft.

Site 287 Smithy SX 44150 73676

Background

Within five years of the discovery of copper at Gard's Shaft in the east of Devon Consols, the eastern section of Main Lode was being worked. *'At the (newly opened) Wheal Emma a counting house and also the necessary buildings for the smiths and carpenters were completed. A good road was also made from this mine to the main road of the district'* (Hall 2000, 22), quoting an 1850 survey of the mine. By June 1850, 9 tutworkmen and 3 labourers were at work. All of these buildings are shown on the 1857 Lease Map and the 1867 maps. The Count House (or possibly Wheal Emma's Captain's House as suggested by J. Goodridge –

occupied by William Woolcock from 1848), is now occupied as a farmhouse, (somewhat extended and enlarged from its original construction (refer to the 1844 Tithe Map – Fig 6). The Smithy is labelled as such on the 1884 OS map. This site is out of the project area.

Survey

This building is extant and roofed. The occupants of the farm now use the building as storage. There are two fireplaces set into the south gable wall, but in places the original windows appear to survive. The northern half of the building may have been used as a carhouse, with extant horse stalls still remaining. A hayloft with external stone steps was built over the stalls.

Recommendations

None, the building is part of Little Tor Farm and is in use as part of a working farm. This building retains many original features and is a potential candidate for Listing.

Site 288 Building SX 44132 73648

Background

This building is shown on the 1867 map as a mine (or perhaps farm) building. Its function is unknown, although it was used as part of the farm after the mine closed. This site is out of the project area.

Survey

The two-storey building is partially extant although part of the roof has recently collapsed. The east wall measures 4.0m high and the west wall has collapsed down to lintel level. Other lintels are at the point of collapse.

Recommendations

The building is part of Little Tor Farm and is in use as part of the working farm, though should, if possible be consolidated.

Site 289 Mine offices SX 44114 73721

Background

The mine offices and carpenter's shop do not appear to be on the 1857 map, but are shown in detail on the 1867 (shaded red) and the 1884 OS map. This site is out of the project area.

Survey

This building is fully extant. The north-western end of this long building is said by the owners of the farm to have been the mine offices. It is single storey and constructed of killas with a slate roof. The windows are protected by iron bars and the building has a central doorway. The walls measure 2.0m high to the roof plate. A timber veranda (shown on the 1867 map), has been constructed on the west face of the building (facing into the courtyard). There is an outside toilet on the eastern side of the building.

Recommendations

The building is part of Little Tor Farm and is in use as part of a working farm, but should, if possible, be consolidated where required.

Site 290 Carpenter's Shop SX 44123 73712

Background

See background section above.

Survey

The owners of the farm hold that the southern section of this long building was the Carpenter's Shop. A sawpit was sited in its centre (now filled in). The aqueduct from the reservoir pond is shown on the 1867 map ending outside the northern end of the eastern side of the building (see Fig 22); from here some of the water may have gone into the building to power the saw pit, or alternatively been diverted into a water tunnel that went under the courtyard. The west wall of the building is constructed of brick supporting piers, between which timber doors were built. Located at the south end of this building is a small slate lined dairy, used by the occupants of the Counthouse.

Recommendations

See recommendations section above.

Site 291 Miners' Dry SX 44096 73734

Background

A long building is shown on the 1867 map to the north of the offices and carpenter's shop. The landowners suggest that this was an extra miners' dry. The original miners' dry appears to be located on the western side of the engine and boiler house complex (shown on the 1867 map). This may have been another dry if additional miners needed to be accommodated. *'drys' are fitted up for the men, in which they can shift comfortably; provision being made for the drying of the wet clothes over flues or steam pipes. Each man also has a lock-up cupboard; and hot water is supplied to those who want it. The 'dry' at Wheal Emma gives the best accommodation...* (1864 newspaper article). If this building was a miners' dry it would have been supplied with hot water via pipes from the engine boiler. This site is out of the project area.

Survey

This building is also single storey, its walls measuring 2.0m high. It is built of stone with a slate roof. There is a doorway opening at the south end of the west wall. The floor inside of the building has been re-surfaced with concrete. There was a chimney located at the exterior face at the north end of the building. This has been reduced to a height of 2.3m above ground level and has an internal width of 0.7m.

Recommendations

The building is part of Little Tor Farm and is in use as part of a working farm, but should be consolidated where required.

Site 292 Site of Thomas's Shaft SX 44060 73717

Grade A

Background

'Incline Shaft (Site 305 to the west) is sunk to the 205-fm. Level below surface, Thomas's reaches the same depth, but, since it is on higher ground, its bottom level is the 216-fm... East of Incline Shaft ...from the 47-fm. down to the 137-fm. the ground between the two shafts is practically undeveloped, but lower the ground is more or less completely blocked out down to

the ... 216-fm .of Thomas's' (Dines 1956, 659). 'Thomas's Shaft is down perpendicular to the 64, and below that on the course of the lode to the 145, but the water is at present only kept to the 100, by the 40-inch pumping-engine...the lifts ...are 10 and 11 inches...and Thomas's Shaft commenced, which has turned out to be the only unfortunate hit made in Devon Consols, it being sunk in an entirely poor and unproductive bar of ground' (Hall 2000, 103 – quoting an 1860 survey of the mine).

This shaft was the first to be sunk on the mine, which must have occurred prior to 1850. The shaft is shown on the 1857 lease map, and in detail on the 1867 map (see Fig 22). The balance bob box and mountings were located on the east side of the shaft, as is the capstan.

Survey

The shaft site is not visible. Some cow sheds and a concrete hard standing with a subdividing concrete block wall has been built close to the southern edge of the shaft and engine house. The shaft has been over-dumped with a variety of rubbish and vegetation. There is no visible shaft marker.

Recommendations

It would be prudent to accurately locate and then secure the shaft, irrespective of the degree of public access.

Site 293 Thomas's Engine/boiler house and miner's dry SX 44058 73727

Background

'There is only one draft engine on the concern, and that is only a 40-inch cylinder ...pumping from Thomas's and the incline shafts. The engine was formerly at West Maria ...in Lamerton Parish' (Hall 2000, 107). Barton (1964, 73): 'Wheal Emma however could not be worked by this wheel and a 40-inch engine was erected there in 1850 (71 hp) for use primarily as a reserve, to be worked at times when the Tamar fell too low to work the great pumping wheel' (Agnes Wheel pumping Agnes's Shaft).

Survey

The area within which the engine house is located is densely overgrown with brambles, gorse and trees. There are also numerous mounds of masonry rubble and mine waste as well as rubbish thrown onto the site. All of the buildings have been reduced to ground level and given the general character of the site there is very little evidence for these buildings. However the large size of the engine house granite cylinder bedstones have, at least, ensured their survival (seemingly *in-situ*).

Recommendations

If the public are to be given access over Wheal Emma, there will need to be some clearance of undergrowth, trees and rubble to reveal any mine buildings.

Site 294 Wheal Emma Incline Plane railway

SX 43699 73461 to SX 44038 73716

294/1 Masonry bridge base SX 44006 73699

Background

Presumably, this was an inclined plane railway, utilising the weight of two or three empty trucks to take a full truckload of ore down to the main line. The lines from the incline were extended uphill to the east by 1884 (see Fig 22).

Survey

The incline railway bed is in a good condition and measures 4.0m wide. 294/1: The 1867 and 1884 maps show the inclined plane track going over the main mine track towards the northern boundary of the mine. Its bridge appears to have been of timber founded on a masonry base (similar to that west of Railway Shaft – Site 276). Part of the western side of the masonry base survives for a length of 8.5m and a height of 2.5m. The top two courses of stone near the ground surface have fallen away in places.

Recommendations

There does not appear to be the need for any long-term management recommendations for the track bed of the inclined railway, which would make an excellent footpath route for the public to walk along the track that leads to the main line railway (creating a circular walk), providing permissive access was approved by the landowners.

The upper courses of the masonry wall that supported the timber bridge needs to be consolidated to stop any further 'peeling off' and collapse of the vertical wall.

Site 295 Site of Incline plane steam winder SX 44046 73711

Background

The 1857 map (Fig 7) shows no surface buildings west of Thomas's Shaft, but the 1867 map shows a developed site in detail. At the top of the incline railway (near the pumping shaft) there was a building that resembles a steam winch working the incline railway. There is no detailed documentary evidence for the presence of this machine (though has an equivalent 22 inch cylinder engine at the head of Morwellham incline). It may be that only the larger engines were documented.

Survey

There is no surface evidence of a building related to the operation of the incline railway. The site is partially occupied by a mound of brambles and earth; the remainder has been cut by a track.

Recommendations

The site of this building should not be disturbed further.

Site 296 Site of mine buildings SX 44031 73728 (centered)
296/1 Site of mine building SX 44015 73688

Background

A number of mine buildings are shown to the north of the top of the incline railway on both the 1867 and 1884 maps. These may relate to preliminary dressing work to the ore brought up the two main working shafts (Thomas's and Incline) as those near Agnes Shaft (Site 259).

Survey

There is no evidence for these buildings. Most of the site has been landscaped and now covered with hundreds of plastic silage bags.

296/1: All evidence for this long mine building has gone, although the earthwork platform upon which it was sited survives.

Recommendations

The sites of these buildings should not be disturbed below ground level.

Site 297 Pond SX 43985 73672 (centered)

Background

The 1867 and 1884 maps (Fig 22) show the site of a large rectangular pond to the east of the site described above (Site 296/1). This appears to have been a condensing pond supplying water to the winding engine house boiler at Incline Shaft.

Survey

This pond is in excellent condition. Its floor measures approximately 4.0m below ground level at its deeper east end and 1.5m below ground level at its west end. There is a retaining wall built next to the incline, as the bank of the reservoir rises to a maximum height of 1.18m (at its western end). There is very little tree growth on the surface of the pond but there are some trees along its banks.

Recommendations

Refer to general recommendations concerning tree growth on archaeological features.

Site 298 Powder magazine SX 43957 73667

Background

This site is not shown on the 1867 map, although is shown on the OS 1884 map. Presumably the powder magazine described below (Site 299) was the first to be built (being shown on the 1867 map). Given the amount of development work that was undertaken underground in the latter years of the mine (including the deepening of Railway Shaft), it appears likely that a good deal of blasting powder and fuses needed to be stored necessitating the use of two powder magazines.

Survey

This magazine is in good condition and is mostly extant to roof plate level (the east wall is 2.0m above ground level). The entrance is at its north-west corner. Internally, studwork for

internal planking in the form of two horizontal timbers (at a height of 0.4m and 0.8m above ground level 0.1m deep) can be seen. A blocked up doorway (with timber inserts later added), is visible in the south-west corner of the south wall (the door opening is 0.9m wide and the wall is 0.45m thick) and is extant to its full height. The eastern outer wall is constructed of brick, but the top 0.4m of masonry has collapsed in places.

A hedge (blast barrier), has been built near the northern side of the building. This measures 0.5m across its top, 1.8m across its base and is 1.0m high. An entrance has been cut through its western side (0.8m wide).

Recommendations

The building can be accessed from the incline railway. If the public are given access to the mine via a circular walk, this feature will be readily accessible. The walls should be repointed and the tops of the walls capped. If compression of the rotting horizontal timber joints has caused structural instability, new timbers should be inserted and the sections of wall rebuilt.

Site 299 Powder magazine SX 44001 73650

Background

See background section to Site 298 above.

Survey

This building is not in as good a state of preservation Site 298. The north wall is now a pile of rubble measuring 0.6m high. The surrounding blast wall (shown on the OS 1884 map (Fig 22), survives a height of 0.5m and is 0.4m wide on its south side. The magazine measures 3.5m x 3.5m.

This magazine is not in good condition, but is extant in places to roof plate level (the east wall varies in height from 1.0m to 2.3m above ground level), with the entrance at the western end of the north wall. The doorway and window lintels have gone, with a slight collapse of the walls at these locations. The south-west corner of the building only measures 1.0m high, with openings set in the south and west walls.

Recommendations

Although this site may not be accessible to the public, it is one of the few extant surface buildings on the site and should be repointed and consolidated where necessary.

Site 300 Site of tramways SX 44020 73722 to SX 43938 73677

Background

Tramways that were used to move waste rock around the site are shown on the 1884 OS map (Fig 22). These would have been re-sited as the waste rubble piled up either side of the tramway, in time getting higher. The tramways start from a point to the west of the primary dressing floor buildings.

Survey

No clear evidence of the tramways survives. Although some of the spoil tips can be seen, some appear to have been removed, for re-processing. There is some fly-tipping debris east of the Incline Shaft engine and boiler house site.

Recommendations

None.

Site 301 Pond SX 44032 73759 (centered)

Background

The 1867 map shows the site of a pond (Fig 22), but the 1884 OS map shows a slightly smaller and more rectangular shaped pond on the same site. This may have been a dressing floor pond, supplying water to mine buildings to the south (Site 296).

The 1860 account of the mine states: '... including two new ones (ponds) now making at Wheal Emma' (Hall 2000, 111). Unfortunately which two ponds were being made cannot be identified, but it is likely that the condensing ponds were built first to supply the steam engines in the late 1840's and early 1850's.

Survey

This pond is in good condition. The banks measure 1.5m deep internally and are 1.8m wide. The outline of the earlier 1867 pond can also be seen as a low bank around the outer edge of the later pond which in places measures 1.7m below the top of the later banks.

Recommendations

Refer to recommendations above with regard to the removal of trees from the banks and interior of the pond.

Site 302 Site of small (dressing floor/settling) ponds SX 43954 73726

Background

The 1867 map shades in these small square features as ponds – probably as settling tanks. These are located downslope and west of a large spoil heap. It is possible that water from the jigger house (or an overflow from the higher reservoir pond), percolated through the spoil heap which then needed to have its impurities removed via settling tanks. Alternatively, these features may have been precipitation tanks designed to retrieve copper salts.

Survey

These sites are not evident at ground level. The adjacent spoil tip has covered over the site.

Recommendations

None.

Site 303 Incline Shaft boiler house SX 43923 73694 303/1 Chimney SX 43938 73695

Background

It is likely that the original 22" whim engine only had a single boiler, although this may have been increased to two (based on field evidence) either when the man-engine was installed approximately twenty years later or (more likely), if a steam compressor was also added to power rock drills). The 1867 map shows the building before the man-engine was added. The 1884 map shows a possible extension of the boiler house southwards and the

construction of a railway line down to the boiler house, (presumably to take ore from the shaft uphill to the dressing floors).

Survey

Field evidence for the boiler house is provided by changes in topography. There appears to be no surface evidence for walls. There are two 7.0m long depressions in the ground 1.0m wide, a banked up section of ground between measuring 0.7m high.

303/1: There is no surface evidence for the chimney stack. However, there is a 0.9m deep depression in the ground over a diameter of 1.5m at this location. The area is overgrown with brambles.

Recommendations

None. This site should not be disturbed below ground level.

Site 304 Incline Shaft Winding/Man-engine house SX 43912 73698

Background

A 22" diameter whim steam engine was installed and working by 1860 (it is not shown on the 1857 Lease map but is mentioned in the 1860 survey of the mine). *'Two man-engines had then been installed, the first one soon after 1864 at Wheal Josiah ..., followed by a second, 190 fathoms deep, at Wheal Emma some years later'* (Barton 1964, 79). From documentary evidence for Wheal Emma, this date appears to be approximately 1879. Comparison of the 1867 and 1884 maps (see Fig 22), shows additional buildings constructed at or near the engine house in the intervening period (some of which may relate to the man-engine).

Survey

The masonry of the engine house has all been removed. However a section of granite cylinder bed stone is visible and measures 0.7m wide x 1.7m long (although this may have been moved from the man-engine loading, north of this site). There are numerous large plastic baling bags over the area that probably obscure other features. The crank pit loadings have survived and appear to be fully extant. The crank pit measures 0.4m deep and 1.1m long. The upper section of the loadings are built of granite blocks that (overall) measure 1.2m wide, 3.8m long at a height of 1.4m above ground level (at the west end). The flywheel slot (on the south side), measures 1.2m wide over a length of 5.0m and has a height of 3.0m.

There are another set of granite block loadings located 1.9m to the north of the north side of the crank pit loadings. These may be related to the man-engine. Cut granite blocks measuring 0.5m thick, 1.5m long and 0.4m deep are set on a masonry plinth. At its western end this measures 2.2m above ground level. The slot in the centre of the two masonry plinths measures 0.83m wide, 5.0m long and 0.4m deep. There are three large granite blocks on the northern loading and two on its southern side (the third block may have been moved and may have been misinterpreted as a cylinder bed stone). These granite blocks appear to be re-used steam engine bedstones from another site. Four boltholes have been cut in three of the blocks, each one being triangular (0.08m in diameter). The bolt tensioner access openings are visible near ground level.

Recommendations

A structural survey of these loadings should be carried out, as it is likely that some consolidation and limited strengthening will be necessary. The County Archaeologist should be consulted if any structural intervention is thought to be necessary.

Site 305 Incline Shaft and balance bob box SX 43868 73700 Grade A 305/1 Capstan SX 43867 73678

Background

The 1860 survey of the mine stated: '*The incline shaft is down on the course of the lode to the 150, and is now sinking. ...but the water is at present only kept to the 100, by the 40-inch pumping engine, which also pumps in the incline, with a line of flat rods, raising the water from the bottom to the 47, where it goes back to Thomas's shaft- the lifts ...in the former 8 inches*' (Hall 2000, 103). from Dines (1956) given in Site 292 (Thomas's Shaft), gives the final depth as being 205 fms. This shaft had compartments for winding, pumping and a man-engine mechanism.

Survey

The shaft is choked but marked by a granite post (at the northern end of the depression). The depression within which it is sited measures 1.8m in deep, 3.5m wide from east to west and 9.0m long. There is no surface evidence for the balance bob box, which was sited on the south-east side of the shaft. Presumably this has been infilled, and survives below ground.

305/1: The capstan was located to the south-west of the shaft (see Fig 22). It is sited on a rounded plinth whose outer platform wall measures 1.0m deep and 4.0m long on its north face. The south face is rounded and measures 2.2m deep. The top of the plinth reveals an excellent example of a capstan and is shown in plan on the 1867 map. The bottle shaped structure has a narrow neck at its northern end measuring 0.75m wide and 1.75m long. The rounded section (where the capstan and central shaft were sited), measures 0.6m deep and 3.0m in diameter.

Recommendations

The sides of the shaft depression should be fenced and warning signs erected. Shaft fencing at the site of the balance bob box should be supervised by an archaeologist to ensure that the balance bob mountings are not damaged. The capstan should be cleared of vegetation and consolidated for public interpretation.

Site 306 Mine building SX 43854 73687

Background

A small mine building is shown to south-west of Incline Shaft next to some waste tramways and the end of tramways from the upper area of the site. The building's function is unknown.

Survey

There are fragmentary remains of this building. Two courses of stone at ground level measure 1.6m long and 0.3m deep on their south face. A spoil heap approximately 1.5m high and 1.2m wide obscures the east side of the building. The wall may have collapsed on its north face for a length of 8.0m, as there is a 1.0m dip along its course.

Recommendations

Visible sections of the wall need to be consolidated and repointed.

Site 307 Site of mine waste tramways

SX 43868 73699 to SX 43784 73622

307/1 Bridge SX 43846 73686

Background

West of Incline Shaft are some mine buildings (Site 310) that appear to be dressing floor buildings near a shaft that was producing ore in quantity. Linear waste tips surmounted by tram rails are shown in detail on the OS 1884 map. When compared to the 1867 map the increased area occupied by waste tips (in the intervening years) is plainly visible.

Survey

In a few places evidence of tramways can be seen by the ends of timber sleepers exposed in the sides of the eroding spoil heaps. In other areas, no evidence of surface tramways can be seen. The main waste dump to the south of the pond measures approximately 4.0m high and 2.5m wide. There are sections of dry stone revetment walling (1.0m high over lengths of 5.0 to 10.0m) along the lower edge of this waste tip near the south edge of the reservoir pond.

307/1: At a location west of the mine building (Site 306) there is evidence of a small stone built bridge. This appears to have been a waste tram rail route bridging a small leat (Site 309). The bridge is constructed of stone with an arched roof measuring 1.8m wide. This small feature is not in a good condition.

Recommendations

The bridge will not last for very long if the public, accessing this site, walk and climb over it. Consolidation and repointing will be necessary soon.

Site 308 Pond SX 43809 73683 (centered)

Background

The pond is shown on the 1867 and 1884 maps. Its function is not entirely certain although it may have been a settling tank for (contaminated) waste water coming out of the mine buildings where ore may have been roughly dressed prior to being taken by rail to the larger dressing floors at Anna Maria.

Survey

The pond is located between two long linear waste mounds of rubble. It is partly filled with water. The waste dumps sprawling into the pond have for the most part obscured the original banks of the pond.

Recommendations

None.

Site 309 Reservoir pond leat aqueduct

SX 43850 73688 to SX 43817 73626

Background

The 1867 and 1884 maps show a leat running from a point north of the pond (see site above). The water appears to have come from (or gone to) a long leat running around the upper head of the RubbyTown valley to end up at Wheal Josiah's 'lower' dressing floors. This small section of leat appears to be going towards Railway Shaft winding engine condenser pond (Site 281).

Survey

The leat appears to run along the top of a well-preserved revetment wall. Stones here have been set on edge to a height of 1.3m for a length of approximately 40.0m. According to the map evidence the leat disappears, but presumably enter tunnel under the incline railway, possibly heading for the reservoir pond.

Recommendations

None. This site should not be disturbed.

Site 310 Site of mine buildings SX 43842 73709

Background

Two rectangular shaped buildings are shown on the 1867 map at this site, but by 1884 (see Fig 22), more buildings had either been added or larger buildings had been constructed at this site. From the shading on the 1884 map they appear to have been open sided and possibly of timber construction, suggesting a dressing floor type function.

Survey

There is no evidence of these buildings at the location shown on the archive maps.

Recommendations

None, this site should not be disturbed.

Site 311 Site of pond SX 43783 73710 (centered)

Background

This site is shown on the 1884 OS map, seemingly as a small but long reservoir pond. Its profile is also shown on the 1904 and third edition OS map. Leats south of Rubbytown Farm run down to its northern end. If the small ponds at Site 310 were used to settle mine water, this pond may have combined the water before it was sent to another leat to the Agnes Shaft ponds.

Survey

This part of the site is overgrown and contains much mine waste rubble. The profile of the pond can be seen but its outline has become blurred.

Recommendations

None.

Site 312 Adit portal

SX 43502 73185 to SX 43463 73139

Background

This possible adit is not shown on any archive map referred to during the production of this report. It was not been identified during the production of Sherrell's Geotechnical report (which focussed on known and mapped sites). However, this site may have been mistaken for a leat tunnel that under the adjacent mine trackway (shown on the 1867 map). If a leat, it may be a continuation of the leat north of this site (Site 282).

Survey

At a distance of approximately 3.0m from a mine track, field evidence shows a collapsed adit (or collapsed tunnel portal – downslope south end). The depression is 1.0m deep, 3.0m wide (east-west) and the collapsed rear wall is 0.5m high. The leat (or adit lobby) downslope measures 1.0m wide, and the banks are 0.6m high. The leat runs in a straight line parallel to the track until it reaches a quarry (see site below), whose entrance has cut the leat.

Recommendations

A small scale examination of the site is suggested to confirm whether this is an adit portal or simply a (blocked or collapsed) leat tunnel. An appropriate remediation solution should then be agreed with the County Archaeologist.

Site 313 Quarry SX 43481 73130

Background

This stone quarry is shown on the 1867 map and OS 1884 survey.

Survey

The highest part of its rear wall (north) measures 4.5m high. The quarry measures approximately 12.0m in diameter. The base and sides of the quarry are overgrown with trees and vegetation.

Recommendations

This has the appearance of an old quarry. Small amounts of vertical rock scaling may be necessary to the rear wall and the trees that are growing on its steep banks should be cut down. If the public are to access this area, the entrance of the quarry may need to be fenced off.

Site 314 Leat SX 43568 73506 (tower) to SX 43619 73048 (Wh. Watson)

314/1 Leat SX 43501 73273 to SX 43434 73221 (to Blanch.. ponds)

Background

A stream or leat that emerges from the bottom of the Agnes Shaft pond (Site 249/4) (through the flat rod tower base), runs down the centre of the Rubbytown valley. The water appears to split in two directions at SX 43501 73273, one branch feeding the upper section of the Blanchdown settling ponds, the other running along the eastern edge of the works to turn to the east to feed the Wheal Thomas's/Watson's water wheel.

Survey

There is no evidence of a leat between the pond outlet near the Flat rod tower. The leat ran along the base of a retaining wall and bank on the west side of the mine track and the eastern side of the Blanchdown ponds. Its route is plainly shown on the 1867 and 1884 maps, but is hard to distinguish in the field. The leat can plainly be seen at a point east of the quarry site (313). It measures 0.75m wide across the leat's base. The downslope bank measures 0.3m high and is 0.5m across the top of the bank.

314/1: This leat measures 0.75m wide and 0.4m deep, although is obscured by Rhododendrons and other vegetation. Some water is flowing down the leat and enters the west side of the upper ochre 'beds'.

Recommendations

Refer to recommendations above with respect to leats.

Site 315 Adit portal (Fremmentor) SX 42449 72455

Background

This area, east of Wheal Fremmentor has been worked for a long time. A number of east-west lodes intersect the Great Crosscourse according to the Symons 1848 map Fig 4. This feature appears to have been a lower drainage adit, its outflow directed over the Great Leat (through its south bank) and into the River Tamar. Higher up the hillside on this same lode there is another Adit (Site 351) and an openwork (Site 351/1).

Survey

The adit portal masonry and roof has collapsed leaving an undercut opening measuring 2.0m high, 4.0m wide and 2.6m deep. The roots from a tree support this open part of the feature. There is a small collapse at the base of the feature that has revealed another opening, measuring 0.75m wide and long. A masonry wall can be seen through the hole that is 1.0m wide and approximately 3.0m deep. This appears to be the north side of the adit at the junction of the bedrock and subsoil.

Recommendations

The outer opening should be made safe by removing the tree and any remaining overhanging ground above and to the sides of the opening cut back. The ground at the base of the inner opening will have to be investigated, as it is likely to be deeper. The inner opening may need to be grilled (although access to this site is only via the south bank of the Great Leat).

Site 316 Blanchdown precipitation/ochre works SX 43434 73188

Background

Blanchdown Adit drained Wheal Josiah and carried large quantities of water from the massive stopes on Main and South Lode. It was recognised from the first days of the mine that the mine waste water was poisonous to the fish in the River Tamar (the salmon fishery was leased by the mine). A variety of settling tanks and ponds, were created and it was recognised that precipitation works would create additional income for the mine, as well as removing a large proportion of the contaminants from the adit water.

An 1864 newspaper article of the mine describes in detail these works: *'We allude to the precipitate works, which are there carried on more efficiently, and it is said to a larger extent than at any other place...Where the water is suited for precipitation all that is necessary to be done is to let it flow over pieces of iron. The copper is then immediately deposited, and the iron taken up instead, in its turn to be thrown down as an ochreous oxide. Usually this operation is conducted in shallow pits-called strips, divided breadthways into compartments (see Sites 67 and 336). The great objection to this plan is that by it the ochre-which forms most rapidly in summer-and the copper become mixed, and ...cannot be separated. Captain Isaac Richards has cleverly contrived a mode of proceeding which entirely meets and overcomes this difficulty. He has erected decagonal wooden cisterns, several feet across, on the tiled bottom of which the iron is placed. In each cistern is what he calls a sprinkler ...water is sprinkled equally over the whole iron ...and washing with it the deposited copper ...which falls free from any ochreous admixture into a pit ...and then filtered from the iron in solution in an ochre bed ...It is a singular fact that the copper lies on the cast iron to such an extent as to require to be removed by scrubbing with a broom, whilst it is washed off by the water ...the best precipitate contains 55% of copper, and fetches about £48 per ton, the common ore averaging £5 5s...The precipitate works themselves require scarcely tiny labour...By Capt Richard's excellent plan-which is in process of considerable extension at Devon Consols-therefore both the copper and the ochre are marketable, and the waste is of a very insignificant character'.*

This site provided the mine with large supplies of both mine and clean water from the Rubbystown valley. The 1867 map shows six 'ponds/tanks' and eight circular features (resembling buddles in plan). A further four tanks had been added by 1884 (see Fig 35). It would appear that the 'ponds/tanks' are the ochre 'pits' and the round 'buddles' are the 'decagonal cisterns with sprinklers' described above.

Between the closure of the mine in 1903 and up to the 1920's the Duke of Bedford allowed some small concerns to continue to precipitate copper at the mine, Blanchdown being very likely to have been part of the site of operations. From the 1940's copper precipitate works were built (Site 336) near the Tamar; again, it is likely that work continued at Blanchdown. Ochre was also removed from Blanchdown Adit (and probably these 'beds') during the Second World War.

Survey

Many of the upper 'ochre beds' have filled up, creating the effect of a creamy/orangey yellow bed of material continually overflowing; in cold weather steam rises from the warm water coming out of the adit. The stream flowing down the valley from the reservoir ponds above runs along the east side of these ponds although some of the water still enters the west side of the upper 'beds'. Together with the mine water entering the central western side of this area from Blanchdown Adit, there is a constant flow of water through the ochre bed, which appears to have been overflowing for some time.

At SX 43416 73142 (centered) there is a stone retaining wall around the south and east sides of the 'ochre bed'. The south wall measures approximately 1.8m high at its centre point, whilst the corner measures 2.9m high. The East Side of the retaining stonework then reduces in height in the northern part of this eastern wall.

Recommendations

It may be prudent to test the toxicity of the ochre beds as some of this material appears to be being taken up by the water coming out of the adit. Given the proximity of these 'beds' to the adjacent track, it may be appropriate to fence off the site.

Any recommendations by appropriate authorities with respect to management of the 'overspill' or the content of the 'beds', should be discussed with the County Archaeologist (if archaeological features are likely to directly or indirectly affected by management proposals to tackle water pollution).

Site 317 Blanchdown Adit SX 43416 73202

Background

This adit is one of the most functionally important of the mine given that it drains the working levels of Wheal Josiah, which had the deepest and most productive lodes of all the Devon Consols Mines. It is likely that this adit is the main outflow point for the mine.

Survey

The portal is timber framed and appears to have been relatively recently built. Although water issues from a metal pipe, there has been a collapse approximately 2.0m behind the end of the pipe in the adit. The portal measures 0.75m high and 0.6m wide across the top of the roof section.

Although cloudy ochreous water is coming out of the adit, one must assume that the most serious pollution in terms of contaminated water occurred when the mine first filled with water to its natural level (in 1903). Since that date material within the workings will have settled out. The ochre beds appear to continue to act as a filter, perhaps precipitating the heavy metal content of the water.

Recommendations

It may be prudent to test the quality of the water coming out of the adit. Any mitigation recommendations in respect to water pollution should confer with the County Archaeologist, if archaeological features or their historic character and setting are to be affected. The adit portal collapse should be cleared, but it may not be necessary to formalise the portal, as it is relatively inaccessible.

Site 318 Site of twin 'great' waterwheels

318/1 Josiah wheel SX 43442 73063

318/2 Anna Maria wheel SX 43432 73053

Background

The 1850 survey of the mine stated: *'The increasing depth of the mines requiring more powerful machinery, it was decided to adopt water power in preference to steam. For this purpose a grant of the use of the water of the Tamar was obtained from the Duchy of Cornwall at an annual rent of £250...The water is brought about two miles from a point up the river in order to get the proper fall by a leat (a weir on the river ensured a good supply) and the water pumped out of the mines and operating the crushing wheels and all other necessary work is brought round by another leat to assist in working the new wheel'* (Bennett 1992, 19).

The 1860 survey describes these wheels in more detail: *'The two great wheels on the mines are the Josiah and Anna Maria wheels ...They are placed parallel, about 50 feet apart, on the banks of the Tamar ...they are both the same size and make: 40 feet diameter, 12 feet breast, with oak axles, cast-iron sockets and cylinders, oak rings with deal arms, backing and buckets; water brought 10 feet above the centre ...in launders 10 feet wide ...each wheel worked with a bridle and two balance-bobs'* (Hall 2000, 106).

By the end of 1849 the 'Great Leat' (the main water supply to these wheels), had been cut and the wheels working soon after. People came from miles around to watch the wheels, – a model of which was displayed in the Geological Museum, Jermyn Street, London. The Josiah wheel (1860) pumped Richard's and Hitchins Shaft via 360 fathoms of 3.25-in round flat rods. The Anna Maria wheel pumped Anna Maria Engine Shaft and Field's Shaft using 396 fms. (just under half a mile) of the same sized flat rods. These wheels produced 140hp and worked at four strokes per minute.

The 1867 and 1884 maps show these massive wheels in detail (see Fig 35). The water supply appears to have come via another leat joining the 'Great Leat' from the southern side of the wheels, the water then being carried by launders. The courses of their tailraces are not certain.

Survey

Water flowing from the Blanchdown Adit goes under the adjacent track (via pipes) and into a large deep pool - the site of the water wheels, balance bobs and crank pits. It is not known if any masonry remnants of these features survive underwater. A 4.0m high stone retaining wall built on the north side of the wheelpit, is in relatively good condition, as is a high wall and bank on the southern side of the southern wheelpit. Presumably, the level of the incoming leat dictated the depth of the wheelpits.

On the south-eastern side of the wheelpits there is an arched brick and stone tunnel (measuring 3.0m wide and 4.0m long), that has partially collapsed at numerous locations. This is very unsafe and if it is to remain will need to be partially rebuilt. Much of the water in the pond leaves the site via another tunnel on its south-western side. This tunnel is also stone arched but has also partially collapsed for a length and width of 3.0m. There is a gap of approximately 1.2m between the water level (at the time of the survey) and the top of the stone arch tunnel.

Recommendations

A steep drop on the southern side of the track really may need to be fenced. It is likely that the public access to the mine will use the adjacent track. There is an opportunity however, for an information board to be erected at this site to illustrate the size of the wheels and the mechanism by which the flat rods were powered.

The existing tailrace gives cause for concern. It is not stable and further collapse may close the tunnel entirely, causing localised flooding. It is recommended that a structural survey of the tunnel is carried out and that it is partially rebuilt and repointed. There may be a high cost implication for this, both in terms of carrying out the works and in water management whilst the work is proceeding. The ownership of the site is not known.

Site 319 Shaft SX 43475 73008

Grade C

Background

Both 1867 maps show a shaft (labelled 'Old Shaft') at the NGR given above. The shaft is quite close to Watson's Lode (as shown on Fig 35).

Survey

There is no definite surface evidence for the location of the shaft. However, at the NGR given, there is a depression measuring 1.25m deep over a diameter of 4.0m.

Recommendations

It is recommended that the site is identified, fenced and warning signs erected.

Site 320 Plunger Shaft and pumps SX 43289 73111

Grade B

Background

This shaft functioned solely to pump water from the Tamar up to the main reservoir at Wheal Josiah (possibly Site 229). *'The plunger wheel (Site 322/2) ...works an 18-in. plunger-pole (with a bridle and 80 fms. of iron flat-rods) with a 6-feet stroke, balanced by 50 tons, forcing water up from the river to the great reservoir, a height of 66 fms. perpendicular, in a column of 18-in. pumps 231 fms. long (414m). This single plunger is now going to be removed and replaced by two 16-in. plunger-poles, one attached to each side of the wheel, and forcing the water in a continuous stream through the same column of pumps. The water is supplied to the plunger by a lobby driven in from the Tamar'* (Hall 2000, 106 – Quoting an 1860 survey). The 1864 newspaper article also states: (pumping) *'at the rate of 500 gallons per minute, for dressing, condensing and other purposes'*. The presence of the shaft is hinted at on the 1857 map, but is shown on detail on the 1867 and later maps. The 1857 map (Fig 7) shows the route of the *'Forcing Pumps'* (which presumably took the form of a cast iron pipe at ground level), ending at a point west of some ponds (Site 245). The large square reservoir pond higher to the north (Site 229) was probably the main reservoir.

Survey

The shaft is sited in a depression measuring approximately 12.0m in diameter. There is a near vertical slope of approximately 1.5m within the depression measuring of 8.0m wide. Within this depression there is another hollow measuring 2.0m from east to west and 3.0m from north to south, its depth totalling approximately 7.0m below the nearby track level. There is a timber fence around the depression, but it is not sufficient to keep people out. On the south side of the shaft is a rectangular-shaped stone retaining wall that measures 4.5m wide, the highest point being 1.25m, the lowest being 0.3m high, over a length of approximately 6.5m. At the south end of the depression there is a dry stone wall blocking that may post-date the shaft. This measures 1.5m high for a length of 4.5m. There is no shaft marker.

Recommendations

The shaft depression should be fenced around its outer perimeter and a warning sign erected.

Site 321 Quarry railway line SX 42512 72518 to Impham Quay

Background

'A lease was dated 6th March 1861 (for 40 years) from Ladyday 1860' (pers comm. J. Goodridge). A private concern built a tramway from a granite quarry (Site 343) east of Wheal Frementor around the lower edge of the hillside to the north of the Great Leat and then from Blanchdown following the Devon side of the Tamar under Newbridge, past South Bedford Consols to Impham Quay. This followed a similar route to the railway that earlier was proposed for Devon Great Consols in the mid 1840's. The railway is shown in detail on the 1867 map (Fig 8); its route but not the lines are shown on the later 1884 map (See Fig 9).

Based on cartographic evidence, the line appears to have been fenced throughout its course, again suggesting that it was a separate concern from mining, and associated with granite extraction, moving waste and transporting worked stone to a quay for export (possibly Impham Quay - *pers comm* J. Goodridge).

Related sites (all lying within the fenced area) include: Mine building (Site 324), granite quarry (Site 343), a 'mine/quarry' building (Site 345) and a quarry waste tip (Site 333).

Survey

The railway line has not been walked along its whole route. All of the sections that have been seen indicate that the course of the line is mostly extant. In some places over dumping and collapse of the sides of the line (particularly in cuttings), have obscured the track bed.

At a point east of an adit (Site 342), there is a rocky outcrop (SX 42598 72569) whose base has been cut into form the railway track bed. A dry stone revetment wall has been built to retain loose rock from the high outcrop. The wall varies in height from 1.0m to 3.0m.

The track bed measures approximately 2.5m in width (at SX 42521 72623). At a point west of an adit portal (Site 323) the railway line is in a cutting, although elsewhere where there are dips in the hillside topography, embankments and bridges have been built.

At SX 43162 72941 (between the 'lower' copper processing site—Site 326 and the Plunger wheel—Site 322/2), the railway has been cut through the hillside. Banks parallel to the track measures from 2.0 to 3.0m high, the higher side being on the northern side of the track.

The railway line east of the point where it goes over the 'Great Leat' supply to Josiah and Anna Maria wheels, appears to have been built on timber trestles. East of Agnes wheel and a field access track), the railway track bed is built on an embankment (SX 43343 72908). This measures 2.2m high (above track level) and 5.5m wide. The face of the embankment is built of stone placed on edge. As the embankment goes eastwards its height above ground level diminishes until it is at ground level by the time the eastern end of the Devon Consols sett is reached.

Recommendations

It is doubtful if the railway line will need to be cleared as an access route, as there are better routes through the lower reaches of the mine. However, it is recommended that the track bed is not disturbed in any way.

Site 322 Large twin water wheels

322/1 Agnes wheel SX 43319 72876

322/2 Plunger wheel SX 43305 72882

Background

The 1860 survey also describes these wheels in more detail: *'The two next important wheels, also worked by Tamar water, are lower down the river; they are called Agnes' wheel and the plunger wheel. The former is 32 feet in diameter by 10 feet breast (80hp), and works 10-in. poles in Agnes' Shaft, 170 fms. deep, by a line of 9-in. square wooden flat rods. The plunger-wheel, 32 feet by 16 feet (100hp), works an 18-in. plunger pole ...Both of these wheels have the same kinds of axles, sockets, rings etc as the great wheels'* (Hall 2000, 106).

The 1867 and 1884 maps show these massive wheels in detail (see Fig 35). The water supply was stopped from the 'Great Lear', via a slightly smaller headrace to the northern ends of the wheels.

Survey

Field survey evidence for Agnes water wheel pit consists of a dip in the ground measuring 1.0m deep, 2.0m wide and 6.0m long. The ground has been landscaped (presumably with a tracked swing shovel), and large boulders piled up over the site of the plunger wheel.

At SX 43334 72976 there is a large pond. The origin of the water for this is unknown but possibly came from the upper water wheel tailrace. There appears to be an underground pipe from this site much comes to surface above the Agnes wheel site.

Recommendations

None, although this site should not be disturbed below ground level, as there may well be wheel pit foundations here.

Site 323 Adit portal SX 43239 72906

Background

The adit portal is shown but not labelled on the 1867 map, whilst it is labelled 'Sluice' on the 1884 OS map. It may well be related to the function of Plunger Shaft (Site 320), possibly as a mechanism for water to return to the River Tamar. The site where water was fed to the shaft has not yet been positively identified, though this may be the site.

Survey

The adit is open, fenced and has water issuing from it. The ground above its portal has collapsed. The opening measures 2.0m high, 0.5m wide across its roof and 1.0m wide at ground level. The adit can easily be accessed and has timber setts (at 1.0m intervals) *in-situ* for a distance of 8.0m inside the adit.

Recommendations

The small amount of collapsed material lying across the adit portal (from the overhang above the opening), should be removed and a gated adit grille may need to be inserted to restrict public access.

Site 324 Site of building SX 43183 72955

Background

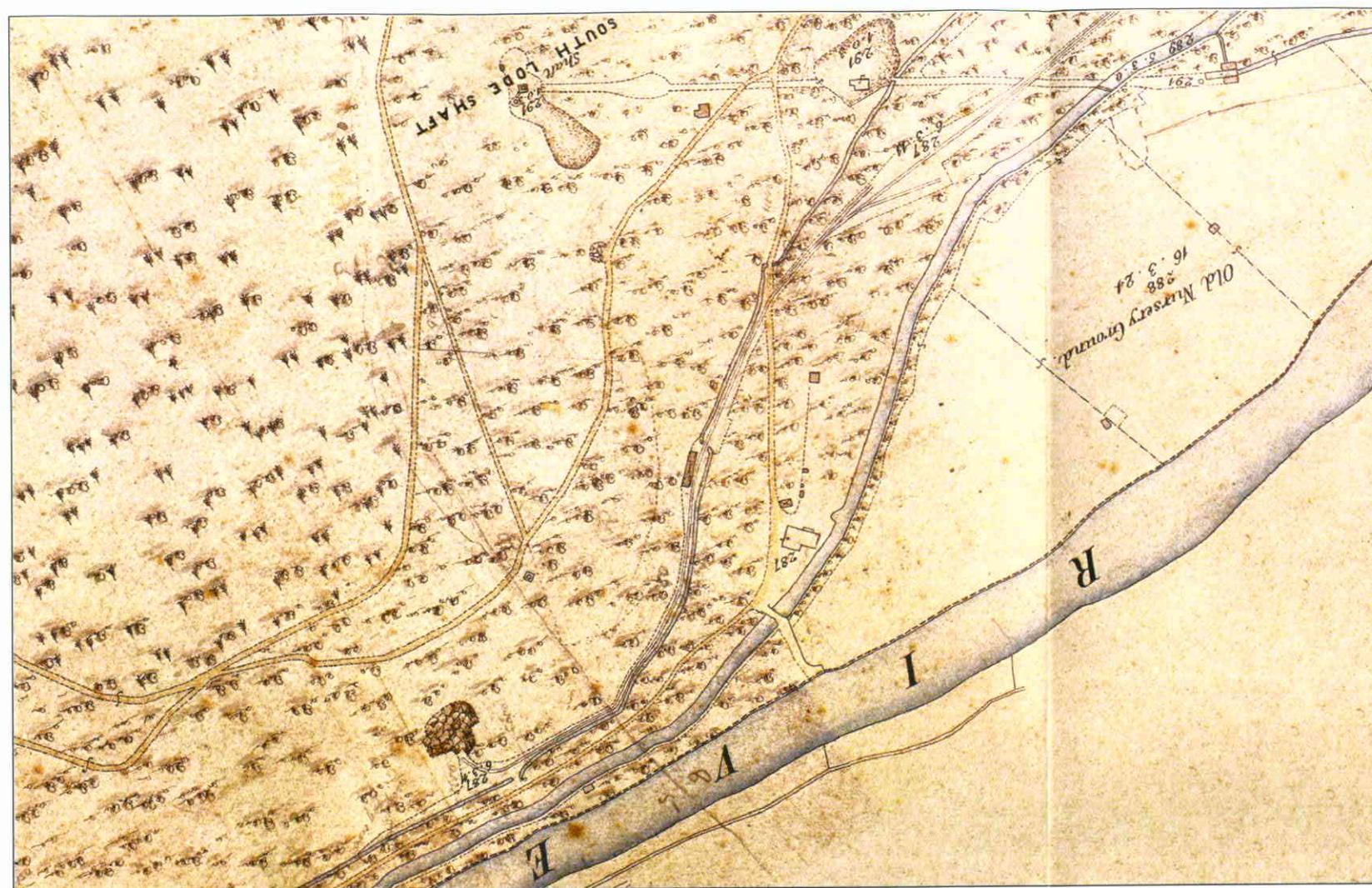
A small building is shown on the 1864 and 1884 maps close to the fence line next to the tramway line. It may be related to the tramway as there is space nearby for a small siding within the fenced area.

Survey

No upstanding evidence for this building survives.

Recommendations

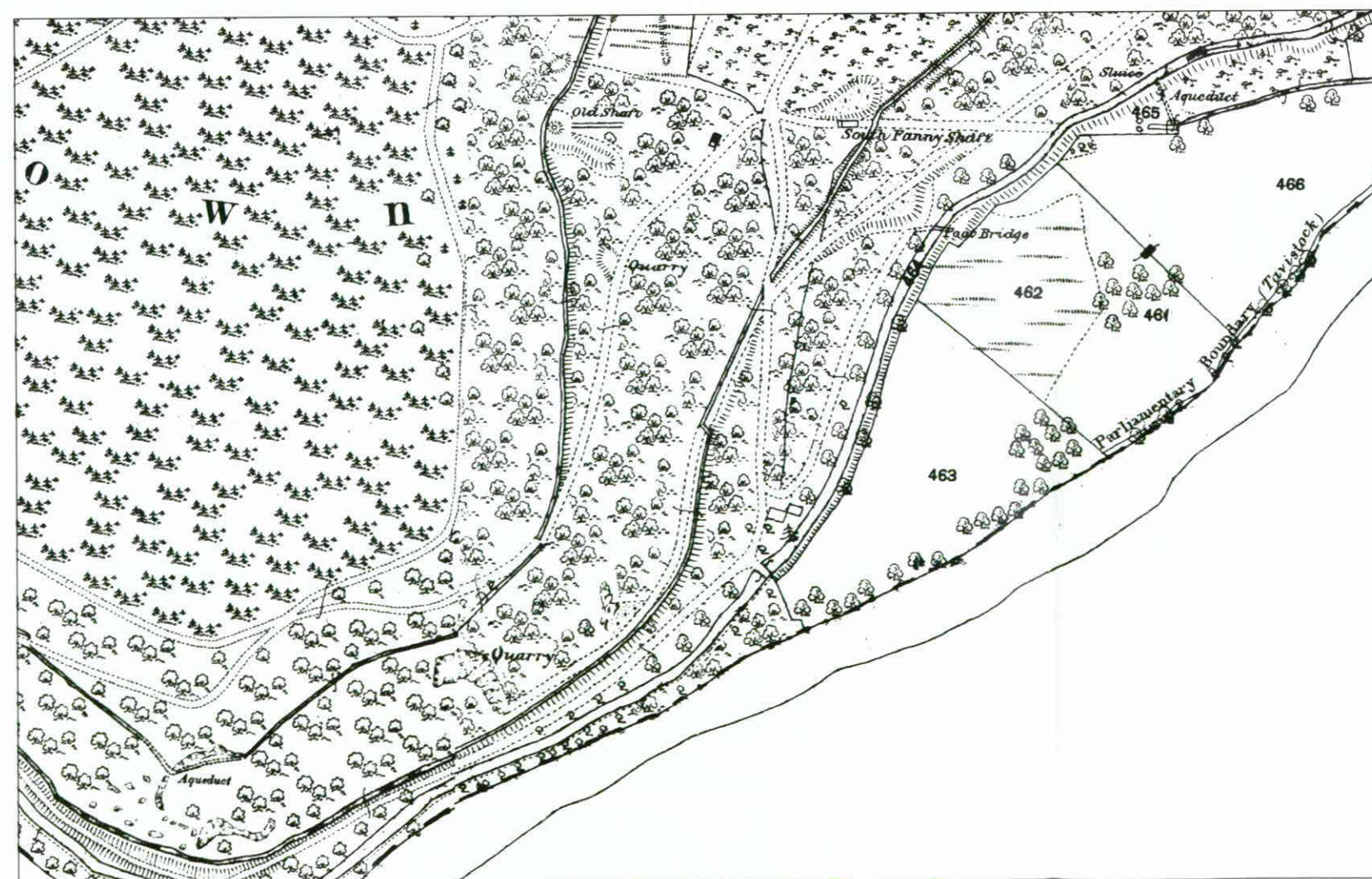
None. This site should not be disturbed.



0 25 50 75 Metres

Figure 26 *South Fanny as shown on the surface plan 'Tavistock Parish (Div. No.1)' 1867*

(Tavistock Parish (Div. No. 1) - DRO/T1258M/E11 - 3 chains - 1 inch)



0 25 50 75 Metres

South Fanny as shown on the Ordnance Survey plan 1884

(OS 1884 - © Crown copyright and Landmark Information Group
CCC licence No. LA076538.)

Site 325 Site of South Fanny water wheel SX 42921 72860
325/1 Tail race SX 42921 72860 to SX 43122 72883

Background

The 1867 and 1884 map (Fig 26) shows the site of the water wheel and flat rod trench to South Fanny (Site 226) and South Lode Shafts (Site 220). The earlier 1857 map also shows this detail (labelling it 'Rods'), when it presumably pumped South Fanny Shaft only. Ten years later it was also pumping South lode Shaft, also by flat rods. A small aqueduct carrying water from the Great Leat fed the water wheel.

There is no direct documentary evidence for these specific works, only; *'The fifth wheel, working by Tamar water, but much higher up the river, is 30 feet by 8 feet; it works two 10-in. plungers for sending up water from the river to the halvan floors'* (Hall 2000, 106). If this 1860 quote relates to this water wheel, then it may be that Site 225 is in fact, the site of the flat rod powered pumps to the 'lower' halvan floors.

The tailrace is shown on the 1867 map going in an easterly direction to the River Tamar. However from the 1940's to the 1960's, the 'lower' copper precipitation works were set up at the water wheel site; its east other ponds also affected the original course of the tail race.

Surveys

There is no direct field evidence for the existence of the water-wheel site. The landscape around this site has been drastically altered (see below), and the bed of the 'Great leat' (Site 100/5) altered to accommodate railway sidings and precipitation launders.

325/1: The tailrace is extant (resembling a leat), although its course has been changed to go through the ponds. It measures approximately 1.0m deep and 0.4m wide. Its depth may relate to erosion by the water into the soft banks of the River Tamar. At SX 43123 72888 the tailrace goes under a stone arched tunnel, the opening measuring 1.25m wide, 0.8m high and 3.75m long. This appears to be a small bridge for the 'Blanchdown (or Duke's) Drive'.

Recommendations

Both faces of the small bridge need to be consolidated and repaired. It seems likely that the water wheel pit was reduced to ground level and the stone re-used for other buildings on site.

Site 326 'Lower' 1940 Copper Precipitation works SX 42975 72897
326/1 Building SX 42930 72878
326/2 Kiln/furnace SX 42904 72872
326/3 Railway sidings SX 42857 72864 to SX 42952 72913

Background

These works are not shown on the 1904 (see Fig 11) or earlier maps. The 1954 third edition OS map shows a small number of buildings, but the site of the wheelpit has not been shown.

This site is at the lowest point of the adit (and surface) run-off drains from the large dumps south of the Anna Maria 'lower' dressing floors. These tips were approximately half their size in 1904; the 1920's and later works added much more waste to them. Mine-water and

adit run off was captured in settling ponds and timber lined shallow strip trenches (Sites 67 and 316 above and Site 336 below). Pieces of iron were placed in the trenches and copper was precipitated onto them through electrolysis. This process appears to have taken place at this site (see the photographs in Figs 27 and 28), from the 1960's compared with the present day. The third edition map appears to show a water wheel at a similar site as the original but oriented to the north. Buildings were also shown to the south, and it is remnants of these that appear to survive today (these are shown in Figs 29 and 30).

Survey

This site has few identifiable features with piles of stone, brick and rubble lying all over the area. The tail-race cuts through the site (up to 25.0m in length), in places revetted with stone to a depth of 1.0m below ground level. The south bank of the Great Leat is also covered with rubble and two sections of walling and steps.

326/1: This is a remnant of a small lean-to building, partly roofed and with a chimney set in its northern face. The wall behind the chimney measures 0.8m thick and 4.0m long. The fireplace has a brick arch (held by a thin iron lintel) and an opening that measures 1.0m wide and high, extending by 0.5m into the room. The roof has intact rafters, wall plate and corrugated iron roofing. Half of the wall (measuring 1.5m high), supporting the lower end of the rafters (i.e. the south wall) has collapsed. A window is set at the eastern end of the building. Figures 29 and 30 show the degradation of this building over the past forty years.

326/2: This feature appears to be related to the production of heat. This low-lying feature measures 3.5m long, 2.0m wide and 0.6m in high. It is mostly built of brick. There is a central opening at ground level in its east face that measures 0.85m wide and 0.7m high. Concrete and reused tram rails have been used to form this opening and the other sides. This may have been used to heat, the pieces of iron covered with precipitated copper, to dry them sufficiently for the precipitate to be brushed off. Fig 29 shows the feature in the 1960's.

326/3: For a length of approximately 80.0m, a section of the Great Leat has been used as a base for horizontal timbers similar to railway sleepers (see Site 100/5). Fig 27 shows these timbers to have supported the timber precipitation launders.

The southern bank of the leat was flattened and spread onto the working platform below. Blocks of slag were used to form a hard stable surface upon which the timbering was laid. These are approximately 0.15m thick, 0.45m long and 0.3m wide. These are visible for a length of approximately 15.0m but the ground is broken up in places, obscuring the surface. There is surface evidence of timber 'sleepers' and tram rails at ground level, as well as some vertical timbers that may have held launders. Figures 27 and 28 show this site in the 1960's and the present day.

Recommendations

Evidence for the change of use and fragments of the buildings and works from the 1940's onwards are scattered over this area. The consolidation of the remnants of the building and kiln would be advantageous.



*Figure 27 Copper precipitation launders (H. Ordish 1/12/62)
(VMdgc 010)*



Figure 28 Site of copper precipitation launders (C. Buck CAU 2002)



*Figure 29 Copper precipitation works (H. Ordish 01/12/62)
(RIC VMdgc 009)*



Figure 30 Copper precipitation works (C. Buck CAU 2002)

Site 327 Adit SX 42906 72897

Background

This adit is shown on the 1884 OS map (labelled as 'Sluice') and later OS maps. The adit appears to have come from the Anna Maria dressing floors or main waste dump and was probably laundered over the Great Leat to go into the River Tamar via the wheel-pit tail race. It is likely that this was one of three adits used in the copper precipitating process.

Survey

The adit portal has collapsed and is now only approximately 0.3m high. The roof consists of collapsed boulders with water issuing at their base. To the north of the portal there is a cutting in the ground measuring approximately 1.1m deep and 0.4m wide at its base. This appears to be further evidence of a collapse of the adit over a distance of approximately 3.0m.

Recommendations

The adit appears to be draining without any apparent problem. If the landowners want to open the adit and formalise the portal, any remediation works should be discussed with the County Archaeologist who will advise on archaeological recording methodologies.

Site 328 Adit/shaft SX 42943 72917

Background

This feature is not indicated on any archive map. It has been identified as a possible adit from field evidence only.

Survey

East of Site 327 (at the NGR given), water emerges from the ground over a small and densely overgrown area, measuring 5.0m in diameter, at the centre of which is a small mound of earth and rubble measuring 1.0m high and 2.8m in diameter. This is either a blocked adit that is welling up in front of the blockage or alternatively a flooded, blocked shaft.

Recommendations

Refer to recommendations given above.

Site 329 (South Fanny) Adit SX 42852 72866

Background

This adit appears to be shown on the 1867 map as a slight northward indentation in the north side of the Great Leat. The same site is not labelled on the later 1884 map, but a small footbridge is labelled close by the west of this location. This appears to be an adit from South Fanny Shaft (Site 226).

Survey

The extant adit portal is stone lined with a brick arch. The opening measures 0.8m high and 0.5m wide. The facing stone of the adit extends 0.5m on the west side, 1.0m on its east side and is 0.75m above the top of the opening. Water is issuing from the adit, which then runs in a westerly direction back along the Great Leat.

Recommendations

This small adit drain appears to be in good condition structurally.

Site 330 Blanchdown Drive SX 41538 73764 to SX 43679 72777

Background

In the early years of the second decade of the 19th century the Duke of Bedford built Endsleigh House (the gardens were designed by Humphrey Repton), near Milton Abbot. At the same time, the Duke had 'drives' built along both the Devon and Cornwall sides of the River Tamar. On sunny summer days, the Duke or his family, when living at Endsleigh, would take a horse and trap and take leisurely circular sight seeing trips along a variety of routes, stopping for refreshment at pre-arranged locations at timber and bark built summer houses.

One of these routes was the Blanchdown Drive. This went along the foot of Blanchdown Wood near the River Tamar between the Great Leat and a smaller leat (Site 5). The track then turned to the south to run next to the river before it went past Blanchdown Farm. This latter section is not shown on the 1867 or OS 1884 maps. The 1954 third edition OS map shows the route running parallel and next to the River Tamar and joining up with the mine track at the end of the Devon Consols sett boundary (to the east of Blanchdown Farm).

Survey

The track is in a relatively good condition and is approximately 3.0m wide. Long lengths of the route are used for access by the local fishing club and woodland maintenance vehicles. Small passing and parking places have been created in the narrow track along the foot of Blanchdown Wood.

Recommendations

Part of this track has already been identified as a possible route for public access.

Site 331 Large ponds (in reclaimed grassland) SX 42749 72661

Background

Much of the ground between the Great Leat and the River Tamar is riverine silt that has been turned into fields for summer pasturage. One rectangular field is labelled on the 1867 map as 'Old Nursery Ground'. This may relate perhaps to the salmon fishery that once existed here. By 1904 this area was beginning to revert to overgrown marshy ground (Fig 11) and by the time of the third edition OS map, the overgrown ground had been fenced off.

Survey

Part of this ground (on its south-western side) has since been returned to pasture, but two conjoined large shallow ponds have formed. These have been fenced. On the eastern sides of the ponds there are two leats which go east to the copper precipitation site. The ponds may simply reflect the flooding of particularly low-lying areas of the valley floor.

Recommendations

None. The surrounding land is privately owned and has no public access.

Site 332 Leat from SX 42684 72642 to SX 42732 72855

Background

A leat is shown on the 1884 OS map from a mine building at SX 43183 72955 (Site 324) to possibly join the long leat (Site 5) and then to separate from this to run to mine buildings at SX 42680 72626 (Site 339). It is not certain if this leat was fed by the larger and older leat or whether it simply ran parallel to it, but it appears to have fed the small ponds at Site 340.

Survey

At SX 42696 72741 the leat measures 0.5m wide, 0.4m deep and has slight banks with heights of only 0.25m. A large rock waste tip (see below) has blocked the leat.

Recommendations

None. Refer to general management recommendations given above for leats.

Site 333 Granite quarry waste tip SX 42759 72812 (centered)

Background

Given the fencing surrounding this large waste tip and the route of the tramway line from the quarry (Site 321) to Impham Quay, it has been assumed that this tip relates to the quarry as opposed to Devon Great Consols. As shown in detail on the 1867 map (Fig 26), there are two finger dumps carrying short spurs (above and below the tramway to Impham).

Survey

The plan detail shown on the 1867 map can be seen on the ground. The remnants of the tramway track bed can be seen (although broken up in some areas and is overgrown) as it goes between the two linear dumps of waste granite. The southern dump is quite large and measures approximately 3.0m high at its highest point; it is approximately 20.0m in length. The tramline on top of the finger dump is difficult to see due to the quantity of surface rock and site overgrowth.

Recommendations

The slopes of the sides of the southern dump appear to be stable.

Site 334 Shafts/lode-back pits SX 42779 72853 Grade C

Background

These appear to be small outcrop shafts close to the south side of South Fanny Lode. There are two of three similar features within 5.0m of each other within this area.

Survey

A depression in the ground measures 2.5m x 2.5m at its base, at a depth of 3.5m and with an opening of 4.5m x 4.5m is likely to be a small outcrop shaft. If so, the similar depression approximately 4.5m south (and downslope) may have been a capstan or alternatively a second small shaft (measuring 3.5m x 3.5m). There is a small leat going into the east side of this second feature. The rear (north) side of this possible shaft measures 3.5m high, whilst the south side measures 1.5m high.

Recommendations

Both of these features may be shafts. It would be prudent to fence them.

Site 335 Shaft/lode-back pit SX 42779 72860

Grade C

Background

See background above (Site 334).

Survey

This possible shaft is located 5.0m north of those described above and measures 1.75m in diameter. It is open to a depth of 3.5m and is not fenced.

Recommendations

Refer to recommendations above.

Site 336 Copper precipitation trenches

SX 42831 72913 to SX 42993 72978

Background

These features are very similar to those at Wheal Fanny (Site 67). The description given in the background section of that site would seem to apply to these features also. The long shallow trenches would appear to date from the 1940's, the product being processed at the 'lower' copper precipitation works (Site 326), just south of this site. Timber planks would have been set in the earthwork trenches and the coppery mine water laundered into tanks containing pieces of iron, on which the copper precipitated. Along the south end of these trenches are east - west trenches that took the water to a central location at Site 337, from where it appears to return to surface at Site 328 (and possibly Site 327), directly above the 'lower' copper processing works (326).

Survey

The site consists of approximately fifteen long, shallow, north - south oriented trenches (at 5.0m intervals) in the conifer woodland. They measure approximately 15.0 to 20.0m long, 0.6m wide and 0.9m deep. Cut tree branches obscure many of these trenches.

Recommendations

It is probable that the public will walk along the mine track to the north of this site. Excavations such as these have archaeological value and in addition should not be infilled or covered up for this reason.

Site 337 Flooded feature SX 43012 72955

Background

Set in a clearing on the eastern edge of the conifer woodland is a rounded flooded feature of unknown depth (resembling a shaft). This is not shown on any of the OS maps. However it is located due north (and upslope) of another flooded feature (identified as an adit - Site 328). For this reason it has been identified as a possible shallow adit shaft.

Survey

There may be a shallow shaft at this site, although it may also be a tunnel taking water to the 'lower' copper processing floors. This site was not flooded when revisited, but was covered with tree branches, obscuring it.

Recommendations

This feature should be investigated to identify its function and condition. If it is a shaft it may need to be fenced.

Site 338 Environment Agency cabin SX 42626 72527

Background

At the NGR given is an Environment Agency water monitoring station (built in the 1960's). This is used to monitor the depth of the water above the riverbed to warn of flooding further down - river at Gunnislake, Calstock etc. Solar power cells charge batteries and the monitoring equipment, but river bed profiles can also be taken using a winch system that measure the depth of the river from an overhead steel cable. The station is maintained and depth measurements taken twice a month.

Survey

The green fibreglass building is set against the south side of the Great Leat bank. It has been founded on a concrete plinth. During the construction of the foundations, part of the south side of the Great Leat bank was reduced in height. This cutting measures 9.0m long and between 0.4m and 0.7m deep. At times of heavy rainfall, the Great Leat floods and overflows its bank at the site of this cutting, flooding over and into the monitoring station.

Recommendations

The Great Leat bank should be rebuilt to its former specification. A survey of the cutting and the methodology and specification of its replacement (together with access provision for groundworks), will be necessary. The Devon County Archaeologist may require a suitably qualified archaeologist to carry out a watching brief during the works.

Site 339 Site of mine buildings SX 42680 72626

Background

A single mine building is shown on the 1867 map, whilst the 1884 map shows two smaller buildings at the same site (Fig 26). However the latter buildings may have been under a single roof. The function of this building is not known. To the north of this building are a couple of other much smaller rectangular buildings.

Survey

The building platform for this building is visible, as are very low-banked rubble remnants (0.45m in height and width) that may once have been walls.

Recommendations

The site of these buildings should not be disturbed by any activity that will affect below ground archaeology.

Site 340 Three reservoir ponds SX 42702 72686 to SX 42716 72731

- Background

These features (resembling ponds) are not shown on any archive map accessed during the preparation of this report. They may relate to later 20th century precipitation works – these being small ponds within which the iron was left. The source of the water was probably the leat slightly higher up the hill (Site 332).

Survey

There are three rectangular depressions here (described in order from west to east). In each case, the rear (north) bank is higher than the south bank. The first (SX 42709 72652) measures 2.0m wide and 3.5m long, the upslope north wall being 0.5m high and the downslope south wall 0.3m high. The second (SX 42720 72677), is 4.0m wide and 6.0m long, the upslope north wall is 1.0m high and the downslope south wall 0.5m high. The third (SX 42729 72703), is 3.5m wide and 4.0m long, the upslope north wall is 1.0m high and the downslope south wall 0.5m high. They are all set close to the north bank of the Great Leat.

Recommendations

Refer to general recommendations made for other ponds above for vegetation and tree management.

Site 341 Deep Adit Shaft SX 42562 72507 Grade C 341/1 Deep Adit outflow SX 42565 72500

Background

This feature is not shown on any archive map seen to date, but Dines (1956, 660) states: '*Deep adit mouth is on the bank of the Tamar 410 yds. S. of Engine Shaft (at South Wheal Fanny) and the adit ranges roughly north-north-west for 250 fms. partly following the Great Crosscourse*'. This appears to be the final air shaft before the adit drain meets the River Tamar (the adit portal was not found).

Survey

The deep depression, sited in a long openwork on the south side of Blanchdown Drive measures 9.0m long (east - west) and 5.0m wide and is surrounded by granite rubble. This shaft is approximately 5.0m deep, although at this depth it is circular and 1.75m in diameter and 1.0m deep. A tree is growing out of the depression.

341/1: It appears that the Deep Adit portal next to the Tamar is blocked. The pressure of water in the adit has forced it up into the bed of the Great Leat, as there are visible signs of orange coloured contaminated mine water welling up in the floor to the south of the adit shaft. This extends for a length of 25.0m east and west of the emergence point. There is a 4.0m vertical retaining wall between the south side of the mine track and the north side of the Great Leat.

Recommendations

This feature is adjacent to a mine track that may well be used by the public. The probable shaft should be fenced and warning signs erected.

Site 342 Adit portal SX 42548 72530

Background

Archive maps do not show this site. Its lode may have been intersected during quarrying operations as outcrops on the eastern side of the granite quarry.

Survey

The adit is open, unfenced and readily accessible. The height from the ground above the opening (the original portal having collapsed for a length of approximately 4.0m) to ground level is 2.5m. A vertical lode has been removed as the adit was cut. It is likely that this was a working level that was developed as an adit after the lode has been removed and may predate the 1840's.

The roof has the appearance of being very unstable and is held together by large granite boulders. The opening varies from 0.75 to 1.0m wide and 1.5m high (although the floor is raised at the entrance due to roof collapse). Timber work setts can be seen at 1.0m intervals in the adit for a length of approximately 5.0m, supporting the roof and sides.

Recommendations

The adit portal opening should either be fenced or gated.

Site 343 Granite Quarry SX 42498 72532 (centered)

Background

The quarry is shown on the 1867 and later maps. It was worked in the 1860's and a railway line (Site 321) built to transport the granite to a worksite, a waste dump and Impham Quay. *'The spur of granite extending from Hingston Down boss comes into this part of the sett, and is at present about being worked as a granite quarry by Dr Wagstaffe, of Kensington ... It is to be sincerely hoped that Dr Wagstaffe may be more successful in this than in his previous mineral speculations; but it is very doubtful'*. (Hall 2000, 105 – quoting an 1860 survey).

This site may have begun as an abandoned 18th century copper working. The earlier excavation may have offered an opportunity for granite working when market demand increased in the mid-late 19th century. Given the number of mid/late 18th century openworks (and the sites of stamping mills that have been documented in the Bedford and Wheal Russell mines – Greeves, Devon SMR), this and the adjacent site at Frementor may have been the site of earlier workings.

Survey

This quarry can be accessed via the tramway to the east. Piles of granite boulders and rubble lie on the ground and are banked in front of a rear working face which measures approximately 25.0m high and looks very fractured and unstable. There is a flat working area within the quarry which measures approximately 10.0m x 10.0m. Some stone left on the ground within the quarry has been worked.

Recommendations

This quarry is relatively unsafe in its present condition. The working face is very unstable and the ground in front of this mostly filled with boulders and granite waste rock. A geotechnical assessment may be necessary to ensure that any rock fall does not cascade down onto the road below. It may not be practical to fence the upper edges of the quarry.

Site 344 Shaft SX 42518 72511

Grade C

Background

This shaft is not shown on archive maps, but was identified by Sherrells (Report 1915) in their 2000 desk study and field survey. It is located near a lode (L20) that runs broadly east - west.

Survey

The shaft is sited near the entrance to the quarry and is a shallow rectangular excavation that measures approximately 3.3m long, 1.8m wide and 0.7m in deep. It appears to have been sunk onto (L20).

Recommendations

The shaft should be fenced (and warning signs erected).

Site 345 Site of quarry building SX 42634 72665

Background

A long rectangular building is shown on the 1867 map (Fig 26), within a fence line that appears to run along the entire route of the tramway. Following the hypothesis that the granite extraction company owned sites within the fence, it is suggested that this was a stonemason's workshop. The building is not shown on the later OS 1884 map.

Survey

The 1867 map evidence shows that the building was in an area of ground excavated into the side of the hill. A pile of rubble marks the site of the building.

Recommendations

None, although the site should not be disturbed.

Site 346 Small pits (canal quarry pits) SX 42402 72423 and SX 42152 72513

Background

These pits/trenches may be small localised extractive pits to provide material for the construction of the lower bank of the 'Great Leat', and its higher side revetment wall. The area where they have been noted is shown on the site inventory map, although they may well be found at any point along the course of the leat where such materials were needed. Alternatively, these may be exploratory costean pits, dug after the canal was built.

Survey

These pits are located at the base of the lower side bank of the Great Leat. They measure approximately 2.0m deep and are 4.0 to 10m long and 2.0m to 4.0m wide. The pits are spaced between four and fifteen metres apart.

Recommendations

None.

Site 347 Adit Shaft SX 41713 72800

Grade A

Background

This shaft is not shown on archive maps (although an adit is labelled on the 1867 maps; this may refer to Site 348 below). It was identified by Sherrells (Report 1915) in the 2000 desk study and field survey. It appears to be an adit shaft, as an adit portal (Site 348) is just below the track to the west.

Survey

This feature is partly enclosed to the west by a wooden post and rail fence measuring 0.75m high. It is sited immediately next to the mine track and Blanchdown Drive. The opening has partially collapsed on its south-western side, which is now partially occupied by a parking area). The opening measures 1.8m in diameter and has a depth of approximately 4.0m, where it is choked. The shaft is cut into the downslope side of the leat above it (Site 5).

Recommendations

The shaft should be securely fenced; the edge of the collapse should be identified in order to site the fence at a safe distance.

Site 348 Collapsed adit portal/lobby SX 41673 72775

Background

This adit is labelled on the 1867 plans, but was confirmed by Sherrell (Report 1915/2) in the 2002 path risk assessment survey, after being identified in this survey. Given the relative shallow nature of the lodes in this part of the sett, it is not surprising that adit drains are found on the west and south facing valley slopes.

Survey

The adit lobby (oriented in a south-westerly direction), measures approximately 6.0m long, 2.0m wide across the top of its banks, is 0.75m wide at ground level and is 2.0m deep (below the top of its banks). The adit opening is not visible and presumably has collapsed.

Recommendations

The top and sides of the adit lobby should be fenced if needed.

Site 349 Shaft, building and spoil mound SX 41666 72774 Grade C

Background

This possible shaft (or perhaps capstan/whim) is not shown on archive maps, but was identified by Sherrells (Report 1915/2) in the 2002 path risk assessment survey, after being identified in this survey. The general distribution and type of sites suggests that this may have been a dressing floor for material brought out of the adit.

Survey

5.0m west of the end of the adit lobby there is a circular feature that has been identified as a possible shaft. It measures 4.0m in diameter and has a downslope bank 0.5m high and 0.25m wide. A further 7.0m to the west is a small remnant of masonry walling, this being a 1.0m section of corner return. The wall measures 0.4m high and 0.3m wide. The spoil

mound is 8.0m to the south-west of the adit portal and measures 1.5m high, 6.0m long and 2.0m across its top edge.

Recommendations

The possible shaft should be fenced as a precaution as it is easily accessible from the adjacent track.

Site 350 Adit SX 42484 72487

Background

This adit is not shown on archive maps, but its location was identified by Sherrells (Report 1915) in the 2000 desk study and field survey. Symons 1848 Lodes map (Fig 4), shows a number of small east - west lodes and junction with a crosscourse in this vicinity. Hall 2000, 104 (quoting an 1860 mine survey) states: '*Wheal Frementor, on about the same run as Wheal Thomas, but farther west, has been worked only by an adit, in which several lodes, or branches, have been intersected*'. It is located south of a lode (L20) that runs broadly east - west and is one of a number of north - south adits that have been cut into the side of the valley. These may well have been worked from the latter years of the 1840's as Wheal Frementor, or possibly have been re-opened old workings started in the 18th century. The presence of visible timber setts may lead to the conclusion that some of the adits were reopened in the 1920's (see Site 352 below).

Survey

This adit has an open portal entrance which measures 1.8m high and wide and is in relatively good condition (with an intact granite lintel); there has been a slight collapse inside the entrance. Timber setts can be seen inside the adit for a length of approximately 5.0m. Given the proportion of the adit it is likely that it had a tramway installed within it to bring out waste rock and ore.

Recommendations

This site is difficult to access but fencing might be necessary.

Site 351 Adit SX 42445 72469

351/1 Gunnis SX 42440 72479

Background

Refer to the background section above.

Survey

This adit has similar dimensions to that above (Site 350), but its portal was fenced and has now collapsed, as has part of the portal itself.

351/1: North and upslope of the adit, there is a good example of a gunnis worked to surface. This large excavation measures 6.5m wide, approximately 25.0m long and 18.0m deep. The lode inclines to the south. There has been an attempt to fence the site but this is unsuitable at present.

Recommendations

Refer to recommendations made to the site above for the adit. The gunnis should be re-fenced.

Site 352 Wheal Frementor Gunnis SX 42341 72490 (centered)

Background

Given the number of early lode back pits and openworks located during the field survey along this part of Blanchdown Wood, it seems to be reasonable to assume that this site was also worked during this 18th century period but abandoned, resuming in the middle of the following century.

By 1850, four 'tutworkmen' were working Frementor (Bennett 1992, 22) and this site was also worked in the 1860's (see accounts given above at adit sites). It seems that a small number of people worked the site for some years. *'The 20-fm. Level of Frementor Mine connects with this adit (Deep Adit from South Fanny Engine Shaft) 25 fms. in...During the search for arsenical ores in the early 1920's, the mine was reopened and deep adit cleared. Arsenic values between 6 and 8% are said to have been found and some patches of low grade tin ore; there appears to have been no underground production but the dumps were worked for tin until about 1930, yielding between 10 and 15 lb. of black tin per ton'* (Dines 1956, 660).

Richardson (1995, 103) gives more detail on the 1920's work: *'in January 1925 ...underground work at Wheal Maria and Wheal Fanny had ceased and the main effort had switched to 'Framator' (Wheal Frementor) where work had been suspended since 1919. Entries (in workbooks) occur in respect of 'moving hoisting lorry from Wheal Maria to Framator' and a major project, occupying half of the available workforce of about 40 was 'Extending railroad to Framator' from Wheal Anna Maria. At Frementor characteristic preliminaries of 'Timbering shaft'... 'stoping', 'filling kibbles', 'hoisting' and 'preparing to send in tin ore' and shortly afterwards 'Sending in ore for stamps', implying that the (small narrow gauge) railway was then in use between Frementor and Bedford. The record of the workbooks ends in May 1925, which is probably the date that the Arsenic Works was abandoned, although mining at Frementor, together with limited re-working of dumps, carried on until about 1930 (for tin and wolfram)'.*

Refer to the background section of Site 350 for references to lodes/cross courses etc at Wheal Frementor.

Survey

Field survey at Wheal Frementor identified the location of a large open gunnis. At the higher end of this feature (from SX 42321 72505 to SX 42340 72509), it is to the south of a mine track. At its base on the south side, evidence of the 1925 works can still be seen.

The gunnis is approximately 15.0m long (from east to west, following the lode), 15.0m deep (to water level) and approximately 4.0m wide. It has an old concrete and timber post fence (1.1m high), with five strands of wire, though this is in poor condition.

Downslope of the south side of the gunnis (next to the 1925 workings), part of the covering of the granite outcrop has been removed allowing miners to access the lower parts of the gunnies, firstly by another narrow openwork cut into the south side of the gunnis, and secondly, by later shafts and a possible adit (perhaps cut in the 1920's), to access the lower parts of the lode (see Site 353 below).

The north - south narrow openwork (at SX 42354 72486), appears to follow the line of the main cross course shown on Symons 1848 map. Granite has been left along the sides of the openwork. The top of this is 2.0m below ground level, its depth being 3.0m and in width varying from 0.8m to 1.3m, over a length of 5.0m. At its end there is an opening 1.0m wide and 2.0m high (with rubble at its base), which gives a view of the interior of the

gunnis. The section that can be seen measures 2.8m wide and 4.0m deep. Timber setts can be seen in the gunnis, which seems to be approximately 10.0m in length. The gunnis is flooded, and there appears to be a flooded shaft in its floor.

Recommendations

There are few deep holes or open shafts remaining at Devon Great Consols. This is one site close to a track that could perhaps allow a view into open workings. The gunnies should be fenced. At the bottom part of the gunnis the front of the openwork will also need to be fenced as it leads both into the flooded interior of the gunnis and a shaft (see Site 353 below).

Site 353 Wheal Frementor Shafts SX 42358 72481 Grade C

Background

Refer to the background section above. The shafts and adit are located on the southern side of the gunnis by the leat or track bed adjacent to the northern openwork.

Survey

Two possible shafts and an adit were located. One shaft (SX 42354 72486) is on the eastern side of the narrow openwork. This has a side entrance at ground level whose opening measures 1.7m wide and 1.6m deep. The shaft is choked at a depth of 2.0m below ground level where it is 0.9 x 0.9m in plan. The shaft does not appear to link to surface.

The possible adit is located 4.0m east of this shaft. It is spanned by a rotting timber lintel and its base is 0.7m above ground level. The opening measures 1.3m wide and is 1.6m high. A large boulder and stones block the interior.

The second shaft (at SX 42354 72486) is at the northern end of the narrow openwork, near the opening into the gunnis. The shaft is cut through bedrock and measures 4.0m deep, is 3.0m across the top of the opening and is 1.0m in diameter and is choked with rubble and leaves.

Recommendations

It is possible that there could be public access to this site (from adjacent tracks along the tramline). The front of the openwork will need to be fenced. The other shaft side entrance could be grilled, whilst the possible adit is already blocked internally.

Site 354 Wheal Frementor (1925) dressing floor SX 42361 72484

Background

The 1925 mine was located at the west end of a leat (Site 71), at SX 42360 72488. This consisted of a winding/loading area and the start of the narrow-gauge railway to the new Anna Maria arsenic works. Refer to the background comments made in Site 352 above.

Survey

The track bed leading to the shafts and gunnis is roughly 3.0m wide. A working area 6.0m wide has been created near the gunnies. On the ground are remnants of iron straps, timber connectors and a riveted iron plate ore hopper, 0.7m wide, 1.0m long and 0.9m high.

There is a retaining wall on the northern side of the working area which measures up to 2.0m in height. Evidence of corrugated roofing can be seen as well as a low machinery plinth with upstanding bolts.

10.0m east of the shaft - gunnis area (at SX 42361 72491), an excavation has been made into the hillslope measuring 5.0m in width and 8.0m in length, the rear wall measuring 3.0m in height. There is a low revetment wall measuring 0.7m high in front of this excavation that is slightly proud of the rest of the revetment wall (whose maximum height is 1.9m). This may be the location of the Garrett steam engine (pictured in Richardson 1995, 102) '*with chain drive transferred from road wheels to hoisting drum*'.

Recommendations

A small amount of consolidation is needed to the retaining wall.

Site 355 Quarry SX 42580 72783

Background

This small stone quarry is shown on the 1867 and OS 1884 maps.

Survey

The rear of the quarry is 5.0m high, which reduces as the sidewall meets the mine track on its south end. The floor of the quarry is covered with rubble and stone and the sides are covered with vegetation and trees. The quarry measures 11.0m from east to west and 12.0m from north to south.

Recommendations

See recommendations for similar sites above in terms of the removal of trees from the sides of the quarry and fencing of the track side edge.

Site 356 Shaft SX 42546 72600

Grade C

356/1 Prospecting pits SX 42570 72602 to SX 42532 72600

Background

This shaft is shown on the 1867 map, but not the OS 1884 map. No other shaft head features were shown in close proximity. Sherrells shows this shaft as being on No. 1 Lode (oriented east - west) (2000, Report No. 1915).

Survey

The shaft was difficult to locate (being amongst lode back pits) but it is 2.0m long, 1.0m in wide and 0.5m in deep. It is sited on a rocky outcrop.

356/1: The numerous lode back pits east and west of the shaft measure approximately 1.0m in deep, 2.0m in diameter with elliptical shaped spoil heaps on their downslope side.

Recommendations

The shaft is relatively close to a mine track that may well be used by members of the public. It should be fenced.

Site 357 Large dressing floor sands tip SX 42737 73244 (centered)
357/1 Sites of earlier reservoir ponds
SX 42737 73205, 42773 73240

Background

Since the 1850's, dressing floor waste has been deposited in the area south of the 'lower' Anna Maria dressing floors. Unfortunately, the 1867 map that shows the mine in such detail does not show waste dumps. However, the OS 1884 map indicates where the waste material was tipped (refer to Fig 16), the space between the long line of automated settling tanks and the site of two rhomboid shaped reservoir ponds.

The water held in these two ponds appears to be separate from that coming out of the long settling tanks, which went to a series of smaller settling tanks to the south, before being fed to a large rectangular tank (see Site 363 below).

The 1884 map shows that ~~the two~~ rhomboidal ponds (SX 42734 73203 and SX 42773 73240-both centered), had not been impinged upon, although two long finger dumps with railway lines on top had been constructed. The 1904 OS map (Fig 11), however shows the site topography to be very different, and similar to its present form, with two earlier reservoir ponds completely covered over. Presumably the re-processing of old dumps caused much waste to be created (the mispickel contained only 1% of copper ore and 5% arsenic). The MRO Abandoned Mines Plan (15314 Fiche 11/11 dated December 1940), shows a plan of the sands tip and the finger dumps described below.

The 1947 aerial photo (Fig 36), shows the further dumping that occurred during the 1920's, extending the tip to the west and slightly to the south. The 1954 third edition OS map shows the mine track delineated between the main two main tips, but the western edge is now further back to the east. This shape closely resembles the field remains.

The 1990 Wardell Armstrong Report (South-west Water Gunnislake intake pollution risk study), tested the waste tip material and found it to contain high levels of arsenic, with some tin and mercury.

Survey

There is very little vegetation on the top of the waste tip and there are four distinct finger dumps on its top surface. It appears likely that tramlines were built forming these distinctive linear dumps. These dumps are approximately 1.0m high and 1.5m wide. On the sides of the tip there is evidence of timber revetment posts and of timber supports for tramlines. These can be seen by reference to Richardson (1995, 100 Plate XLV) in a photo taken in 1938. The waste material is brown and the particles are angular (having been crushed) and burnt. Motorbikes use this tip and a course has been partly excavated into the dump surface.

The top northern edge of the tip is approximately 100m in length. At its north-western corner this is approximately 1.0m above ground level, whilst the opposite northern corner is approximately 9.0m above ground level. At this north-eastern corner the tip section provides evidence of previous tramway dumping levels. The tip measures approximately 80m from north to south.



Figure 31 Large sands dump tunnel (C. Buck CAU 2002)



Figure 32 Large sands dump tunnel – interior (C. Buck CAU 2002)

The top edge of the south-western tip is approximately 18.0m in height. This top southern side of the tip is approximately 90.0m in length. The sides of the slope are weathered, with some small water run-off gulleys. The tip appears to be stable. At the south-eastern corner of the tip, some material has been removed by machine, leaving a vertical face from 1.5m above ground with a height of 2.25m over a length of 10.0m.

Recommendations

This large spoil heap is contaminated with heavy metals. It is recommended that it is allowed to naturally re-vegetate (as part of the west slope already has), to contain the contaminants and bind the tip together. Both motorcycles and people should be kept off the entire feature. It is recommended that no more material is removed and the heap is fenced around its base at an appropriate distance.

It may be prudent to analyse the toxicity of metal contaminants that are being carried in solution from the heap to enter the water courses downslope.

Site 358 Water tunnel (west) SX 42739 73188

Background

The MRO Abandoned Mine Plan 15314, Fiche 1 to 11), dates from 1940. This includes plans of three 'Sand Dumps' (Sites 112, 357 and 363). Tunnels were cut into the dumps and water run through them to allow copper solution to be precipitated on pieces of iron. Fiche 11/11 shows four tunnels cut through the dressing floor dump. Three of these are oriented north - south, the fourth is east - west. The north - south tunnels opened onto the south face of the main 'upper' tip (Site 357). Only two of these are visible (this site and Site 359 below). From the MRO plan, it appears this site is 'No. 2 Tunnel'. See Site 361 below for the background history of the adjacent 'upper' copper precipitation works.

Survey

The floor of the tunnel is approximately 2.5m above ground level in the south face of the large spoil tip (see site photo-Fig 31). The tunnel is open and water runs through it. The opening measures 0.95m wide and 1.6m high. Adit setts have been used at 1.4m intervals to support the sides and roof of the excavation. The tunnel is accessible for a distance of approximately 8.0m before it is blocked by a roof collapse.

Recommendations

The opening should be gridded, with the design, specification and installation method agreed by the County Archaeologist.

Site 359 Water tunnel (east) SX 42781 73207

Background

Refer to the background section of Site 358 above and 361 below. This tunnel appears to be the 'No. 1 Tunnel' on the MRO plan.

Survey

The floor of this tunnel is located approximately 8.0m above ground level. The opening is 0.7m wide and 1.7m high. In the upper eastern side of the tunnel (0.4m below the roof), a 'bench' has been made along the length of the tunnel. This measures 0.25m high and 0.2m wide. On the western side of the tunnel another 'bench' has been cut out of the tunnel,

measuring 0.7m from the top of the tunnel (see photo in Fig 32). The function of these 'benches' are uncertain. However it may have held timber as part of the roof structure. Approximately 25m from the opening the tunnel is blocked by a roof collapse.

Recommendations

Refer to recommendations given to Site 358 above.

Site 360 Site of 'Higher' Copper Precipitation Works SX 42728 73161

Background

The term 'Higher' and 'Lower' Copper works is used by Booker (1971, 176) to describe the copper precipitate works, although their exact locations are not described nor shown on a map. From the available documentary and cartographic evidence, it is suggested that this site (shown on MRO Abandoned Mine Plan 1531 Fiche 2/11- Dated December 1940), is the site of the 'Higher' works. It appears to have operated in the late 1930's until (according to Booker); it stopped in 1940 when a drought interrupted the water supply.

The plan shows a number of buildings including water tanks, a large stock pile tank, a slimes tank, an electricity sub-station, sheds and offices, and many lines of copper precipitation tanks. A large slime pond is shown south-east of the works site, with an overflow pipe taking water via a long precipitation tank to the west. It is likely that water (with copper in solution) from these works also went into further precipitation tanks sited above the 'lower' works (Site 336). Two buildings are shown on the third edition OS map west of the precipitation works site, the area of which (but not the buildings), are marked on the MRO plan as No. 1 Furnace and Tube (Rinkle Dump).

Survey

There is no surface evidence of the works shown on the plan. Presumably these works were progressively dismantled after closure in the early 1940's. In the late 1960's another processing building was erected here (Site 360). Sites 362 and 363 may relate to either the 1930's precipitation works or the later 1960's reprocessing works.

Recommendations

None, apart from the observation that the site (as shown on the inventory map), should not be affected by any works which would affect below ground archaeological features.

Site 361 1970's Reprocessing mill site SX 42684 73177

Background

'In about 1965 a small but relatively sophisticated modern plant was put up to treat dump ore and included a ball mill, several concentrating tables and a magnetic separator. This was operated by a succession of companies but I have no information as to how well they did and this activity had ceased by 1979' (Richardson 1995, 104). In 1974 a magazine titled 'Mining in Cornwall Today' (describing the activities of the mine companies belonging to the Cornish Chamber of Mines'), gives a description of 'Redcaves Ltd': '...In 1970 the existing company obtained a lease from the present owner, The Rt. Hon. Lord Bradford, and active assessment and exploration of these dumps began again. In 1971/72 a small plant was installed for the dual purpose of recovering tin from small particle (minus 14 mesh) material and to carry out further investigations and tests on a commercial scale. These proved satisfactory ...in 1973, following a partnership with a Canadian mining company, the mill building was extended and a ball mill with ancillary equipment for the recovery of tin was installed. ...the construction



Figure 33 Ball mill (C.Buck CAU 2002)



Figure 34 Lower slimes/settling dump (C. Buck CAU 2002)

and installation work is not quite complete, but a throughput of 300 tons per day-on a three-shift, six-day week basis, is planned to be in operation early in 1974' (Magazine 1974, 13). A photograph of the galvanised steel walled and roofed mill building is shown in the article, and its site plan is shown on the 1954 Third Edition OS map. See a recent photograph of the Ball Mill (Fig 33).

Survey

The cylindrical ball mill is still *in-situ* on a concrete plinth. The mill is 4.0m long and 1.8m in diameter. The plinth is 1.2m wide at its base and 1.0m wide at its top. The main supporting plinth for the ball mill is 1.3m high.

The eastern side of the plinth is 1.2m wide at its base, 0.6m at its top and 1.5m high where it supports the electric motor. A rusting generator powered an electric motor on the eastern side of the ball mill. This was sited in a single skinned concrete block structure (possibly a dwarf wall surmounted by corrugated sheeting), measuring a maximum of 1.2m above ground level. Numerous sections of the demolished wall lie all over the site. The 1954 OS map showed a longer galvanised building than the remnants described above (the ball mill is located at the northern end of the building). Presumably the remainder of the site ran downslope to the start of the southern spoil heap. Little evidence of this survives.

At a point south-east of the south-east corner of the site (at SX 42702 73169), there is a concrete haunched clay pipe (0.15m in diameter) extending for a visible surface length of 7.0m, with concrete blocks built on either side running towards the large southern spoil heap.

Recommendations

The site is now unsightly and contains trip hazards which could be mitigated by the removal of loose rubble and concrete blocks. There seems to be no consolidation works necessary to this site.

Site 362 1940's Mine building SX 42752 73107 362/1 1940's Building SX 42771 73083

Background

The Abandoned Mine Plan (15314 Fiche 2/11) shows a shed and mill building (in outline only), at this site. Many of these buildings were probably constructed of a concrete block dwarf wall (with sometimes a concrete floor but often a suspended timber floor), on which a corrugated wall and roof was erected. Once demolished the surface evidence to such buildings is fragmentary. When the site is on sloping ground, the 'cut and fill' technique used leaves a rectangular flat site. These features may date to the 1970's reprocessing period.

Survey

Earthwork remnants may be this building or perhaps a small reservoir pond. The feature measures approximately 6.0m along its northern side and 5.0m along its eastern side. The banks on the western and southern side are 1.0m deep and 0.5m high (on its southern side). There appears to be little evidence of stone or block work foundations, suggesting that this may have been a small pond.

362/1: This is a similar but smaller rectangular feature that measures approximately 2.0m x 2.0m. There are remnants of asbestos walls in and around the site that were fixed to a timber framework.

Recommendations

The asbestos sheeting should be removed to an appropriate landfill site, but otherwise this site should not be disturbed.

Site 363 Large 1920-60's slime/tailings pond

SX 42816 73135 (centered)

363/1 Site of earlier slime pond SX 42874 73089 (centered)

Background

The slimes water from the long settling tanks (Site 187), went directly to a series of smaller settling tanks to the south, before feeding into a large rectangular tank, as shown on the 1867 map. The 1884 map shows that four of the small settling tanks had been removed by this date. This network of smaller tanks seems to have been an attempt to take out the heavy metals remaining in the waste slimes after all the dressing floor processes had taken place, before the water reached the River Tamar. The 1904 OS map (Fig 11), however shows the site to have been very different from the 1884 map, and similar to its existing form. The MRO Abandoned Mines Plan (15314 Fiche 2/11 dated December 1940), shows a plan of the tip and the 'slime ponds' described below.

The large rectangular slime pond shown on both the 1867 and 1884 maps had, by 1904, been completely covered over. The 1940 MRO plan labels a 'Slime Pond', but appears to show two ponds. This appears to be confirmed by the 1947 aerial photo (Fig 36), which shows the site to be similar to the earlier MRO plan. The 1954 OS map does not show the south edge of the slime pond nor delineate its western side in the same way. This may be a result of the 1940's reprocessing works - expanding the area of the top of the slimes pond to the west. This profile and shape of the tip shown here closely resembles the field survey observations.

The 1990 Wardell Armstrong Report (South West Water Gunnislake intake pollution risk study), tested the waste tip material and found it to contain high levels of arsenic and tin, with slightly lower levels of silver, copper, antimony and mercury.

Survey

The route of a tramline from the re-processing site is visible on the western side of the site. The eastern side of the site still retains the two tailings ponds shown on the 1940 abandoned mines plan. The top surface of this large feature is grassed over far more than the dressing floor tip. The colour of the surface material is a much darker brown and contains a finer sandier/clayey aggregate than the dressing floor tip.

The tailings ponds measure approximately 80.0m wide (east - west) and 100.0m long. The entire top surface of the feature measures approximately 120.0m wide and 130.0m long. The north end of the ponds are low, but at their south-western corner, the top of the bank is approximately 10.0m above ground level.

Recommendations

Refer to recommendations given in Site 357 above.

Site 364 Leat (west) SX 42845 73051 to SX 42874 72993
364/1 Leat (east) SX 42898 73058 to SX 42910 73019
364/2 Drainage pipe SX 42932 73023

Background

The 1867 map shows a pair of leats to the south of the large slime pond. The western leat came straight down from a pair of reservoir ponds (apparently carrying 'clean' water), and is now completely covered by the dressing floor sands tip (Site 357). The leat then fed directly into a larger leat (Site 5), that took 'cleaned' mine water back to power another water wheel and then to power the Josiah and Anna Maria wheels. Part of the western leat was also shown on the OS 1884 map, although its route down to the rectangular slime pond (later covered over by later larger ponds) had, by the late 19th century, either gone or was not recorded.

As shown on the 1867 map, the eastern leat went from a small settling tank (immediately south of the much larger slime pond), before it met the larger leat (Site 5) further to the east. This is not shown on the 1884 map.

Survey

Both leats are extant and measure 1.0m in width across their bases and their banks are 0.5m wide. At a point where the eastern leat goes under the road a new steel pipe has been laid (Site 364/2). This measures 0.3m in diameter and has a length of approximately 5.0m, being set at a depth of 0.15m below ground level.

Recommendations

Refer to general recommendations with regard to leats. Heavy machinery may damage this pipe.

Site 365 Small precipitating tank/building SX 42867 72979

Background

This feature is not shown on archive maps. It appears to be contemporary with Site 362/1 (dated to the 1940's or 1960's. It is located near the original course of the western leat (Site 364) above, and appears to either be a small precipitating 'pond' or the low banked site of a building.

Survey

The feature is rectangular in shape and measures 2.6m wide and 7.0m long. Its base is at a depth of between 0.7 and 1.0m below ground level. There are remnants of rotting timber and pieces of corrugated asbestos sheet around the site.

Recommendations

The asbestos at this site should be removed and disposed of. The building should otherwise not be disturbed.

Background

Survey

Recommendations

Site 367 Ventilating Shaft and capstan pit
SX 43101 73415 Grade C

Background

Survey

The shaft is 8.0m from the railway track and is approximately 1.75m in diameter, open to a depth of 2.0m. The south side of the shaft has been partially excavated away, leaving an elongated gash measuring 1.0m wide and 0.7m deep.

Approximately 5.0m to the west of the shaft there is a depression measuring approximately 2.5m in diameter and 0.9m deep. This may be the site of a capstan (although one is not shown on the 1867 map).

Recommendations

Given the shaft's proximity to the main railway line, which may be used as a public access route through the mine, it should be fenced and a warning sign erected.

Site 368 Small Quarry SX43223 73387

Background

This quarry is not shown on archive maps.

Survey

A small quarry is cut into the eastern side of the flat rod gulley (north of the junction of the flat rod cutting with the main railway line). Its rear face is approximately 3.0m high, and its floor area is 5.0m wide and 4.0m long (north - south). In front of the quarry (on the flat rod bed) is a small pile of earth and rock. The OS 1884 map (Fig 9), shows a rectangular feature of unknown function in the flat rod bed close to this site.

Recommendations

None.

Site 369 Parallel leats SX 43213 73144 to SX 43083 73162

Background

These leats are not shown on any archive maps seen during the production of this report. They appear to run parallel to one another.

Survey

Both leats are 0.4m wide at their bases and 0.5m deep, with banks approximately 0.4m above ground level and 0.4m wide. They are sited approximately 0.75m apart. The pair of leats merge at a point 10.0m south of a south-easterly change in alignment near Plunger Shaft (Site 320). These features appear to be leats however but may be old woodland maintenance tracks that have given the impression of leats.

Recommendations

Refer to general recommendations given above for long term management of leats.

Site 370 Wheal Thomas/Watson's waterwheel pit SX 43599 73017

Background

This mine, named Wheal Jack Thomas up to the 1870's, and Wheal Watson thereafter (after Mr Peter Watson, the managing director from 1879), was worked from the late 1840's, 12 Tutworkmen and 2 labourers being employed in 1850. It developed the eastern end of South Fanny Lode: *'It had yielded arsenical mundic when it had been worked in 1855 and 1856, at which time the emphasis had been on copper production. The ore had then been left on one side, but 24 years later (after Main Lode had been exhausted and the arsenic market inflated); it represented a valuable asset. To speed up the work in the mine and to reduce labour costs by as much as ...30% the company decided to purchase rock drills and an air compressor'* (Goodridge 1964, 253). Barton (1964, 79) goes further: *'This section of the sett (in 1879) ... was opened up vigorously and was pumped by a further 280 fathoms of flat-rods extended to the shaft from one of the existing pumping wheels'*. By the early 1880's this mine and Wheal Emma were the only copper producing parts of the mine.

The mine, shafts and flat-rod from the water wheel are shown on the 1857 Lease map (Fig 7), and succeeding maps. The site stretched from the water wheel at the bottom of the valley to Watson's Shaft at the top of the hill. Documentary evidence for the size of the

water wheel comes from Hall (2000, 107), quoting an 1860 survey; *'Wheal Thomas pumping wheel, 36 ft. by 4 ft.. cast-iron axle'*. The 1867 map shows the site of the water wheel, an adjacent building (perhaps a flat rod crank pit), and the leat supply for the wheel (from Site 5-the leat from Scrubtor 2.5 miles away).

Survey

A fragment of wall 1.0m long and 0.2m in height may mark the south side of the building. The water wheel pit has been entirely filled in, leaving a slight dip in the ground at its eastern end. The area where the building was sited is raised by 0.6m from the level of the ground at the wheelpit site.

Recommendations

It is likely that there are below ground remains of the wheelpit, and possibly the adjacent building. The site should not be disturbed. More could be made of this site by revealing the top 0.5m of the sides of the wheelpit and building, and consolidation and repointing thereafter.

Site 371 Old Shaft SX 43608 73094 Grade B
371/1 Masonry structure SX 43608 73094

Background

This shaft is only shown on the 1954 third edition OS map. *'Wheal Thomas lies ...on a lode 330 fms. to the south of the main lode. It has not been rich, but it has been, on the whole, a productive mine, having about paid cost. The lode, like the main lode, underlies south, and at about the same angle; it averages about 3 ft. wide, and is explored 35 fms. below adit, which comes in itself about 40 fms. deep. It is drained by the water wheel...'* (Hall 2000, 104).

Survey

The shaft (in plan measuring approximately 1.5m x 1.5m), is located on the east side of a tall masonry structure (its design resembling the Wheal Emma flat rod tower-Site 284). The shaft itself can just be defined but it has been filled with rubble from the nearest of two halves of the masonry feature next to the shaft.

371/1 The extant tall masonry (tower) wall next to the shaft is not stable. Its top is narrower than the base. Its width at the base measures 4.0m and at the top is approximately 2.4m wide. The stonework is 0.95m thick and approximately 5.0m high. There are four timber joist holes set in the inner (east) face of the wall (the highest pair located 1.0m from the top, the others 1.0m lower). These appear to have supported the second parallel and similar sized wall (that has now collapsed into the shaft). The pile of stone in and next to the shaft supports the remaining tower wall (to a height of 2.5m above ground level). The remnants of the masonry feature next to the shaft may have been a high masonry mounting for a winding drum or related flat rod pumping mechanism.

Recommendations

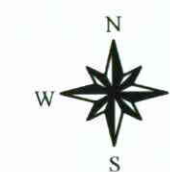
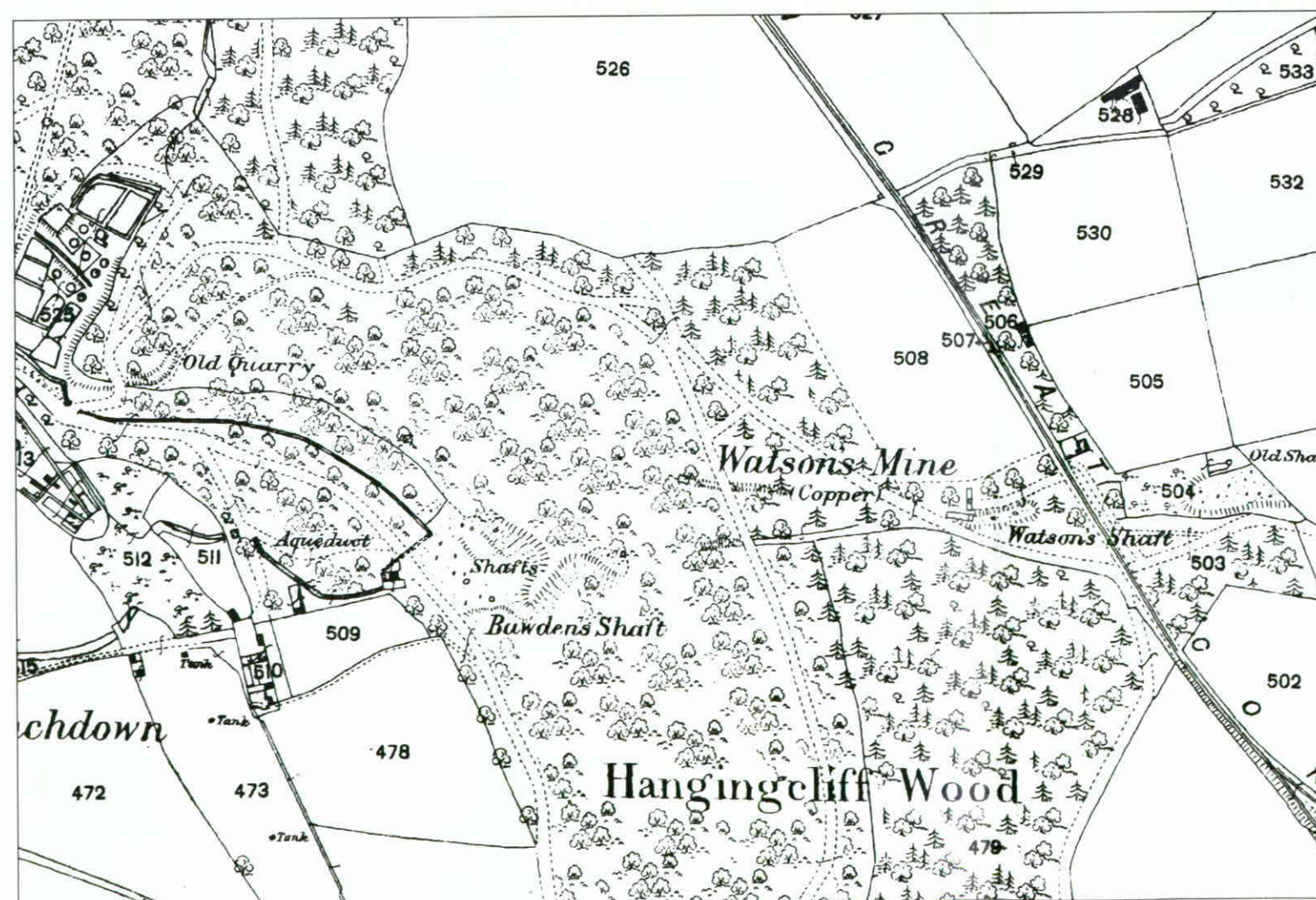
The nature of the shaft choke (below the collapsed masonry), is not known. The adjacent standing wall is not stable and is held up by rubble. These features should be photographically recorded and surveyed in detail as soon as possible, prior to consolidation. The shaft and remaining masonry should be fenced.



Figure 35 *Wheal Thomas/Watson
as shown on the surface plan
'Tavistock Parish (Div. No.1)'
1867*

(Tavistock Parish (Div. No. 1) - DRO/T1258M/E11 - 3 chains - 1 inch)

0 25 50 75 Metres



**Wheal Thomas/Watson
as shown on the Ordnance
Survey plan 1884**

(OS 1884 - © Crown copyright and Landmark Information Group
CCC licence No. LA076538.)

0 25 50 75 Metres

Site 372 Masonry structure SX 43604 73092

Background

The masonry feature south of the shaft (Site 372/1) appears to have been a mounting plinth for an angle bob which transferred flat rod power from the east (possibly Site 383), to a vertical motion to pump the shaft. The flat rod cutting is partly shown on the 1884 OS map, but has been pencilled in on the 1867 map. The date of this structure therefore seems to be soon after 1867.

Survey

This feature is approximately 5.0m south of the shaft. The masonry measures 3.2m wide and 2.1m long (east - west), whilst the maximum height of the structure is 2.5m. There is a timber lintel (with three mounting-bolt tensioner openings below), along the northern and southern sides of the feature, 1.0m below its top surface on the north side and 1.4m on the south side. The timber lintel is not in a good condition, and the stonework above it is moving and collapsing. Vegetation is also growing all over the masonry, dislodging more stonework on the sides and top.

Recommendations

The masonry plinth needs to be consolidated. The timbers should be renewed and the masonry above repointed.

Site 373 Site of mine buildings SX 43646 73045

Background

Three small mine buildings set within one of two yards (with an outer wall) are shown on the 1867 map. The later 1884 map does not show the buildings, merely the site upon which they stood. The buildings may have been primary dressing floors or may relate to power feeds from the flat rod to Watson's Shaft (Site 383).

Survey

The site of these buildings and yards show as two excavations now forming level platforms. The upslope revetment (either a wall or bank), for each of the yards varies from 1.0m to approximately 2.6m high with a length of approximately 10.0m and the downslope side is 2.0m high. There is much rubble over the site masking possible features.

Recommendations

The remnants of the platforms and revetment walls should not be disturbed.

Site 374 Adit SX 43699 73031

Background

This feature is not shown on the 1884 or later maps. The 1867 map shows a mass of waste rock from a point half way up the hill (at Site 375) down to the bottom of the hillslope. This follows the line of the lode and suggests that adits and shafts were cut to follow the lode. The flat rod also follows this route up the hill. This feature is either a small quarry or a collapsed adit portal (an adit is shown on the 1867 map in this general area).

Survey

Although the physical remnants of this site resemble a small quarry, a collapsed adit cannot be discounted. If so, only 2.0m of the portal rock is visible as some of it has collapsed and is banked against the probable site of the opening. The rear wall is set back from the adjacent track at a length of 10.0m. The adit lobby floor is 5.0m long.

There is a finger dump coming away from the floor of the feature to the west. This is approximately 10.0m high at its downslope end; the tramline route on top of the finger dump is approximately 13.0m long.

Recommendations

This site is relatively inaccessible. The positive identification of this feature as an adit needs to be undertaken.

Site 375 Whim/Air Shaft, capstan and finger dump SX 43719 73032 Grade C

Background

This shaft is sited part way between Wheal Thomas/Watson's Engine Shaft at the top of the hill (accessing the eastern part of the lode), and Western/Bawden's Shaft at the bottom of the valley sides (accessing the western part of the lode). The shaft is shown on the 1857 Lease map and was labelled 'Air Shaft' on the 1867 lodes map (Fig 8). Dines (1956, 660) notes that this shaft is sunk to a depth of 44 fms. below surface. The name of the shaft perhaps indicates that a horsewhim was sited here to wind the ore from the workings below and to the east.

Survey

A granite stone in the centre of a depression marks the shaft hollow, which is 6.0m in diameter and 0.8m deep. In its eastern corner there is another depression 1.5m long and 2.0m wide. On the southern side of the shaft there is a flat area measuring 9.0m x 9.0m, that may have been a working area or the location of the whim.

Recommendations

This site is relatively inaccessible, and the shaft appears to be stable. It may well be sensible to fence the shaft, erect a warning sign and to annually monitor its condition.

Site 376 Wheal Thomas flat rod cutting SX 43721 73036 to SX 43900 73049 376/1 Flat rod cutting SX 43868 73063 to SX 43741 73073

Background

The 1857 map shows a flat rod running from the water wheel up to Air Shaft (Site 375), to Engine Shaft (Site 383) and further uphill to Old Shaft (Site 380). The 1867 map (Fig 35), shows the flat rod route from Air Shaft to Engine Shaft and a pencilled-in upper route from Engine Shaft in the direction of Old Shaft (Site 372). Both routes are shown as cuttings on the 1884 OS map.

Survey

The bottom of the cutting shown on the 1884 map, south-east of Air Shaft can be seen. This measures 1.0m wide and is cut into the ground for a depth varying from 0.5m to

0.75m. The hillside at this point is very steep and the feature could be safely followed. The cuttings can be seen west of Engine (or Watson's Shaft) in the woods, but these have been damaged in places by plantation activity.

Recommendations

None. However, it is recommended that no further damage be caused to these archaeological features.

Site 377 Bawden's/Western Shaft and Capstan SX 43651 73009

Grade B

Background

Dines (1956, 660) notes that this shaft is sunk to a depth of 44 fms. below surface. This shaft was named Western Shaft in 1867 but the name then changed to Bawden Shaft by 1884 (after Moses Bawden, then purser of Devon Consols). The siting of the shaft, very close to the road, may have provided a good opportunity to transport the ore straight onto wagons for dressing. It is perhaps likely that in the second working phase of the mine mundic would have been wound up Watson's Shaft and taken by the mine railway to Anna Maria.

Survey

The shaft depression measures 4.0m from north to south and 5.5m from east to west, with a recent surface collapse at the western end measuring 1.5m deep and 1.3m wide. This has revealed a small section of masonry (0.45m x 0.5m) in the side of the shaft which may be the site of balance-bob mounting masonry. There is a granite marker post in a deeper depression in the eastern part of the shaft which is 1.0m x 1.0m below ground level.

The capstan appears to have been sited approximately 7.0m north of the shaft. Its hollow is 2.0m in diameter and 0.5m deep. This is located equidistant between this shaft and Shaft 378.

Recommendations

It is recommended that the shaft is fenced and a warning sign erected.

Site 378 Shaft and Capstan SX 43638 73019

Grade C

Background

This shaft is not shown on any archive map seen during the preparation of this report. It was originally identified as a shaft in the Sherrell Geotechnical report (No. 1915, dated 2000).

Survey

There are a number of depressions north of Bawden's Shaft measuring 1.0m in diameter and 0.5m deep. This depression is larger and measures 3.0m in diameter and 0.5m deep. The capstan for this shaft may well have been that serving Bawden Shaft.

Recommendations

It is recommended that the shaft is fenced and a warning sign erected.

Site 379 Site of adit SX 43622 73020

Background

Dines (1956, 660) states: '*Adit Level is the 40-fm. Level of Watson's Shaft and its portal is on the hillside about 50 yds. W. of Bawden's Shaft*'. The 1867 map shows the position of the adit outflow on the west side of the road and its path down to the south of the water wheel to join the water wheel tailrace which fed to the larger water wheels to the west. The adit was not shown on the 1884 OS map.

Survey

The site of the adit is covered over with earth and leaves (its route runs under the road). The portal of the adit is not visible and the ground level here appears to have been raised by earth and spoil dumping.

Recommendations

The adit, if it has not already been filled in, is likely to be close to ground level under the road. Given the likely use of this track for contractor's access, the location and condition of the adit should be investigated. Searching for the adit portal by hand (given the information shown on the 1867 map), should be the initial step, followed by an assessment of the tunnel under the road. The nature of these safety works and any subsequent remediation should be agreed with the County Archaeologist.

Site 380 Old (Eastern) Engine Shaft SX 44034 73077 Grade B

Background

'Eastwards of Watson's Shaft the 25-fm., and 40-fm. levels open up the ground for about 200 fms., but the stoping between them extends only 100 fms. E. and about 10 fms. W. of the shaft. Eastern Shaft, 150 yds. E. of Watson's is sunk to the 30-fm. Level only' (Dines 1956, 660).

The shaft is shown on the 1857 lease map (Fig 7) and later maps but labelled as Old Shaft. Presumably it was one of the shafts sunk when the mine was first investigated in the early 1850's.

Survey

The shaft depression is 2.5m wide, 4.0m long and 0.8m deep. A granite shaft marker is set in the eastern end of the shaft near some vertical walling that is 3.0m long and 0.3m deep, set in the north face. The shaft appears to be set at the east end of this elongated depression. The 1857 lease map implies a flat rod up to this shaft, which suggests that the long depression was an angle-bob pit (transferring the horizontal motion of the flat rod to a vertical one for pumping). South and west of the shaft are spoil heaps that appear to be relatively stable, although covered by trees. A stone revetment wall has been built at the foot of the spoil heaps.

Recommendation

The shaft is accessible with ease from the main railway line. If the railway line is to be re-opened as a route across the mine and to Morwellham, this shaft will need to be fenced and a warning sign placed nearby. If there is funding, a small amount of interpretative excavation could reveal a little more of the masonry wall and any remnants of the angle-bob pit walls.

Site 381 Prospecting pits SX 44000 73065 (centered)

Background

Watson's Lode was worked from the late 1840's to mine copper ore. From the late 1870's this lode was re-worked, to remove the mundic left on the sides of the copper lode worked some twenty years previously. These pits may well date from the late 1840's when the lode was being first investigated. Given the shallow depth of the nearby shaft (its floor is only 54.0m deep); there may have been signs of the top of the lode at bedrock level. It may well be that these pits are earlier in date (late 18th century).

Survey

The pit openings measure 2.0m x 2.0m in diameter and are 0.5 to 0.75m deep, with spoil often on their northern sides.

Recommendations

None, although if access to Old (Eastern) Shaft is allowed it may be necessary to steer people away from this area, to avoid any possible trip/fall hazards they present.

Site 382 Site of mine building SX 43929 73145 382/1 Site of mine building SX 43952 73086

Background

This large mine building is shown on the 1867, 1884 and 1904 maps. The later map shows that part of it may have been re-used and re-roofed. Given the amount of mine waste near Old and Watson's Shafts, it appears likely that there may have been a certain amount of primary ore dressing before the ore was loaded onto railway wagons to be fully dressed at Anna Maria. This building may have been associated with that activity.

Survey

The platform upon which the building was sited is visible, but there is no evidence of walls, only a mound of rubble. There appears to be a ditch around the platform that is 0.4m below ground level, with a possible entrance on the north side.

382/1: There are slight traces of the platform upon which the building was sited. Again rubble and vegetation have hidden any other surface remnants.

Recommendations

The site should not be disturbed. If woodland management may have an effect on the long-term preservation of this archaeological feature, these implications should be discussed with the County Archaeologist.

Site 383 Watson's Engine Shaft and spoil tips SX 43911 73048 Grade B

Background

'Watson's Mine worked an east-west lode about a third of a mile south of the eastern end of the Devon Great Consols Main Lode. The chief shaft was Watson's ...sunk on the underlie, 18° S., to the 172-fm. Level below surface.... The ground west of Watson's Shaft seems to have been

unproductive. Eastward of Watson's Shaft ... between the 136-fm. and the 172-fm. the ground is blocked out from 30 fms. W. and 100 fms. E. of the shaft ... about a third of the ground has been stoped' (Dines 1956, 660).

This shaft is shown on the 1857, 1867, 1884 and 1904 maps. The 1867 map (Fig 35), shows the shaft in detail. The angle bob pit (and probable balance bob box mountings) are shown on the western side of the shaft (aligned with the flat rod), with the capstan shown on the north-west side of the shaft. The 1884 map shows a similar layout, although the long slot appears to be oriented towards the flat rod down to Old Shaft (Site 372). Another building or feature is shown on the northern side of the shaft.

Survey

On the eastern side of the shaft there are large spoil heaps. At least five finger dumps can be seen (two of which are well defined). The spoil dumps themselves are 8.0m high. There is no visible evidence for the two structures next to the buildings. Two rubble dumps measuring 1.0m high and 2.0m across the top occupy the site of the northern feature. There is no evidence for the shaft, apart from an area where four mounds of waste rubble (averaging 4.0m high), have been formed around a level area. The capstan may well have been located on the top of the spoil dump. The area around the shaft is much changed from the 1867 map.

Recommendations

The shaft should be located and fenced.

Site 384 Charcoal burning platforms SX 43724 72867 (centered)

Background

The woodland on the side of this west-facing hill consists of deciduous trees. Charcoal burning platforms are likely to have been distributed around the mine (particularly in the Blanchdown woodlands shown on the 1843 Tithe Map -see Fig 4a. Little evidence for these medieval (and/or post medieval) features have been found elsewhere on the mine and it is presumed that the conifer plantations have destroyed evidence for them.

Survey

The platforms measure approximately 4.0 to 5.0m long (along the slope), and 2.0 to 3.0m wide. They are cut into the hill slope giving a rear face approximately 0.5 to 0.7m high (dependant on the slope). They are distributed across the side of the hill from a quarter of the way up the slope to the steepest slopes.

Recommendations

Haulage and woodland management vehicles should not disturb these features.

Site 385 Plunger (Engine) Shaft flat rod cutting

SX 43289 73110 to SX 43303 72876 (Wheelpit)

385/1 Site of pipe route from Plunger Shaft to Wheal Josiah

SX 43290 73113 to SX 43209 73545

Background

The 1867 and 1884 maps (Fig 35) show the route of the flat rod from the Plunger water wheel (Site 322/2) to Plunger Shaft (Site 320). The 1867 map shaded in the flat rod route

as a track, but the piped route from the shaft to Wheal Josiah reservoir is not shown, except on the 1857 lease map (Fig 7).

Survey

With the exception of a small part of the route through the woods to the south of Plunger Shaft, there is no surviving surface evidence for the flat rod route. The section through the woods contains fragmentary remains of the cutting although it seems to have been at ground level for most of its route.

385/1: There is no evidence at surface of the pipe (which incorporated non-return valves), through which water from Plunger Shaft was pumped up to Wheal Josiah reservoir ponds. Presumably it was on small supports on the ground.

Recommendations

None.

Site 386 Prospecting and lode back pits

SX 42148 72902 to SX 42255 72945

Background

Refer to Site 179 above. These pits are offset slightly to the north of South Fanny Lode and runs parallel to a north - east, south - west track.

Survey

There are two parallel lines of pits (approximately 25.0m apart). The southern line of pits is smaller and more sparsely distributed (in the areas that have been surveyed) than those to the north. An average measurement of the depressions is 1.2m wide, 1.8m long and from 0.8 to 1.2m deep. A typical width across the top banks is approximately 3.6m. The elliptical shaped spoil heaps are approximately 1.0m high (downslope).

The northern line of pits is deeper and includes an openwork. This is made up of a number of excavations connected underground to a stope that is approximately 1.5 to 2.0m deep. The average width of the depressions measures (at their base) 2.0m and they are 5.0m across the banks on either side of the lode back string. The average length of each pit at its base is approximately 3.0m, and the total length of the openwork is approximately 30.0m.

Recommendations

Given the proximity of this feature to the track it may be prudent to fence along the southern line of pits closest to the tracks.

Site 387 Prospecting pits SX 42235 72879 to SX 42313 72913

Background

Refer to Site 179 above. The alignment of the lode back pits is along South Fanny Lode and at the junction with the great Cross-course from Wheal Frementor to Wheal Maria.

Survey

The pits are small and sparsely distributed (in the areas that have been surveyed), averaging 2.5m long, 1.0m wide and from 0.6 to 1.2m deep. The elliptical shaped spoil heaps are

approximately 0.7 to 1.5m high (downslope) along the lower edge of the pit. The pits are sited across the lode and around the junction with the Cross-course.

Recommendations

None. Do not disturb these features during timber operations.

Site 388 Prospecting pits SX 42186 73047 to SX 42297 73054

Background

Refer to Site 179 above. The alignment of the lode back pits are east - west. There are no known lodes or cross-courses nearby.

Survey

These pits are typical in size of prospecting pits and are relatively sparsely distributed. An average measurement of the depressions is 1.2m wide, 1.9m long and from 0.8 to 1.2m deep. The typical width across the top of the pits is approximately 3.6m. The elliptical shaped spoil heaps measure approximately 1.0m high (downslope). The pits are overgrown and sited in a conifer woodland environment.

Recommendations

Obscuring the pits by throwing branches into them creates a Health and Safety hazard. It may be prudent to re-fence the gunnis described above.

Notes:

All the following sites are Listed buildings within Devon Great Consols Mine sett. Detailed survey accounts are given in the Listed building record. However notes have been made here with respect to general observations and relevant historical information collected during research for this report.

Site 389 Wheal Maria Cottages No's 1-20

Listed Building II (EH Ref. 5/154) Devon SMR 37326
SX 41860 74129 to SX 42015 74148.

Notes:

Row of ten paired houses. Built in 1852 (*pers comm.* J. Goodridge).

Site 390 Wheal Maria Mine Count House (No's 23-24)

Listed Building II (EH Ref. 5/153) Devon SMR 37325 SX 41773 73975

Site 391 Wheal Maria Mine Captain's House (Grenoven Farmhouse)

Listed Building II (EH Ref. 5/127) Devon SMR 37327 SX 41821 74019

Notes:

A site labelled as 'Cottages and Gardens' on the 1857 Lease map (although not shown on Symons 1848 map). Shown on the 1867 map (Fig 13) as a single house but appears to have been originally constructed as four cottages (possibly miners or estate workers accommodation). These have now been converted to a single dwelling (Wheal Maria Farm). The local farmer maintains that within living memory part of the lower section on the western side was used to stable ploughing horses.

Site 392 Wheal Fanny Mine Captain's House

Listed Building II (Woodland View - EH Ref. 5/155), Devon SMR 37321
SX 42472 73626

Site 392/1 Listed wall/railings (EH Ref. 5/156) Devon SMR 37323

Notes:

These houses are shown on the 1857 lease map. Only the western building of four shown on the 1867 map survives. This building appears to be one of two mine (or engine captain's) houses sited next to each other; the other two appear to have been ordinary houses. The site of the previous houses can be seen at ground level (on the east side) and have been turned into part of a neighbouring garden. At the back of these houses were other mine buildings and a courtyard with cobbled surface. The cobbles are still extant and some of the adjacent buildings have a 3m high back wall.

Site 393 Wheal Fanny Mine Count House

Listed Building II (Tree View/Harford House) (EH Ref. 5/150) Devon SMR 37322 SX 42379 73606

Site 394 Wheal Anna Maria Houses (1-3)

Listed Building II (EH Ref. 5/151) Devon SMR 37317 SX 42688 73536

Notes:

The 1867 map shows five houses, only three survive. The eastern pair of semi-detached houses have been combined. The eastern detached house has gone, leaving walls 1.0m to 1.5m high.

Site 395 Wh Josiah Cotts (1-5)

Listed Buildings II (EH Ref. 5/152) Devon SMR 37316
SX 42938 73833 to SX 42970 73850

Notes:

The 1867 map shows six houses. There are now five extant houses, the two western cottages having been amalgamated.

8 Table of Sites

Notes:

Fig: Although all sites can be seen on Fig. 38, this column indicates where the site can be viewed in detail on archive maps (the 1867/1881 maps).

FSL No: This column relates to the two geotechnical reports written by F. Sherrell Ltd (see Section 9.1).

WDBC No: This column relates to West Devon Borough Council's Mine Shaft Survey Numbers (reproduced in Sherrell, 2000).

SMR No: This column is cross-referenced to the Devon Sites and Monuments Record. To refer to these sites in the Devon database each site should have a suffix attached before each number (SX 47SW/****).

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
1	Western Shaft	40	8	41811 74342	S129		504/1/8
2	Eastern Shaft	40	8	41917 74357	S128	180J	504/1/8
3	Unnamed Shaft	41	8	41732 74312	S130		
4	Lode back pits	41	38	41574 74461 41710 74436			
5	Leat	42	8	41479 74385 43599 73017 41594 74080 43355 73154 43437 73111	H10/B5		504/32 504/26
5/1	Leat tunnel/spoil heap						
5/2	Leat tunnel under track						
5/3	Leat tunnel and aqueduct						
6	Adit	44	38	41571 74308	S131/H1	179F	557
7	Streamworks	44	38	41446 74352 41500 74215			
8	Adit Shaft	45	13	41603 74082	S126/H2		
9	Working area/platform	45	13	41601 74087			
10	Enclosure	46	13	41541 74101			
10/1	Site of mine building			41550 74088			
11	Bridge	46	13	41533 74077			
12	(Old) Engine Shaft	47	13	41520 74072			
13	Adit	47	13	41542 74066	S127	179H	
14	Adit	47	13	41544 74045	S125	179C	
15	Pair of leats	48	13	41562 74066 41566 73966			
16	Adit/culvert	48	13	41544 73892	S124	179E	
17	Mine building	49	13	41602 73919			
18	Wh. Maria wheelpit	49	13	41629 73919			
18/1	Reservoir pond			41642 73905			
19	Quarry	50	13	41603 73967	E1		
20	Drain portal	50	13	41653 73882	B1		
21	Upper leat	51	13	41632 73885 41599 73829			
22	Lower leat	51	13	41620 73892 41588 73829			
23	Drainage portal	51	13	41600 73829	S123/B1	179B	
24	Drainage portal	52	13	41621 73757	S122	180K	
25	Reservoir pond	52	13	41569 73808 41572 73882			
26	Collapsed shallow adit	53	13	41528 73810	SD9		
27	Settling tank pond	53	13	41534 73894			
28	Mine building	53	13	41582 73808			
29	Mine spoil finger dump	54	13	41672 73903			
30	Castle Shaft	54	13	41670 73887	S121		504/1/7
31	Pond	55	13	41776 73941			
32	Mine building	55	13	41752 73909			
33	Outhouse building	55	13	41716 73966			
34	Reservoir	56	13	41866 74037			
35	Wagon House	56	13	41866 73988			
36	Site of house	56	13	41852 73957			

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
37	Morris's Shaft	57	13	41877 73883	S119	179A	504/1/6
38	Lode back pit	57	13	41894 73889	SD11		
38/1	Lode back pit			41914 73889	SD12		
39	Engine house	58	13	41873 73871			
39/1	Boiler house/chimney			41876 73857			
40	Quarry/tramroad head	59	13	41848 73855	E2		
41	Costean/lode back pits	59	13	42114 73899 42241 73863			
42	Shaft	59	13	42216 73869	S133		
43	Water culvert portal	60	13	41838 73894	S118/H6		
44	Shaft/lode back pit	60	13	41803 73860			
45	Dressing floor building	61	13	41785 73880			
46	Small ponds	61	13	41760 73862			
47	Signalling platform	62	13	41753 73794			
48	Powder Magazine	62	13	41762 73804			
49	Buddles (southern)	62	13	41735 73858			
49/1	Buddles (northern)			41752 73880			
50	Wh Maria settling tanks	63	13	41742 73890			
51	Gard's Shaft	64	13	41769 73903	S120	179	504/1/2
52	Dressing floor buildings	64	13	41689 73876			
52/1	Dressing floor building			41711 73878			
53	Dressing floor wall	64	13	41696 73886 41730 73898			
54	Reservoir/settling pond	65	13	41681 73861 41656 73806 41683 73852 41676 73837 41667 73818			504/1
54/1	Reservoir/settling pond						
54/2	Reservoir/settling pond						
54/3	Reservoir/settling pond						
55	House (sluice operator)	65	13	41676 73798 41694 73788			
55/1	Outbuilding						
56	Leat	66	13	41689 73778 42017 73709			
57	Foundry reservoir pond	67	13	41677 73780			
58	Lower Foundry reservoir pond (north)	67	13	41648 73825			
58/1	Lower Foundry reservoir pond (south)			41647 73827			
59	Foundry House	68	13	41647 73852			
60	Foundry Wheelpit	68	13	41640 73807			
61	Foundry	69	13	41623 73794 41646 73769	S132		504/1/1
61/1	Foundry Water tunnel						
62	Foundry waste/slag tip	70	13	41634 73735	H4		
63	Quarry	70	13	41693 73758			
64	Retaining wall	71	14	41805 73722 41952 73726			
65	Leat	71	14	42017 73771 41794 73724 42020 73755			504/30
65/1	Leat						

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
				41819 73727			
66	Settling tanks	71	14	41913 73729 41939 73730			
67	Copper precipitation trenches	72	14	41953 73748 41955 73733			
68	Shaft	72	14	41970 73732	SD10		
69	Shaft	73	14	41964 73748	S116	180	
70	Site of openwork	73	14	41969 73730 41993 73721			
71	Leat	73	14	42598 73105 42004 73701 42370 72495 42571 73306			504/25
71/1	1925 Tramline from Fremontor to works						
72	Wh Fanny buddles	74	14	42046 73703			
73	Buildings and grinder	75	14	42070 73702			
74	Adit	75	14	42012 73738	S114	180D	
75	Shaft	76	14	42017 73771	S115	180C	
76	Western (Engine) Shaft	76	14	42120 73691	S113	181	504/2/1
77	Finger dump spoil heap	76	14	42108 73671	H5		
78	Western Shaft/capstan	77	14	42117 73716			
79	Waterwheel winder	77	14	42143 73722			
80	Ore Floor	78	14	42154 73701 42170 73700			
81	Site of dressing floor buildings	78	14	42126 73688 42183 73681			504/2
82	Three settling ponds	78	14	42211 73691			
83	Eastern Shaft/capstan	79	14	42238 73695	S112	182	504/2/2
84	Launder/tramroad	79	14	42281 73685			
85	Adit and site of wheelpit	80	14	42277 73691	S111	182B	
86	Site of house/office	80	14	42253 73706			
87	(Air) Shaft	81	14	42264 73704	S110	181B	
88	Leat	81	13	42502 73766 41866 74037 41904 73852 41738 73864	SD16		
88/1	Leat						
89	Reservoir pond	82	14	42268 73657			
90	Leat	82	14	42305 73647 42241 73672			
91	Small settling pond	82	14	42224 73674 42082 73722 42219 73676	SD15		
91/1	Leat channels						
92	Large reservoir pond	83	14	42198 73657			
93	Flooded area	83	14	42175 73653 42276 73651			
94	Large reservoir	84	14	41880 73690 41943 73692	B2		
95	Leat	84	14	41560 73726 42165 73631			
95/1	Leat tunnel						

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
96	Footbridge/Quarry	85	9	41397 73669			
97	Site of building	85	11	41461 73644			
98	Timber summer house	85	11	41486 73442			
99	Adit	86	38	41497 73398	S137		
100	'Great Leat'	86	9	41486 73383 43245 72914 41489 73365 41922 72551 41935 72553 42674 72585 42854 72868 42948 72917 43116 72443 43347 72992			504/27
100/1	River Tamar sluice gate						
100/2	Sluice gate						
100/3	Building						
100/4	Tunnel						
100/5	'Lower' Copper works						
100/6	Leat bridge						
100/7	Site of sluice gates						
101	Site of weir	89	9	41451 73382			
102	Adit portal	89	38	41470 73507	S136		
103	Costean pits	89	38	41548 73358 41612 73207	SD19		
104	Timber maturing ponds	90	8	41529 73280 41609 73055			
105	Site of reservoir	90	9	41680 73698			
106	Rubbytown leat	91	14	42372 73597 43598 73590 42875 73433 43198 73376			
106/1	Leat tunnel and aqueduct						
106/2	Leat railway crossover						
107	Quarry	92	14	42145 73600			562
108	House	93	14	42127 73608			
109	Walled Garden	93	14	42325 73673			
110	Site of mine buildings	94	14	42402 73628 42424 73638			
111	Incline Railway tunnel	94	14	42382 73621	S108	182F	
112	Spoil tip	95	15	42477 73699 42493 73714	S107/H7	182C	
112/1	Leat/railway tunnel						
113	Reservoir pond	95	15	42502 73766 42527 73711	S106	182D	
113/1	Adit						
114	Shaft	96	15	42538 73697	S105	183C	
115	Adit Shaft	96	15	42553 73684	S104	183D	
116	Ventilating Shaft	97	14	42367 73719	S109	182E	504/2/3
117	Site of Jigger House	97	15	42539 73732 42567 73738	H8		
117/1	Waste settling tanks						
118	Reservoir	98	15	42636 73766			
119	1925 Incline railway line	98	14	42602 73348 42266 73703 42454 73568 42419 73587			
119/1	Incline railway cutting						
120	Site of building	99	14	42379 73564			
121	Blackwell's Shaft	99	15	42336 73419	S86	182E	504/19
122	Shaft/Lode back pit	100	15	42322 73419			

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
123	Reservoir	100	15	42453 73442			
124	Reservoir	100	15	42446 73417			
125	Adit portal	101	9	42441 73398	S85		504/20
126	Spoil dump	101	9	42543 73392			
127	Leat	101	8	42462 73411 42502 73237			
128	Site of reservoir	102	15	42517 73409			
129	Site of spoil heap	102	15	42519 73456			
130	Leat aqueduct	102	15	42438 73438 42570 73583			
131	1920's Arsenic chimney	103	15	42580 73557	B3		504/5/4
132	Arsenic flue	104	15	42585 73456			
132/1	Waterfall chamber			42580 73557			
133	Site of leats	105	15	42663 73539 42572 73584 42574 73576			
133/1	Shallow waste water leat						
134	Settling/reservoir ponds	105	15	42614 73573			
135	Wh AM Engine Hse etc	106	15	42586 73615 42587 73649 42556 73648			
135/1	Site of Chimneys						
136	Shaft/building/wheel pit	106	15	42546 73632	S134		
137	House	107	15	42613 73660			
138	Site of Railway siding	107	15	42635 73525			
138/1	Railway to dressing floor			42663 73539 42588 73302			
138/2	Railway to Site 169			42672 73554 42621 73448			
138/3	Railway to waste dump			42595 73405 42715 73417			
139	Settling tanks/buildings	109	15	42585 73447			
140	Wh. Anna Maria 'upper' dressing floor buildings	109	15	42669 73588	H9		504/5/7
141	Anna Maria Engine Shaft	110	15	42672 73642	S103	183B	504/5/5
142	Coal yard and building	111	15	42641 73615			
143	Shaft	111	15	42683 73654	S102	183	
144	Pair of Houses	112	15	42717 73660	B4		
145	Site of Foundry	112	15	42788 73685			
146	Reservoir pond	112	15	42925 73676			
146/1	Site of aqueduct			42899 73673 42803 73678			
147	Possible Shaft	113	15	42945 73741			
148	Richard's Engine Shaft, Capstan	113	15	43025 73655 43025 73663	S98	185B	504/6/2
149	Old Shaft	114	15	42965 73639	S99	184B	
149/1	Old Shaft			42953 73662			
150	Wh. Josiah Railway lines	115	15	42625 73656 43495 73548			
150/1	Incline railway			42697 73583			

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
150/2	Saw mill line			43147 73644 42934 73809 43001 73488			
150/3	Field Shaft winder line			42789 73628 42832 73539			
151	Reservoir pond	117	15	42875 73643			
152	Leat	117	15	42909 73635 42848 73612			
153	Field Shaft/Capstan	117	15	42848 73640	S101	184	504/5/6
154	AM Engine/Boiler Hse	118	15	42776 73629			
154/1	Detached Chimney			42797 73630			
155	Reservoir pond	118	15	42728 73612			
156	Office/railway building	119	15	42713 73570			
157	Site of office/house	119	15	42724 73571			
157/1	Site of mine building			42716 73551			
158	Site of Wh.Maria stables	120	15	42178 73629 42210 73629			
159	(Wh.Anna Maria) Engine	120	15	42680 73635			504/9/1
159/1	Shaft flat rod cutting			43432 73053			
159/2	Leat bridge			42928 73444	B6		
	Track bridge			43312 73150			
160	Leat	121	15	42734 73578 42761 73554			
161	Site of mine building	122	15	42780 73579			
162	Leat	122	15	42797 73595			504/31
162/1	Leat			43425 73614 43203 73467 42902 73440			
163	Adit portal	123	15	42934 73585	S100	184C	
163/1	Leat/settling tank			42826 73587			
164	Site of Mine building	123	15	42880 73519			
165	Hedge/field remnant	123	15	42874 73519 42856 73507			
166	'Upper' waste rock	124	15	42636 73531			
166/1	railway line			42881 73406			
	'Lower' railway line			42641 73499 42881 73406			
167	Mine building	125	15	42756 73505			
167/1	Outbuilding			42753 73493			
168	Wh.Anna Maria dressing floor reservoir	125	15	42552 73313			
169	Reservoir/settling pond	126	15	42583 73357			
170	Launder/tramline supports	126	15	42619 73432 42599 73409			
171	Adit portal	126	15	42618 73435			
172	Quarry	127		41521 73471	E10		
173	Stone quarry pits	127	15	42697 73452			
174	Site of Mine buildings	127	15	42711 73470			

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
175	Site of Mine building	128	15	42566 73617			
176	Large Mine spoil dump	128	15	42874 73405	H10		504/37
177	Prospecting pits	128	15	41586 73506 41807 73503			
178	Lode back pits	129	38	41624 73403 41845 73396			
179	Adit portal	129	38	41722 73177			
180	Devon Consols Railway	130	15	42557 73261 44081 72888			507
180/1	Lower arsenic refinery line			42832 73421 42586 73130			
180/2	Mine waste dump tunnel			42875 73429	B5		
180/3	Agnes cutting			43543 73687 43652 73575	E6		
180/4	Wh.Emma Bridge			43651 73578	B8		
181	Lode back pits	132	38	41781 73171 42097 73194			
182	Adit	133	38	42232 72549			
183	House/mine offices	133	16	42660 73335			
184	Wagon/Engine shed	134	16	42708 73349			
185	Hedge/Leat aqueduct	134	16	42703 73316			
186	Leat remnant	134	16	42703 73311 42738 73323			
187	Site of Wh. Anna Maria 'Lower' dressing floor	135	16	42689 73277			
188	Twin Buddles plinth	136	16	42638 73301			
188/1	Twin Buddles plinth			42649 73286			
189	Waterwheel pit	136	16	42646 73297			
190	Reservoir pond	137	16	42645 73246			
191	Walled yard	137	16	42619 73283			
192	Timber ore bin	138	16	42633 73266			
192/1	Iron water tank			42624 73225			
193	Lode back pits	138	38	42307 72645 42284 72793			
194	Prospecting pits	139	38	42378 72695 42506 72711			
195	Arsenic condenser	139	16	42568 73295			504/5/3
196	Arsenic flues	140	16	42569 73276			
197	Reverbatory furnace	141	16	42572 73258			
198	Brunton Calciner (No 1)	141	16	42574 73266			
199	Brunton Calciner (No 2)	142	16	42580 73280			
200	Arsenic refiner bed	142	16	42585 73288			
201	Arsenic grinding mill	143	16	42591 73299			
202	Copper Crusher Engine/boiler house	144	16	42602 73305			
203	Copper crusher plinth	144	16	42593 73313			
204	Shaft kiln furnace	145	16	42601 73317			
205	Site of Waterwheel	145	16	42611 73297			

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
206	Site of house/office	146	16	42605 73267			
207	Mine building	146	16	42582 73261			
207/1	Two mine buildings			42592 73256			
208	Small reservoir tank	147	16	42533 73252			
209	Small reservoir tank	147	16	42505 73264			
210	C19th Arsenic refinery	147	16	4250 7312			504/5/2
211	C19th Arsenic Chimney	151	16	42368 73139			
211/1	C19th Waterfall chamber			42379 73107			
212	Reservoir ponds	152	16	42351 73137 42350 73127			
213	Adit Shaft	152	16	42386 73104			
213/1	Adit Portal and lobby			42398 73095 42432 73080			
214	Quarry	153	16	42303 73178			579
215	Large spoil heap	153	16	4256 7302			
216	Small Quarry	154	16	42552 72904			
217	Lode back/Costean pits	154	38	42537 72866 42451 72866			
218	Quarry	154	16	42467 72983			578
219	Aqueduct/Wheelpit	155	16	42598 73105			
220	South Lode Shaft	155	26	42546 72864	S76	196	504/17/2
221	South Fanny flat rod cutting Embankment from cutting	156	26	42554 72864 42578 72867 42578 72867 42615 72868			504/17/4
222	Shallow Adit and lobby	156	26	42649 72873	S74		
223	Possible Shaft	157	26	42648 72890	S138		
224	Site of mine building	157	26	42643 72857			
225	Tramway/water pipe	157	26	42606 72997 42614 72903 42661 72944 42661 72891			
225/1	Leat						
226	South Fanny Shaft	158	26	42720 72866	S73/H22	197	504/17/1
227	Site of Mine building	158	15	43016 73777			
228	Josiah Powder magazine	158	21	43207 73806			504/6/5
229	Reservoir pond	159	21	43142 73718			
230	Mine buildings/yard	159	21	43077 73695			
230/1	Devon Consols School			43059 73687			504/24
231	House, buildings/yard	160	15	43035 73713			
232	Site of Saw Mill	160	15	42995 73730			504/6/4
232/1	Site of timber store			43020 73693			
233	Hitchins Engine Shaft	161	21	43154 73659	S96	186	504/6/1
234	Hitchins Engine house	162	21	43093 73653			504/6
235	Localised surface collapse	162	21	43070 73653	S97	185	
236	Site of Leat	163	21	43420 73823 43089 73621			
237	Wh. Josiah (Richard Shft) flat rod cutting	163	21	43025 73655 43439 73067			504/9/2

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
237/1	Flat rod bridge			43170 73451	B7		
237/2	Flat rod bridge			43324 73226			
238	Leat	164	21	43247 73553 42973 73689			
239	Josiah buddles	165	21	43092 73592			
239/1	Buddles			43103 73613			
239/2	Buddles			43106 73634			
240	Josiah dressing floor reservoir ponds (upper)	166	21	43145 73633			
240/1	Pond			43162 73627			
240/2	Pond			43176 73605			
241	Wh.Josiah dressing floor reservoir ponds (lower)	166	21	43144 73600			
241/1	Pond			43130 73584			
241/2	Pond			43077 73624			
241/3	Pond			43175 73568			
242	Josiah mine buildings	167	21	43115 73594			
243	Quarry	167	21	43165 73536			510
244	Pheasant/fowl structure	168	21	43255 73539			
245	Reservoir pond	168	21	43286 73585			504/22
245/1	Pond			43303 73577			
246	Reservoir pond	169	21	43342 73639			
247	Site of Wheelpit	169	21	43403 73625			
248	Site of House/office	169	21	43476 73569			
249	Agnes's Shaft ponds	170	22	435 735	H14		504/23
249/1	Pond			43539 73657			
249/2	Pond			43552 73592			
249/3	Pond			43561 73542			
249/4	Pond			43564 73524			
250	Track drain portal	171	22	43559 73680	H13		
251	Adit portal	171	22	43569 73660	S90	188C	
252	Adit Shaft	171	22	43590 73640	S89	188D	
253	Shaft/water culvert	172	22	43537 73626	S92		
254	Adit portal	172	22	43553 73633	S91	187B	
255	Possible adit lobby	173	22	43569 73627			
256	Dressing floor	173	22	43530 73627			
257	Adit portal	173	22	43515 73587	S93	187D	
258	Agnes's (new) Shaft	174	22	43508 73585	S94	188	504/11
259	Site of mine buildings	175	22	43500 73585			
260	Agnes's (Old) Shaft	175	22	43513 73631	S95	187	504/12
260/1	Mine building			43517 73637			
261	Small Quarry	175	21	43486 73538			
262	Mine building	176	22	43487 73481			
263	Counthouse Shaft	176	21	43418 73463	S82	189	504/8
264	Spoil finger dumps etc,	177	21	43400 73434	H12		
265	Agnes Shaft flat rod cutting	177	35	43318 72874 43506 73585			
266	Small Quarry	178	9	43414 73398	E5		

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
267	Quarry/building	178	9	43370 73367	E4		
268	Costean/Lode back pits	179	38	43290 73368 43290 73299			
269	Track to 'Hawkmoor' house	179	21	43144 73451 43272 73468			
270 270/1	Path Shaft/capstan Working area	179	21	43289 73430 43237 73415	S83	190	504/7
271	Tramway	180	21	43282 73427 43237 73415			
272 272/1	Agnes's dressing area Stone lined opening	180	22	43599 73524 43595 73549			
273	Railway Shaft/capstan	181	22	43676 73530	S68	192B	504/13/1
274	Railway Shaft dump	181	22	43622 73551	H15		
275	Mine track and plinth	182	22	43647 73550			
276 276/1	Masonry tramway bridge Waste heap tramway	182	22	43658 73532 43610 73565 43662 73531			
277	New Shaft raised track	183	22	43705 73463 43794 73499			
278	New Shaft/capstan	183	22	43791 73516	S67	193	504/13/2
279 279/1	Shaft spoil mound Boiler house chimney	184	22	43773 73509 43751 73514			
280	New Shaft engine house	184	22	43735 73518			504/13/6
281	Site of reservoir pond	185	22	43775 73550			
282	Leat	185	22	43618 73485 43597 73354			
283	Possible Shaft	186	22	43592 73509			504/14
284	Flat rod tower	186	22	43567 73508	S71	188B	
285	Reservoir pond	187	22	44174 73742			
286	Shaft	187	22	44162 73797			504/13/7
287	Smithy	187	22	44150 73676			
288	Building	188	22	44132 73648			
289	Mine offices	188	22	44114 73721			
290	Carpenter's Shop	189	22	44123 73712			
291	Miner's Dry	189	22	44096 73734			
292	Site of Thomas's Shaft	189	22	44060 73717	S87	195	504/13/4
293	Thomas's Engine house	190	22	44058 73727			504/13
294 294/1	Emma Incline railway Masonry bridge base	191	22	43699 73461 44038 73716 44006 73699			
295	Plane steam winder	191	22	44046 73711			
296 296/1	Site of mine buildings Site of mine building	192	22	44031 73728 44015 73687			
297	Reservoir pond	192	22	43985 73672			
298	Powder magazine	192	22	43957 73667			504/13/8
299	Powder magazine	193	22	44001 73650			
300	Site of tramways	193	22	44020 73722 43938 73677			

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
301	Pond	194	22	44032 73759			
302	Dressing floor ponds	194	22	43954 73726			
303 303/1	Incline Shaft boiler hse Chimney	194	22	43923 73694 43938 73695			
304	Incline Shaft Engine hse	195	22	43912 73698			
305 305/1	Incline Shaft Capstan	196	22	43868 73700 43876 73678	S88	194	504/13/3
306	Mine building	196	22	43854 73687	S120	179	
307 307/1	Mine waste tramways Bridge	197	22	43868 73699 43784 73622 43846 73686			
308	Pond	197	22	43809 73683			
309	Reservoir pond leat aqueduct	198	22	43850 73688 43817 73626			
310	Site of mine buildings	198	22	43842 73709			
311	Site of pond	198	22	43783 73710	H16		
312	Adit portal collapse and lobby	199	35	43502 73185 43463 73139			
313	Quarry	199	35	43481 73130			
314 314/1	Leat Leat	199	35	43568 73506 43619 73048 43501 73273 43434 73221			
315	Adit portal (Fremontor)	200	38	42449 72455			
316	Blanchdown Ochre Wrks	200	35	43434 73188			504/21
317	Blanchdown Adit	202	35	43416 73202	S69	189C	504/33
318 318/1 318/2	'Great' twin waterwheels Josiah wheel Anna Maria wheel	202	35	434 730 43442 73063 43432 73053	B12		504/9
319	Shaft	203	35	43475 73008	S144		
320	Plunger Shaft and pumps	204	8	43289 73111	S70	191	504/16
321	Quarry railway line	204	8	42512 72518			
322 322/1 322/2	Large twin waterwheels Agnes wheel Plunger wheel	205	8	433 728 43319 72876 43305 72882			504/10
323	Adit portal	206	38	43239 72906	S143		
324	Site of building	206	9	43183 72955			
325 325/1	South Fanny waterwheel Tail race	207	26	42921 72860 42921 72860 43122 72883			504/17/3
326 326/1 326/2 326/3	'Lower' Copper works Building Kiln/furnace Railway sidings	207	11	42975 72897 42930 72878 42904 72872 42857 72864 42952 72913			
327	Adit	209	38	42906 72897	S141		
328	Adit/Shaft	209	38	42943 72917	S142		
329	(South Fanny) Adit	209	26	42852 72866	S140		

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
330	Blanchdown Drive	210	9	41538 73764 43679 72777			
331	Large ponds in grassland	210	38	42749 72661			
332	Leat	211	26	42684 72642 42732 72855			
333	Granite quarry waste tip	211	26	42759 72812			
334	Shaft/lode back pits	211	38	42779 72853	S72	197B	
335	Shaft/lode back pit	212	38	42779 72860	S72	197B	
336	Copper precipitation trenches	212	38	42831 72913 42993 72978			
337	Flooded feature	212	38	43012 72955	S139		
338	Env. Agency cabin	213	38	42626 72527			
339	Site of mine buildings	213	26	42680 72626			
340	Three reservoir ponds	214	38	42702 72686 42716 72731			
341 341/1	Deep Adit Shaft Deep Adit outflow	214	38	42562 72507 42565 72500	SD6 B13		
342	Adit portal	215	38	42548 72530	S78		
343	Granite quarry	215	26	42498 72532	E11		574
344	Shaft	216	38	42518 72511	S79		
345	Site of quarry building	216	26	42634 72665			
346	Small canal quarry pits	216	38	42402 72423 42152 72513			
347	Adit Shaft	217	38	41713 72800	SD8		
348	Collapsed adit portal	217	38	41673 72775	S135		
349	Shaft, building and spoil	217	38	41666 72774	S145/H21		
350	Adit	218	38	42484 72487	S80		504/29
351 351/1	Adit Gunnis	218	38	42445 72469 42440 72479	S81 SD18		
352	Wh.Fremontor Gunnis	219	38	42341 72490	SD7		
353	Wh.Fremontor Shafts	220	38	42358 72481			504/18
354	Wh.Fremontor (1925) dressing floor	220	38	42361 72484			
355	Quarry	221	9	42580 72783			
356 356/1	Shaft Prospecting pits	221	38	42546 72600 42570 72602 42532 72600	S77		
357 357/1	Large sands tip Sites of two earlier ponds	222	37 16	42737 73244 42737 73205 42773 73240	H23		
358	Water tunnel (west)	223	38	42739 73188			
359	Water tunnel (east)	223	38	42781 73207			
360	Site of 'Higher' copper precipitation works	224	38	42728 73161	H23		
361	1970's reprocessing mill	224	38	42684 73177			
362 362/1	1940's mine building 1940's building	225	38	42752 73107 42771 73083			
363	Large tailings pond	226	37	42816 73135	H23		

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
363/1	Site of earlier pond		16	42874 73089			
364	Leats (west)	227	16	42845 73051 42874 72993			
364/1	Leat (east)		16	42898 73058 42910 73019			
364/2	Drainage pipe			42932 73023			
365	Precipitation tank	227	38	42867 72979			
366	Quarry	228	38	43117 73315 43028 73377	E3		
367	Ventilation shaft/capstan	228	8	43101 73415	S84/H11	190B	
368	Small Quarry	229	9	43223 73387			
369	Parallel leats	229	38	43213 73144 43083 73162			
370	Wh. Thomas waterwheel	229	35	43599 73017			
371	Old Shaft	230	35	43608 73094	S66		504/15/4
371/1	Masonry structure			43608 73094			
372	Masonry structure	231	35	43604 73092			
373	Site of mine buildings	231	35	43646 73045			504/15
374	Adit	231	35	43699 73031	S62/H24		
375	Whim/Air Shaft/capstan	232	35	43719 73032	S61		
376	Wh. Thomas Flat rod cutting	232	35	43721 73036 43900 73049			
376/1	Flat rod cutting			43868 73063 43741 73073			
377	Bawden's Shaft/capstan	233	35	43651 73009	S63/H24	199	504/15/1
378	Shaft and Capstan	233	35	43638 73019	S64	199B	504/15/2
379	Site of adit	234	35	43622 73020	S65		
380	Eastern Engine Shaft	234	35	44034 73077	S59		504/15/3
381	Prospecting pits	235	35	44000 73065	H19		
382	Site of mine building	235	35	43929 73145			
382/1	Site of mine building			43952 73086			
383	Watson's Engine Shaft	235	35	43911 73048	S60/H18	200	
384	Charcoal burning pltfms	236	38	43724 72867			
385	Plunger (Engine) Shaft	236	38	43289 73110 43303 72876			
385/1	Site of pipe from Plunger Shaft to Wh. Josiah			43290 73113 43209 73545			
386	Lode back pits	237	37	42148 72902 42255 72945			
387	Prospecting pits	237	37	42235 72879 42313 72913			
388	Prospecting pits	238	37	42186 73047 42297 73054			
389	Wh. Maria Cottages (1-20) Listed Building II	238	13	41860 74129			504/1/4
390	Wh. Maria Count House (23-24) Listed Building II	238	13	41773 73975			504/1/5
391	Grenoven Farmhouse	238	13	41821 74019			504/1/3

Site No.	Site Name	Page No.	Fig.	NGR (SX)	FSL No.	WDBC No.	SMR No.
	Listed Building II						
392	Wh.Fanny Mine Captains House Listed	239	15	42472 73626			504/3
393	Wh.Fanny Mine Count House Listed Buildings	239	14	42379 73606			504/4 504/4/1
394	Wh.Anna Maria Houses (1-3) Listed Buildings II	239	15	42688 73536			504/5/1
395	Wh.Josiah Cottages (1-5) Listed Buildings II	239	15	42938 73833 42970 73850			504/6/3

9 References

9.1 Primary sources

Cloke, G., 1986, Tavistock Gazette (Article on History of Devon Great Consols-June)
DRO Mine Plans

-MRO (15314, R88A, 4406)

-T1258M (Bedford Estates Archive-leases, maps and Reports on Mines)

Exeter Museum Archaeological Field Unit, 1989, *Devon Great Consols Arsenic Works*,
Report No. 89.08

Sherrell, F., 2000, *Devon Great Consols and Bedford United Mines: Report on the results of a desk study and surface reconnaissance inspection*, Report No. 1915

Sherrell, F., 2002, *Devon Great Consols and Bedford United Mines: A preliminary risk assessment in relation to public access within the site*, Report No. 1915/2

Symons, B, 1848 A Geological Map of the Tavistock Mining District, Cornwall, Truro

Wardell Armstrong, 1990, *South West Water Gunnislake Intake Pollution Risk Study*,
Report No. W3353

Western Morning News (reproduction of an 1864 article) www.tmmrg.plus.com

9.2 Publications

Barton, D.B., 1961, *A History of Copper Mining in Cornwall and Devon*, Truro.

Barton, D.B., 1964, *Historical Survey of the mines and mineral railways of East Cornwall and West Devon*, Truro

Barton, D.B., 1965, *A History of Tin Mining and Smelting in Cornwall*, Truro

Barton, D.B., 1969, *The Cornish Beam Engine*, Truro

Bennett, A., 1992, *Images of Cornwall*, Runpast Publishing

Booker, F., 1971, *The Industrial Archaeology of the Tamar Valley*, Newton Abbot

Buck, C., 1998, *Preliminary assessment of industrial sites of archaeological importance*, CAU Report

Burt, R., Waite, P., and Burnley, R., 1987, *Cornish Mines: Metalliferous and associated Minerals 1845-1913*, Univ of Exeter

Collins, J.H., 1912, *Observations on the West of England Mining Region*, 1988.

Dickinson, M., 1985, *The story of the Devon Great Consols 'Ghost' railways*, Tamar Journal, Vol 7

Dines, H.G. and Phemister, J., 1956 (reprinted, Beer, K.E., 1988), *The Metalliferous Mining Region of South-West England*, HMSO

Goodridge, J.C., 1964, *Devon Great Consols: A study of Victorian mining enterprise*,
The Devonshire Association

Hall, G.W., 2000, *Mines of the Sixties*, Griffin Publications

- HMSO, 1911, *The Geology of the Country around Tavistock and Launceston*, Memoirs of the Geological Survey, Sheet 337
- Hooley, D., 1999, *Smallacombe Downs, Bodmin Moor* (EH woodland management report)
- Jenkin, A.K.H., 1974, *Mines of Devon, The Southern Area*, Vol. 1 David and Charles
- Marchant R. Le., 1987, *The Dressing of Copper Ores*, Tamar Journal, Vol 9
- Marchant R. Le., 1989, *The Man Engine and Devon Great Consols Mine*, Tamar Journal, Vol 11
- Mogford, N., 2002, *An Ecological Assessment of the Devon Great Consols and Bedford Mines*, Devon Biodiversity Records Centre
- Patrick, A., 1983, *Copper production in the Tamar Valley in the Eighteenth Century*, Tamar Journal, Vol 5
- Richardson, P, H, G., 1992, *Mines of Dartmoor and the Tamar Valley after 1913*
- Rowe, G. A., 1984, *The Mines of Tamarside-4 Devon Great Consols*, Tamar Journal, Vol 6
- Sharpe, A., Johnston, N., and Lewis, 1996, *A Guide to Conserving Historic Mine Buildings in Cornwall*
- Spargo, 1865, *The Mines of Cornwall: Statistics and Observations* Vol VI
- Taylor, C., 1988, *The Story of Devon Great Consols Mine 1844-1901*, Tamar Journal, Vol 10
- Woodcock, G., 1994, *The Strikes at Devon Great Consols*, Tamar Journal, Vol 16

10 Project Archive

The CAU project number is **2001036**

The project's documentary and photographic archive is housed at the offices of Cornwall Archaeological Unit, Cornwall County Council, Kennall Building, Old County Hall, Station Road, Truro, TR1 3AY. A copy of the report has been deposited in Devon's Sites and Monuments Archive as well as a copy of all colour slides and digital images.

The contents of this archive are as listed below:

1. A project file containing site records and notes, project correspondence and administration (File No. 2001 0036).
2. An information file containing copies of documentary/cartographic source material (file no SX 47 SW).
3. Digital copies of historic maps are stored on a CD-Rom (held at CAU and Devon Records Office).
4. Finished plans and maps are stored digitally as G:/CAU/Images/Archive/Sites
5. Colour slides archived under the following index numbers: GCS 33855 - 33898
6. This report held in digital form as: G:/CAU/Document/sites/Devon Great Consols (Assessment) 2001036



*Figure 36 RAF aerial view of Devon Great Consols Mine 1947
(CPE/UK/2149/4195-4197 11/6/1947)*

Figure 37. NMP aerial photo features

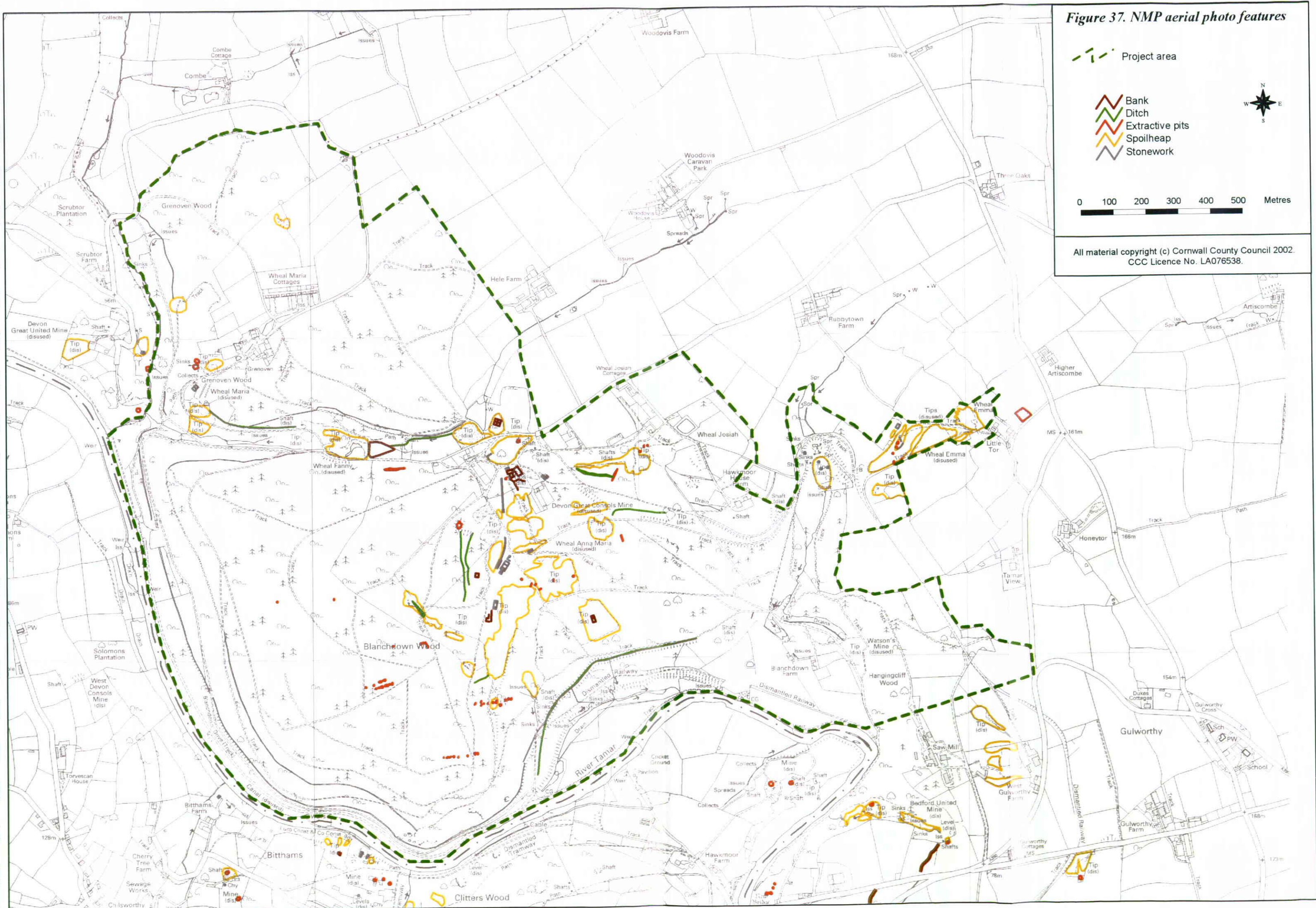
Project area

- Bank
- Ditch
- Extractive pits
- Spoilheap
- Stonework



0 100 200 300 400 500 Metres

All material copyright (c) Cornwall County Council 2002.
CCC Licence No. LA076538.



11 Appendix

11.1 1866 Arsenic works lease

Agreement: Dated 24 August 1866 (expires 25 March 1886)

Parties: John & William Alexander Thomas of London, Gents for Devon Great Consols and William, Duke of Bedford. The original lease of land (dated 4th November 1857), under which they have applied to build arsenic works.

Rent: 1/12 of marketable products from the Arsenic works to be payable to the Duke (as royalty for rent).

Conditions of the agreement:

1. *Construction to be in accordance with the plans and sections deposited at Bedford Office, Tavistock.*
2. *In the construction of the intended works the chambers and flues connected with the roasting kilns shall be carried to a distance (measured horizontally) of at least 600ft before uniting with the stack. The section of the main chamber and first length of flue being of the length of 90ft shall be 12ft in height and 6ft in width as shown in the said plans. A reduction of area shall be allowed after the first length of flue but no part of the flue shall be of less dimension than 4.5ft high by 3ft wide. The walls of the chambers and flues shall be solidly built of the thickness of at least 2.5ft of masonry where the flue is of the greatest dimension and nowhere less than 2ft of masonry covered with cement and puddle.*
3. *The precipitation of the arsenic sulphur gases and volatile substances which shall pass beyond the main flue and chambers shall be effected by means of water falls or water showers as shown in the said plans and in the building of the smaller flue provision shall be made for not less than 3 such waterfalls between the point where it leaves the main flue and its junction with the stack, and cisterns shall be provided in the bottom of the smaller flue for the reception of all substances precipitated as above mentioned with means at the side for their cleansing and refitting when necessary.*
4. *The refinery shall be connected with the stack by flues of dimensions not less than those mentioned*
5. *The flues from the roasting kilns and from the refinery shall communicate separately with the stack and at or near their respective confluence therewith each flue shall be furnished with a damper for the purpose of regulating the draft and which will also afford the means of preventing any matter however volatile escaping beyond the flues.*
6. *That regard being had to the frequent and dense fogs which rise to a great height from the Tamar Valley and to the risk of damage from the rapid condensation so occasioned and with a view to obviate such risk by the abundant dilution of the smoke with the atmosphere before it comes into contact with the said fogs, the stack shall be of the height of at least 120ft.*

Further clauses relate to the inspection of the works, the carrying out of any alterations that are considered necessary, and compensation clauses (due to damage to woodland etc). For example: *'The Duke to employ a person to oversee the works specification and to make sure as agreed above and to have power to require buildings to be pulled down if they are not properly/correctly built to the agreed specification'*.

11.2 1868/9 Report on Mines from the Bedford Estate Collection (excerpts)
DRO Ref: T1258M E44a-b)

The chief mining setts are in the midst of very fine scenery adjoining the River Tamar which of course is much defaced by them although everything is done to make the surface works as sightly as possible and also that they should not be extended further than can be avoided, still to look at these mining operations as a lover of the beautiful only it would I think, seem a great pity that such a strikingly picturesque district as that of Morwell Rocks and its vicinity should have been in any way disturbed when nature had done so much for it – in a commercial point of view there can be no doubt but that the Duke's mines have proved to be a most complete success and fortunately the richest deposits of ores have been found where the surface land is very poor and commanding but a small rent for agricultural purposes...Two years ago this company commenced very extensive works for manufacturing arsenic from mundic ores, a large proportion of which was comparatively worthless. It has spent several thousand pounds and the works are now in full operation...

The Mundic ores containing about 30% of arsenic and a small proportion of copper after being ground at the crushing mill sufficiently fine to pass through a wire sieve (0.5 inch mesh), are taken to the calcining furnaces which may be described as an oven 15ft long x 9ft wide x 3ft high. They are spread over the bottom of the furnace and exposed to the heat of a fire which is placed at one end and when heated through the arsenic immediately passes off in fume at the other. In this state it passes through a series of flues the length of which is 2591ft and the cubic area 44,367 feet. It will be readily understood that directly the fumes meet a cool atmosphere the precipitation of arsenic to the bottom of the flue commences: openings at the sides of the flues are made at convenient distances and the arsenic extracted through them. It is subsequently refined of the coal dust and other impurities it may have gathered in the first process, in a second furnace. The purified arsenic is driven off in a fume and again precipitated in a separate flue the total length of which is 2054 feet and the cubic area 40,184 feet. The flues from the calcining furnaces have an average rise from a horizontal line of 1 in 36, those from the refining furnaces having various elevations, two being 1 in 9 and 1 in 14. There are 5 calcining and 3 refining furnaces. The total length of flues is 4645ft and cubical area 84551ft these end at the bottom of a chimney or stack 120ft in height.

To prevent the escape of fumes and gases and fumes injurious to woods and herbage the company are bound by their working agreement with the Duke to use an injection of water from the top of the main flues. A copious shower is turned on in this way through which the smoke must necessarily pass on its way to the stack. It is hoped and believed that the damage to the surrounding woods and crops will thus be reduced so as not to be observable. The residuum or calcined ores having been reduced in weight and bulk are sent to the quays of Morwellham and sampled and sold to the copper smelters.

Gilson Martin,
Bedford Estates Office
Tavistock 31 December 1868

11.3 Working woodland management recommendations (summarised from Hooley, D., Smallacombe Downs - an EH management plan report)

This text provides general guidelines to enable the long term conservation of the archaeological resource of Devon Great Consols alongside the ongoing and future exploitation of timber by Tavistock Woodlands.

The management principles are applicable across the entire site wherever archaeological remains have been identified within this report (or are currently known or subsequently discovered). However there is a need for number of short term principles and practical measures to minimise archaeological damage in the current forestry cycle, leading to longer term management objectives. The current WHS bid includes the Devon Great Consols project area, and it too will have a management plan designed to provide long term protection of the archaeological resource.

'...the nature, disposition and intensity of archaeological damage (including both degradation and destruction of archaeological remains) varies considerably through the forestry cycle. The greatest risks and incidents of damage are focussed into relatively short periods during the decades of the overall cycle: these most damaging episodes occur during ground preparation where ploughing is employed, during clear-felling and during brash clearance. More gradual insidious damage of varied intensity occurs through the decades of tree growth' (Section II, 3).

Statutory guidance is given by the Forest Authority; 'no new planting should occur in areas identified for archaeological conservation', with the recommendation that the unplanted area should extend at least 20.0m beyond the outermost recognised feature (Forestry Authority 1995, 4, Guideline 1).

Archaeologically sensitive areas are defined as those shown as archaeological features on the site inventory map (Fig. 38), existing SM areas, or any other known archaeological sites.

Long term conservation of surviving archaeological remains:

- The areas of surviving archaeological features (including the full extent of all Scheduled Monuments), are recommended to be taken out of the forestry cycle, and remain unplanted in future forestry cycles.
- Areas to be taken out of the forestry cycle to include a 5.0m wide protective margin beyond the outermost limits of the archaeological feature (as defined by an archaeologist recommended by the County Archaeologist).
- The archaeologically sensitive areas defined above to have their boundaries identified by permanent and clearly visible markers of a form to be agreed by the County Archaeologist. Countryside Stewardship applications may be an appropriate source of funding for these works.
- The archaeologically sensitive areas defined above must not be used for creation of timber storage/loading bays, forestry roads, drainage ditches or the passage of vehicles (which should be along designated routes).
- The archaeologically sensitive areas must not have trees felled into them from beyond their boundaries.
- Timber extraction routes must not cross or impinge upon archaeologically sensitive areas except where specifically permitted in the detailed management plan.

- Windthrown or wind-felled trees which fall within archaeologically sensitive areas should be removed under archaeological supervision.
- The forestry manager and the County Archaeologist should maintain liaison to ensure appropriate and sufficient timing of actions by both parties necessary to implement the principles of this long-term management plan (and to ensure that forestry workers are briefed on the general principles).

Short term conservation of surviving archaeological remains:

- Standing timber within archaeologically sensitive areas (as defined within this report or other known areas not defined in the report), should be felled by hand (leaving the root ball in-situ to ensure that the archaeological feature is not affected), and the stump treated.
- There should be a presumption against felling timber or cutting branches or infilling features within archaeologically sensitive areas.
- After archaeologically sensitive areas have been cleared of cut branches and trees, a permanent boundary should be identified (perhaps by a fence) to the same distance as specified above.
- The methodology (and route) of removing cut trees should be agreed with the County Archaeologist (where the preservation of archaeological features might be compromised).
- Prior to the clearance of trees and brash (and any subsequent boundary fencing), the archaeologically sensitive areas defined above must not be used for creation of timber storage/loading bays, forestry roads, drainage ditches or the passage of vehicles (which should be along pre-designated routes).
- The forestry manager and the County Archaeologist should liaise to ensure appropriate and sufficient timing of actions by both parties necessary to implement the principles of this short-term management plan (and to ensure that forestry workers are briefed on the general principles).

11.4 Devon County Archaeological Service archaeological assessment project brief

ARCHAEOLOGICAL ASSESSMENT & MANAGEMENT SURVEY OF DEVON GREAT CONSOLS MINE, BEDFORD UNITED MINE, DEVON GREAT UNITED MINE & ENVIRONS, WEST DEVON

1. INTRODUCTION

1.1 The archaeology and industrial heritage of the Tamar Valley is a unique asset in its own right and also provides a valuable resource for education, amenity and recreation-related initiatives, and a focus for economic regeneration.

1.2 The Tamar Valley is part of a 'Cornish Mining' candidate World Heritage Site bid (see Appendix A). This bid is currently being prepared and is expected to be formally submitted by 2004.

1.3 In furtherance of the objectives of ongoing key strategies and programmes for the Tamar Valley (summarised in Appendix A) an archaeological assessment and management survey of an extensive area of mining activity on the Devon side of the Tamar Valley is being proposed. This survey will focus on the workings of the Devon Great Consols Mine, Bedford United Mine and Devon Great United Mine. The information provided by this survey will be used to inform current land reclamation and management proposals.

1.4 A programme of land reclamation and management works is proposed at Devon Great Consols and Bedford Unites Mines. This work will be funded by the Rural Development Agency, with matching funding from European and other sources. The work will be expected to result in overall benefits to the public. It is anticipated that the programme of work will address the following elements:

- The protection and consolidation of important archaeological remains and their settings.
- Interpretation of the site to the public including on-site and written materials.
- Provision of low-key public amenity use where appropriate incorporating limited public access.
- Health and safety aspects of the site relating to public access and environmental pollution.
- Identification and safeguarding of important ecological areas.
- Facilitating support for existing appropriate site uses such as forestry.
- Linking the site into the local economic, social, tourism and recreational contexts.

1.5 The archaeological assessment will make full and effective use of existing sources information and surface inspection to record the location, extent, nature, quality and potential of the archaeological resource of this historic mining landscape.

1.6 Areas of archaeological significance and potential and historic buildings and structures on the site will be assessed, including the type, likely date, nature, extent and depth of remains. The survey will consider the historic mining landscape, including associated and ancillary features, and the pre and post-mining archaeology of the area.

1.7 Following the assessment further field evaluation work may be required in order to further assess the presence or absence of remains, their extent, nature, quality and character before determining appropriate mitigation with regard to reclamation and management proposals.

1.8 This brief has been prepared by the Devon County Archaeological Service, on behalf of the Tamar Valley Countryside Service. It has been informed by draft guidelines on the appropriate recording of mining sites produced by both English Heritage and the Cornwall Archaeological Unit (see Appendix A).

2. SETTING

2.1 Devon Great Consols, Bedford United and Devon Great United mines are located on the east bank of the River Tamar in the parishes of Gulworthy and Sydenham Damerel in the Borough of West Devon. The mines are approximately 6km from Tavistock on the opposite side of the river to the Cornish town of Gunnislake.

2.2 The mines form an extensive and irregular-shaped site, with Devon Great United in the north and South Bedford Mine in the south. The core area of mining activity measures approximately 3km east-west and 3.5km north-south, although the proposed survey area is larger (see attached plan). The site occupies the eastern valley side of the Tamar and is crossed by a number of west and south-west flowing tributary streams. Ground levels vary from approximately 130-150m AOD, on the high ground to the east, to approximately 0-20m AOD in the Tamar Valley in the west.

2.3 Most of the site is privately owned and much of the area is utilised for commercial forestry. The site shows extensive evidence of past mining activity. Numerous old mine shafts, spoil heaps and mine buildings and structures associated with the mining survive within the site.

3. HISTORICAL BACKGROUND

3.1 Metalliferous mining in the Tamar Valley dates back to at least the medieval period, possibly earlier. Lead and silver were mined from the 13th century, with tin being exploited in the later medieval period. Shallow mining continued sporadically until the later 18th century, when deep mining led to a boom in tin and copper production.

3.2 Devon Great Consols Mine is the collective name for a group, or sett, of rich copper and arsenic mines. It is located above the tidal limit of the Tamar, some

4.5km upstream from the port of Morwhellam, whence most of its copper and arsenic was exported.

3.3 The initial discovery of copper at Great Consols was made in 1844 at what became Wheal Maria. The original mining sett consisted of five large mines along the length of an enormously rich lode. These were, from west to east; Wheal Maria, Wheal Fanny, Wheal Anna Maria, Wheal Josiah and Wheal Emma. In the 19th century it was the richest and largest mine in the Tamar valley, and probably the richest in Europe. Its workings extending over an area of some 140 acres. From the late 1860's through to the closure of the mine in 1902, arsenic extraction and manufacture was of increasing importance and receipts from copper declined. Indeed by its closure in 1902 the mine had come to rely almost entirely on arsenic for its income. The mine reopened during the First World War, which had brought a brief revival in the arsenic market. A new arsenic works was established in 1921-2 before the mine's final closure in 1925.

3.4 Bedford United Mine in its latter days was worked in conjunction with Great Consols. It originated in 1841 as an amalgam of several older workings; Wheal Marquis, Delve's Kitchen and Ding Dong. In its heyday it was Devon's third largest copper producer. Smaller quantities of arsenic, tin and wolfram were also worked. The mine closed in 1890, and reopened briefly between 1915 and 1925. The adjoining South Bedford Mine was an amalgamation of earlier workings and operated between the 1850's and the 1870's.

3.5 Devon Great United Mine operated from 1883 until around 1900. It was mined for copper and arsenic and consisted of the setts of West Wheal Maria and Wheal Fortescue on the Devon side of the Tamar and Wheal Williams on the Cornish side (the latter does not form part of this survey).

3.6 Although it is perhaps best known for its recent industrial heritage, the Tamar Valley landscape has been shaped by a long history of settlement and industry. It retains a rich and diverse rural and industrial heritage. For example the valley contains significant evidence for prehistoric and medieval settlement activity.

4. STATUTORY DESIGNATIONS

4.1 Devon Great Consols, Devon Great United and Bedford United Mines lie within the Tamar Valley Area of Outstanding Natural Beauty (AONB).

Note: Details of other landscape and natural environment designations are available from the Tamar Valley Countryside Service.

4.2 A number of buildings within the survey area are Listed Buildings because of their architectural or historic importance. These include industrial buildings such as the arsenic works at Devon Great Consols and a number of the mine captains' houses, and some non-industrial structures such as New Bridge on the Tamar.

4.3 No sites within the study area are currently scheduled as Ancient Monuments. However, English Heritage's Monuments Protection Programme review has identified a number of sites as being of national importance. For the purposes of this management survey, areas that are under consideration for Scheduling should be regarded as if they were Scheduled.

4.4 The site falls within Area 7 (Tamar Valley) of the candidate World Heritage Site Bid.

5. THE ASSESSMENT & SURVEY

5.1 The assessment and survey shall consider the area indicated on the attached plan. This area is based upon the area covered by a previous geotechnical report (Frederick Sherrell, 2000) and other mining areas that will be included in the World Heritage Site Bid. A buffer area has been included for 'safety' and to assist future consideration of amenity use and other land management and planning issues.

5.2 The assessment and survey will involve reference to and consideration of:

5.2.1 Geological maps.

5.2.2 Historical documents, maps, plans and other unpublished material held by the Mine Records Office, the Devon County record Office and the West Country Local Studies Library (Exeter), the Cornwall County Record Office and Cornwall Local Studies Library (Truro).

5.2.3 Published sources including journals, held by appropriate record offices, local studies centres, libraries or other archives (a list of key published sources is listed in Appendix B).

Note: Many historic records, maps etc. will already be accessible through existing published or unpublished sources.

5.2.4 Information on mining operations held by individual organisations such as the Trevithick Society, other local special interest groups and caving groups. Such sources may be identified through consultation with the Trevithick Society, the Tamar Valley AONB service.

5.2.5 Records held by Frederick Sherrell Limited (Tavistock).

Note: There is likely to be a charge for access to this material.

5.2.6 Records held by the Devon County Sites & Monuments Register (SMR) (Exeter).

5.2.7 Devon County Council Property Practice's survey of mine shafts.

Note: There may be a charge for access to these records. This information may also be held by Frederick Sherrell Limited.

5.2.8 English Heritage's assessment of industrial sites as part of the Monuments Protection Programme, together with documentation generated by subsequent field visits by English Heritage MPP Archaeologists.

5.2.9 Listed Building records.

5.2.10 Aerial photographs held by the Devon County Council SMR and Environment Directorate Library (Exeter) and Cornwall County Council (Truro).

5.2.11 Trial pit and borehole data from the site, and any geotechnical data, where available.

Note: A geotechnical report for part of the survey area has been produced by Frederick Sherrell Ltd (Sherrell, 2000 - See Appendix B).

5.2.12 Visual inspection of the whole site. Only a surface inspection is expected. The extent and condition of below ground mining features will only be assessed through existing sources of information and surface indicators.

Note: Below ground survey would involve particular survey expertise and health & safety requirements and may form part of recommendations arising from this assessment. Information on the below ground extent of workings and their present condition may be available from a combination of historic records and information from local caving groups.

5.2.13 A black and white and colour transparency photographic record of the salient archaeological features, buildings and structures, a selection of the full range of such features etc. across the site, and features illustrative of potential management issues as appropriate.

Note: A full photographic record of individual features etc. may form part of recommendations arising from this assessment.

5.3 Any constraints on the above sources should be noted, for example, where primary information is not available or is unreliable or where access to land was not possible.

6. PROCEDURES

6.1 The assessment and survey will be carried out by a professional archaeological Unit or Consultant with appropriate experience in industrial archaeology.

6.2 The implementation of the brief will be monitored by the Devon County Archaeological Service the Tamar Valley Countryside Service and the nominated World Heritage Site Partnership archaeologist. The archaeological Consultant will be responsible for agreeing monitoring arrangements with the above services.

6.3 The Archaeological Consultant will submit a statement on its Health and Safety policy with regard to this project, and undertake and document a Risk Assessment prior to fieldwork taking place.

6.4 The Archaeological Consultant will liaise with the Tamar Valley Countryside Service regarding land ownership and access prior to fieldwork taking place.

7. PRESENTATION OF RESULTS

7.1 A final survey report with supporting plans, photographs and appendices will be prepared. This will include:

7.1.1 A summary of the history and evolution of the mines and their environs, the range of features visible and an assessment of the archaeological and historic importance of the sites and these features. The local, regional, national or international importance of the archaeological resource should be considered with reference to the Secretary of State's criteria for scheduling (See PPG16 *Archaeology and Planning*, 1990, Annex 4) and English Heritage's Monument Protection Programme Step 1 reports for the Arsenic and Copper industries (March 1993).

7.1.2 A full gazetteer of individual features, buildings and structures of archaeological and historic interest. For each building/structure etc. the gazetteer will include:

- Survey number (as will appear on accompanying site plans).
- Cross reference to previous survey/database (such as SMR, Frederick Sherrell).
- Title of building/feature.
- National Grid Reference(s).
- An indication of the relative significance of the building/feature.
- Historic and documentary background to the building/feature.
- Survey description including present condition.
- Management recommendations.

Note: Examples of the required level of recording can be found in Buck, C. 1999 *Okel Tor Works Archaeological Assessment* (Cornwall Archaeological Unit), and Buck, C. 1998 *Tamar Valley: Preliminary assessment of industrial sites of archaeological importance* (Cornwall County Council). Example copies from these documents are included as appendices to this brief.

7.1.3 The gazetteer and plans will identify key areas, buildings, structures or other features that are potentially of national or regional importance and should be preserved in-situ.

7.1.4 The gazetteer and plans will identify areas where the nature, extent or quality of the archaeology is uncertain and can only be verified by further evaluation.

7.1.5 Areas of archaeological survival, individual surviving buildings, structures and features, and areas of archaeological potential and areas where all archaeology is considered to be absent or to have been destroyed, will be indicated on Ordnance Survey (or OS based) plans at a scale of not less than 1:2500. Master plans at appropriate scales (e.g. 1:10,000 or 1:25,000) will also be prepared.

7.1.6 Schematic section plan(s) at an appropriate scale indicating topography in relation to the range of identified features and the former below ground extent of mining.

7.1.7 Reproduction of appropriate historic maps and plans.

7.1.8 A selection of appropriate photographs.

7.1.9 Full bibliography and list of sources consulted.

7.2 Ten (10) copies of the final report will be produced.

7.3 Prior to production of the final report a draft of the text, gazetteer and sample plans will be circulated to the interested parties for comment.

7.4 A copy of the text and gazetteers will also be provided in digital form to the Tamar Valley Countryside Service for selected incorporation within related management documents.

8. ARCHIVE

8.1 A full survey archive will be prepared and deposited with an appropriate authority or record office.

8.2 A copy of the site gazetteer will be provided in digital form to the Devon County SMR.

9. CONTACTS

Bill Horner

Devon County Archaeological Service, Environment Directorate, Matford Offices, County Hall, Exeter, Devon, EX2 4QW. Tel: 01392-382494, Fax: 01392-383011, e-mail: whorner@devon.gov.uk.

Tim Selman

Tamar Valley Countryside AONB Manager, Tamar Valley Countryside Service, Kilworthy Park, Tavistock, Devon, PL19 0BZ. Tel: 01822-610676, Fax: 01822-610699, e-mail: tselman@westdevon.gov.uk

12 Glossary of mining terms

ADIT A level tunnel (usually driven into a hillside) in order to give access to a mine, and used for drainage or the hauling of broken ore. Deeper adits did not necessarily connect to surface, and were used to carry water back from distant workings to a pumping shaft.

ANGLE BOB A simple lever-based device using which the direction of a reciprocal motion (of pump rods, flat rods) could be changed (for example from horizontal to vertical).

ASSAY HOUSE The mine laboratory, where samples or ore were analysed for their mineral content.

BAL or BALL From Cornish "*Pal*" a shovel, and hence "a digging" = a mine. Generally applied to earlier mines. See also **WHEAL**.

BALANCE BOB A large counterweighted lever attached to the shaft pump rods and used to offset their weight and thus reduce the work of a pumping engine to lifting water alone. A surface balance bob would be mounted adjacent to the shaft on a pair of plinths or on a masonry support at ground level (balance bob mounting), the attached counterweight - a large box filled with scrap iron or rocks - working in an adjacent stone-lined pit. Other balance bobs would be installed in chambers cut into the rock adjacent to the shaft wall as needed to counterbalance the weight of the pump rods, especially on a deep shaft.

BAL-MAID A woman or girl employed at surface on a mine, generally in the dressing of ore.

BEAM-ENGINE A type of steam-engine much favoured in Cornwall for use in pumping, winding, and providing the power to crush ores preparatory to dressing on Cornish mines. The power from a large cylinder set vertically in an engine-house was transferred via a massive rocking beam or bob to the pumps in the shaft outside. For winding and crushing, the bob was instead attached to a flywheel and crank on a **LOADING** next to the **BOB-WALL** (or in the case of all indoor engines, the side wall). In most cases, the engine house formed an integral part of the framing of the engine.

BEDSTONE The granite slab which formed the foundation for the cylinder of a Cornish Engine.

BLOWING-HOUSE An early form of tin smelting furnace, small in scale and using charcoal as a fuel.

BOILER HOUSE A generally lightly-built structure attached to an engine house, and designed to contain the horizontal boilers for a steam engine; the associated chimney stack may be attached to this structure, or built into one corner of the engine house.

BRATTICING Timber partition work in a mine, for instance the **LAGGING BOARDS** which lined the upper section of a shaft where it ran through soft ground.

BUCKING The breaking down of copper ore on an anvil to about 10mm in diameter by bal-maids using small hammers, after which the ore was separated from the waste by hand. This process followed cobbing, in which it had been broken down to about 25mm in diameter, the waste again being hand removed. These processes, through which the majority of the highest quality copper ore was recovered, took place within roofed structures called bucking houses.

BUDDLE A device for concentrating tin ore. In the mid-19th century these most usually took the form of a circular pit with rotating brushes; the tin from the stamps was fed into the centre or side of the pit and was graded by gravity, concentrating the heavy ore near the inlet point. These were often mechanically worked. Earlier buddles were trapezoidal in shape, and manually operated. A variation used in tailings works to treat sands and slimes was the **ROUND FRAME**: a free-standing, all wooden, mechanically-actuated buddle, whilst a further variation was the dumb buddle or dumb pit, which was not mechanically operated.

CALCINER A furnace and heating chamber in which ores were roasted to drive off impurities such as sulphur and arsenic. These were also known as Burning Houses, later patterns being of **REVERBERATORY** design. The Brunton pattern calciner, introduced in the mid-19th century, was mechanically powered, and operated on a continuous basis, unlike earlier designs. Other patterns of calciner were also devised, the majority named after their designers (e.g. Oxland, Hocking and Loam).

CAPSTAN A manually or steam-operated winding drum, usually installed on a mine to raise pitwork from the shaft for maintenance or repair.

CATARACT PIT (or cock pit) A sub-floor area within the foundation levels of an Engine house between the Cylinder Plat and the Bob Wall, containing the regulating apparatus, and giving access to cylinder hold-down bolts.

CILL The base of a window or other wall opening.

COFFIN or GOFFEN The narrow excavation resulting from stoping on a lode being carried to or from surface on part or all of a lode. See also GUNNIS, STOPE, OPENWORK.

CONDENSER The cast-iron cylinder set in a tank of cold water immediately in front of the bob wall of an engine house in which the exhaust steam was condensed, creating a vacuum which greatly increased the efficiency of a steam engine. For a pumping engine this equipment was often contained within a pair of masonry walls projecting from the bob wall towards the shaft.

COUNT HOUSE Properly ACCOUNT HOUSE, but generally shortened. The mine office, sometimes incorporating accommodation.

CULVERT A small tunnel constructed to carry a channel of water.

CYLINDER OPENING The often large, arched opening in the rear wall of an engine through which the steam cylinder was brought into an engine house during the erection of the engine. This opening was generally subsequently closed off with a timber partition and usually incorporated the principal doorway into the engine house.

CYLINDER PLAT The massive masonry base on which the cylinder of a Cornish Engine was bolted down (see also BEDSTONE).

DRESSING The concentration of the tin (copper or other ores) contained in the rock excavated from the stopes of a mine. Carried out on DRESSING FLOORS.

DRESSING FLOORS An (often extensive) area at surface on a mine where the various processes of concentration of ore took place - these consisted of crushing or stamping to attain a uniform size range, sizing (particularly on later mines), separation of waste rock, concentration (generally mechanically and hydraulically on tin mines, manually on copper mines), the removal of contaminant minerals (by calcination, flotation, magnetic separation), and finally drying and bagging for transportation to the smelter. Tin floors in particular were generally laid out down a slope to reduce mechanical or manual handling between stages in the process.

DRIVE (alternatively lode drive or heading). A tunnel excavated on the line of a lode as the first stage of the development of a STOPE.

DRY or CHANGE HOUSE (earlier MOOR HOUSE) The building within which miners changed their clothes before and after going underground. Some were heated by steam pipes connected to the engine boilers. Where there were large numbers of women or children employed on a mine, there might be two dries - one for men, the other for women and children. The pithead baths or showers found in collieries were rarely found in Cornwall.

DUMP or BURROW (alternatively spoil dump, spoil tip). A pile of waste material, usually from a mine or quarry. May contain primary waste (where this could not be disposed of underground) or waste from various stages in the dressing process. TAILINGS LAGOONS stored the extensive slimes from the final stages in the process; in earlier mines these were flushed over cliffs or allowed to wash away in streams or rivers.

EDUCTION PIPE The large diameter pipe through which exhaust steam was drawn into the condenser set outside the bob wall.

ENGINE HOUSE A building designed to contain steam, gas, oil or electric engines on a mine or other works. When forming part of the framework of a beam engine, these were particularly strongly constructed.

FINGER DUMP A linear dump of waste material from a mine or quarry, flat-topped to allow material to be barrowed or trammed along it, and often equipped with a temporary tramway track.

FLAT RODS Reciprocating (or very occasionally rotative) iron rods used to transfer power from a steam-engine or water-wheel to a remote location.

FLUE A masonry-constructed tunnel or conduit connecting a furnace to a chimney stack

FRUE VANNER A mechanically-driven, laterally vibrated, inclined rotating belt on which fine tin-containing material in suspension in water was treated by relative density.

GIRDER The massive timber beam set across an engine house just below top floor level to which the parallel motion was attached and on which the spring beams sat.

GOSSAN The upper part of a mineral vein as it breaks surface. The natural weathering of the rock will decompose the metallic sulphides, characteristically leaving a porous rusty Quartz.

GUNNIS A narrow linear excavation left where a lode has been worked, most commonly used when open to surface. See COFFEN

HEAD or CROP The richest part of material in a buddle - nearest its feed point.

HEADFRAME The tall construction set over a winding shaft which carried the sheave wheels over which the winding ropes ran. Headframes usually contained ore bins or ore chutes to allow the broken rock in the skips or kibbles to be tipped into trams at surface.

HORIZONTAL ENGINE A steam engine where the cylinder(s) are set on a horizontal bed and the piston rods are attached via a cross-head to a crank and flywheel.

HORSE WHIM Similar to a capstan, but in this case power supplied by a horse walking around a circular platform (PLAT) was applied to an overhead winding drum; frequently used for winding from small shafts on Comish mines, especially during exploratory work and shaft sinking. The smaller under-gear whims found in some 19th century farms were little used on mines.

JIG A large mechanically or hand-operated sieve set in a tank of water using which ore could be separated by waste. Sometimes constructed in groups within jigging houses.

KIBBLE A large, strongly-constructed, egg-shaped, iron container used for ore and rock haulage in earlier shafts. Superseded by SKIPS.

LAGGING BOARDS The timber planks lining the upper part of a shaft, or where it ran through soft ground.

LAUNDER A wooden or steel trough used to carry water or other liquids; often used to feed water or finely-divided material in suspension around a dressing floor.

LABYRINTH (colloquially "lambreth") A series of interconnected masonry-constructed chambers set adjacent to one another on whose walls the arsenic vapourised in a calciner or arsenic furnace was condensed out. The gas followed a zig-zag path through such groups of chambers, and one end of each chamber would be closed off with a door using which the condensed arsenic could be collected.

LEAT An artificial water-course, built to carry a supply of water to a mine.

LINTEL The horizontal timber or stone support above an opening in a wall or structure.

LOADING The masonry platform in front of an engine-house (or elsewhere on a mine) on which machinery such as cranks, flywheels or winding drums were mounted and on which the reciprocal motion of the sweep rod attached to the beam was turned into a rotative motion.

LOBBY The excavated cutting running up to an adit portal.

LODE A linear area of mineralization underground. In other parts of Britain a VEIN, or SEAM. Generally vertical or near-vertical, and often extending for considerable distances along its strike.

LODE-BACK PIT A shallow shaft dug from surface into shoad or the upper part (backs) of a lode, from which ore could be extracted from shallow stopes to the depth of the water table or just below. Waste material was generally dumped adjacent to the shaft mouth.

MAGAZINE Small strongly built store containing explosives (gunpowder or dynamite); often circular, sometimes with additional enclosing walls to contain the blast of an accidental explosion.

MELLIOR STONE The granite bearing stone in which the upright shaft of a HORSE WHIM ran.

MIDDLES The material in a buddle found between the crop and the tailings, this generally containing enough ore to warrant its re-treatment.

OPENWORK or BEAM. A mineral extraction site open to the surface, and similar to a quarry but usually distinguished by its elongated shape, and steep sides. Generally applied to features broader in extent than a GUNNIS OR COFFIN. A variety is a STOCKWORKS, where an area of ground containing a large number of small parallel lodes was removed wholesale.

OVERBURDEN The topsoil and subsoil removed in the process of opening or extending a quarry, streamworks or mine.

PELTON WHEEL A small enclosed water turbine, working at high pressure and rotational speeds. In use from the later 19th century.

PITWORK The term used to describe the pump rods, rising main, shaft guides (buntons) etc. within a shaft.

PORTAL The entrance to an adit beyond its LOBBY. Often timbered or stone vaulted.

PROSPECTING PIT/FOSSICKING PIT OR COSTEANING PIT A small pit dug in search of minerals, and almost always found in linear groups, often arranged cross-contour, or at right angles to the projected strike

of known lodes or deposits of shoad. A COSTEANING TRENCH is a linear excavation cut for prospecting purposes.

RAG FRAME or RACK FRAME An inclined table-like surface on which very fine slimes in slurry form were treated to recover their tin. Large mines would have hundreds of such frames arranged in groups.

REVERBERATORY KILN A design of furnace in which there was indirect contact between the heat from a hearth and ore to be roasted, usually by incorporating a baffle flue.

ROTATIVE ENGINE A beam engine in which the reciprocating motion of the beam was converted to rotary motion via a sweep rod, crank, and flywheel.

SETT The legal boundary within which a mine could extract minerals.

SETT One of a series of stone supports for a tramway, performing the same function as sleepers.

SETT One of the components of timber framing of an adit where it ran through loose ground; also the timber framing of a shaft to which the shaft guides and LAGGING BOARDS were attached.

SHAFT A vertical or near-vertical tunnel sunk to give access to the extractive areas of a mine.

SHAKING TABLE A slightly inclined, mechanically vibrated table on which fine tin (as sands or slimes) in suspension in water was concentrated by relative density.

SHEARS or shear legs. A tall timber frame carrying a pulley or sheave wheel erected in front of an engine house over a shaft and used for the installation and maintenance of PITWORK.

SHOAD or SHODE Ore weathered from the lode and moved (in geological time) downslope under the force of gravity. Material reaching a river valley would be to some degree concentrated before redeposition in horizontal beds. These beds of detrital material (placer deposits) were exploited in streamworks.

SKIP A (generally elongated) iron or steel container equipped with small wheels or brackets running on the shaft guides (buntons) and used for rock and ore haulage in later mines.

SPRING BEAMS The pair of longitudinal timbers extending from the rear of an engine house parallel to and on either side of the BEAM at top floor level. These served to arrest any unwanted excess indoor motion of the beam via catches set onto its rear and were extended out from the front of the house to form the foundation for the bob-plat (the timber platform from which the bearings on the outdoor section of the beam could be serviced).

STACK A chimney on an industrial site, used to carry away smoke or fumes from boilers, furnaces and calciners. Often situated at the end of a Flue.

STAMPS A mechanical device for crushing ore-bearing rock to a fine sand. Heavy vertically-mounted beams (or later iron rods) carrying cast or forged iron heads were sequentially lifted and dropped onto the prepared ore beneath them by a series of cams mounted on a rotating drum; this usually being driven by a water-wheel or rotative steam engine.

STOPE Excavated area produced during the extraction of ore-bearing rock. Often narrow, deep and elongated, reflecting the former position of the lode. Where open to the surface, these form GUNNISES or COFFENS.

STREAMWORKS An area worked for detrital (redeposited) tin deposits by shallow excavation. Often characterised by linear dumps, river diversion, and evidence for leats. Some streamworks (dryworks) exploited deposits of shoad in now dry valleys and on hillsides, where concentrations of this material were economically workable. Leats and reservoirs were necessary to work these sites, and are characteristic of them.

STRIPS (settling strips) Elongated shallow tanks in which the primary settlement and subsequent separation of tin ore from waste took place after it had been stamped.

SWEEP ROD The elongated iron rod which connected the beam of a Cornish engine to a crank and fly wheel.

TAILINGS The waste sand and slime from a mine dressing floor, not containing workable quantities of mineral.

TAILRACE The channel along which water flows after having passed over or under a water-wheel and is then generally returned to the water course.

TRIBUTE A system of payment (by percentage of value of ore broken) whereby groups of miners contracted to work at previously-agreed rates.

TUTWORK A system of payment ("by results") in which groups of miners bid against one another for contracts to work sections of the mine for a percentage of the value of the ore raised from that area.

VANNER A person employed on the surface of a mine to check or assess the tin content at each stage of the refining process. The VANNING SHOVEL was used to test the relative concentration of ore in a sample of finely crushed ore or partially dressed ore.

WATER-WHEEL Wheel fitted with buckets or paddles around its periphery, and driven by the weight or force of a stream of water directed onto them.

WHEAL also WHELE, WHILE, HUEL A mine.

WHEELPIT A structure built to house a water-wheel, often excavated and stone-lined, but sometimes free-standing.

WHIM PLAT The level and usually circular platform on which a horse-whim was sited.

WHIM The winding gear used for hauling from a shaft; consists of a power source and a winding drum. See Horse-Whim.

WIND BORE The cast-iron strainer attached to the bottom lift of pumps

Figure 38. Site Inventory Map

