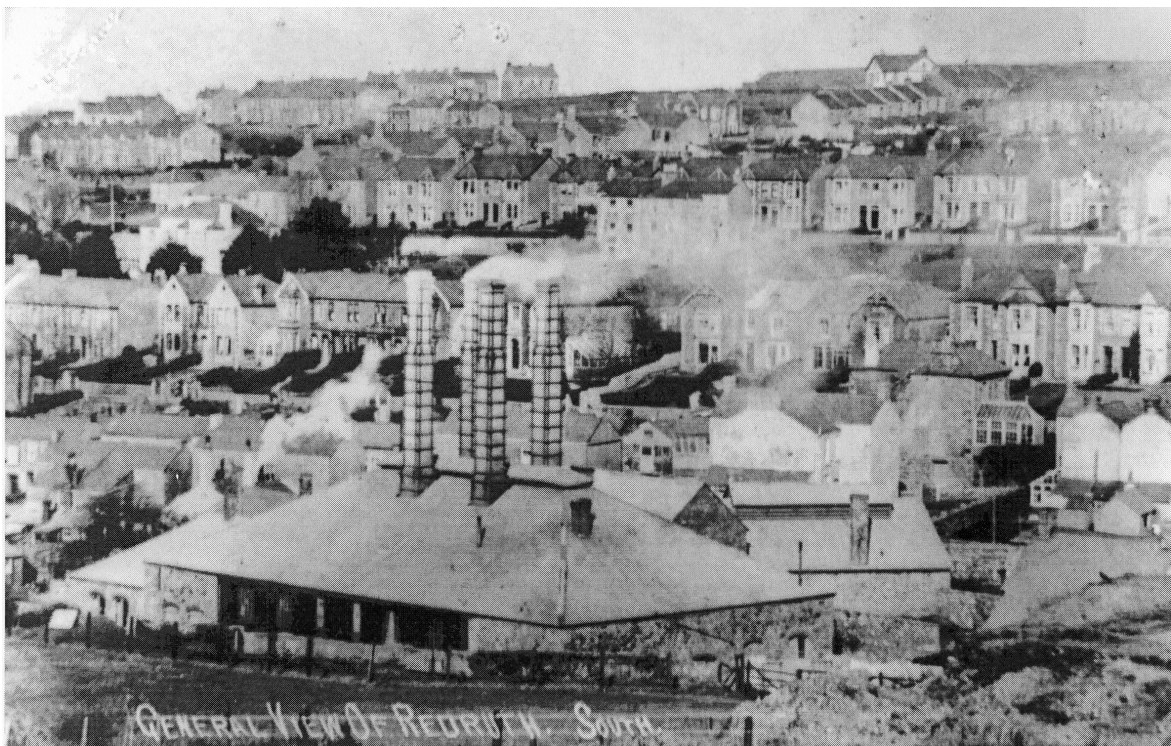




Redruth Tin Smelting Works, Cornwall

Archaeological Assessment



Historic Environment Projects

Redruth Tin Smelting Works, Cornwall

Archaeological Assessment

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The Project Manager was Nigel Thomas.

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

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Cover illustration

Undated postcard of Redruth showing the Smelting Works in the foreground
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Contents

1	Summary	9
	Introduction	10
1.1	Project background	10
1.2	Aims	10
1.3	Methods	10
1.3.1	Desk-based assessment	10
1.3.2	Fieldwork	11
1.3.3	Post-fieldwork	11
2	Location and setting	11
3	Historic Landscape Characterisation	11
3.1	Industry ancillary to mining	12
4	Historic Designations	13
5	Planning Policy Background	13
5.1	Planning Policy Statement 5 (PPS5), 'Planning for the Historic Environment'	13
5.1.1	PPS5 English Heritage guidance	14
5.2	Cornwall Structure Plan	14
5.3	Former Kerrier Local Plan	15
5.4	Cornish Mining World Heritage Site	16
6	Site history	18
7	Site inventory	21
8	Identified Sites	31
8.1	Significance of identified sites	31
8.2	Potential for other archaeological sites in the study area	32
9	Assessment of Impact	32
10	Potential mitigation strategy	32
11	References	33
11.1	Primary sources	33
11.2	Publications	33
11.3	Websites	34
12	Project archive	34

List of Figures

- Fig 1 Location map
- Fig 2 Modern OS Landline
- Fig 3 Tithe Map for the parish of Redruth c1840
- Fig 4 Plan of Wheal Sparnon Sett, Redruth, undated(© Cornish Studies Library, Redruth)
- Fig 5 Plan of Redruth by Rowe 1842 showing the course of an adit running through the site (© Cornish Studies Library, Redruth)
- Fig 6 1854 town plan of Redruth showing the stamping mill at Wheal Buckets (© Cornish Studies Library, Redruth)
- Fig 7 Surface and underground plan of Huel Buckets, undated (©CRO ref: MRO/151)
- Fig 8 First Edition of the Ordnance Survey 25 Inch Map, c1880
- Fig 9 Second Edition of the Ordnance Survey 25 Inch Map, c1907
- Fig 10 Undated postcard of Redruth with the Smelting Works in the foreground (© Cornish Studies Library, Redruth)
- Fig 11 Undated photograph of the Redruth smelter during demolition looking north and showing the four furnace stacks the boundary wall in the foreground (site 3), the surviving chimney (site 17) and surviving part of the smelter (site 25). Posted by Rockdrill
- Fig 12: Locations of identified sites (drawing supplied by the client)
- Fig 13: Site 1- Coal or ore chute in boundary wall
- Fig 14: Site 7- workshop associated with the smelting works
- Fig 15: Site 9- building possibly associated Wheal Buckets but in use throughout the duration of the smelting works
- Fig 16: Site 11- leat looking north along the driveway
- Fig 17: Site 13- infilled wheel pit looking north
- Fig 18: Sites 16, 12 and 12a- former stamping mill looking south-east and offices (possibly former count house (site 26)) to the right
- Fig 19: Sites 16- interior of building associated with stamping mill showing roof trusses
- Fig 20: Wall dividing Sites 16 and 12-former location of stamps associated with smelting works
- Fig 21: Sites 16 and 17- building associated with stamping mill with adjoining chimney, both associated with the smelting works
- Fig 22: Sites 18- air raid shelter built into retaining wall dividing buildings sites 16 and 12
- Fig 23: Site 19- mid 20th century fuel pumps
- Fig 24: Site 21- remains of sluice gate in leat (site 11) at south end of yard
- Fig 25: Site 23- Smelting works manager's office built on top of existing boundary wall
- Fig 26: Sites 25 and 26- part of the former smelting house (right) and earlier office or possible count house (left)

Abbreviations

CRO	Cornwall County Record Office
EH	English Heritage
HER	Cornwall and the Isles of Scilly Historic Environment Record
HE	Historic Environment, Cornwall Council
NGR	National Grid Reference
OS	Ordnance Survey
PRN	Primary Record Number in Cornwall HER
RIC	Royal Institution of Cornwall

1 Summary

This archaeological assessment of the old smelting works site in Redruth, for Percy Williams and Sons Ltd was undertaken by Historic Environment Projects, Cornwall Council (HE Projects). The study was designed to gain a better understanding of the impacts which would result from the development of the site for residential use. It was also designed to identify existing historically significant structures within the site so that consideration for retention of these structures could be given as part of the development proposal. The assessment includes the results of a desk-based study and field visit, and follows current planning policies and guidance, relevant extracts from which are provided in the report.

The proposed area does not include any Scheduled Monuments (SMs) or Listed Buildings (LBs) but does lie within the Cornish Mining World Heritage Site as part of the Camborne and Redruth Mining District. The extant remains within the site - a former stamping mill, part of a smelter and other buildings associated with a 19th century tin smelting works and earlier mine - have identified the site as a significant part of the World Heritage Site. The site contains extant structures and buildings which have been identified as 'Designated Heritage Assets' within Planning Policy Statement 5 (PPS5). No other designations exist within the proposed area.

On the basis of current knowledge the proposed site includes thirty-seven archaeological sites. Many of these sites are extant structures. Those of particular significance and regional importance include the remains of a stamping mill with its associated structures (**sites 12-17**), the remains of the smelter building and adjoining office (**sites 25 and 26**), two ancillary building (**sites 7 and 9**) a WWII air raid shelter (**site 18**) and the western boundary wall (**site 3**). There is also potential for the survival of below ground remains including the site of a former stamping mill associated with Wheal Buckets (**site 27**) and various buildings and structures associated with the former smelting works (**sites 16, 12 and 29-33**).

In terms of Historic Landscape Character, the development area can be characterised as clearly representing 19th and 20th century industrial use, both in the historical processes behind its development and in its current appearance.

The potential impacts include in the construction phase disturbance or loss of both below-ground and above-ground elements of industrial sites associated with stamping mills and tin smelting works as well as WWII structures, and buried features as yet unrecorded. Overall, the impact on the archaeological resource is assessed as potentially negative/moderate without appropriate mitigation; with a neutral or negative/minor residual impact provided the recommended mitigation is undertaken.

The recommendations in this report set out further work likely to be required to mitigate for the archaeological impact should the development proceed. This includes a list of structures suggested for retention and incorporation into any development proposals. It also includes the creation of historic building records for all surviving historic structures within the site. This should be carried out once the buildings have been cleared out but prior to any demolition. It is also recommended that an archaeological watching brief is carried out during any groundworks in the vicinity of **sites 12, 16, 27 and 29-33**.

Introduction

1.1 Project background

The former smelting works on Falmouth Road in Redruth (located at NGR SW 70199 41299) was founded by the Redruth Tin Smelting Company in 1862. After the works closed in 1923 the site served as a council depot and in the last twenty years as a builder's storage yard owned by Percy Williams and Sons Ltd.

The present owners and occupiers (Percy Williams and Sons Ltd) are considering options for redevelopment of the premises and how best to achieve an acceptable design incorporating the historic elements where possible. As the property lies within the Cornish Mining World Heritage Site, an archaeological assessment was commissioned by Simon Williams and undertaken by Historic Environment Projects. This report presents the results of the archaeological assessment.

1.2 Aims

The principal aim of the study was to gain a better understanding of the historic development of the site and former smelting works through a brief study of documentary, cartographic and illustrative sources as well as the physical remains. The study provides an assessment of significance of features that survive and also looks at options for inclusion of historic elements when the site is redeveloped.

The site specific aims were to:

- Draw together the historical and archaeological information about the site.
- Inform whether archaeological recording of any extant remains is required.
- Inform whether an archaeological evaluation or further archaeological recording of any potential buried remains is required.
- Inform whether existing structures/features should be incorporated into any development.
- Inform whether palaeo-environmental sampling would be required.

1.3 Methods

All recording work was undertaken according to the Institute for Archaeologists *Standards and Guidance for Archaeological Investigation and Recording*.

1.3.1 Desk-based assessment

During the desk-based assessment historical databases and archives were consulted in order to obtain information about the history of the site and the structures and features that were likely to survive. Photograph collections held by the Cornwall Centre and RIC were searched for any historic views of the site. The main sources consulted were as follows:

- Cornwall Council's Historic Environment Records
- Cornwall Record Office, Truro
- Cornwall Centre, Redruth
- Royal Institution of Cornwall, Truro
- Early maps and photographs (see Section 11.1)
- Published histories (see Section 11.2)
- Websites (see Section 11.3)

Initial research included regression of historic maps, to understand the historic development of the site.

1.3.2 Fieldwork

A site visit was undertaken to create a gazetteer of historic sites within the development area. Significance of sites or structures (both singly and as related groups) were examined. Brief descriptions of standing buildings (recorded as notes) were made on site. Areas which may have the potential for below-ground archaeological remains were also noted.

Fieldwork data comprised written notes and annotations on copies of existing site plans and elevations.

A condition survey was carried out to record archaeological condition and potential rather than structural condition, and recommendations for retention of historic structures and any further archaeological work were noted.

1.3.3 Post-fieldwork

During this phase the results of the fieldwork were collated for archiving and the results of the desk-based assessment and fieldwork were drawn together in this report.

2 Location and setting

The area under assessment covers approximately 0.5 hectares (Figs 1 and 2) and includes land within an enclosed yard which was once part of Wheal Buckets (an early/mid 19th century copper mine) but later became the site of Redruth Tin Smelting Works (1862-1923). After the works closed in 1923 the yard and remaining buildings were used for most of the 20th century by the County Council as a depot. Since the 1990s the site has been used as a builders' yard (Simon Williams pers comm.). The assessment area lies on the south-west side of Redruth and is centred at NGR SW 70199 41299 with its entrance on the western side of Falmouth Road and with Bucketts Hill immediately to the south. The site gently slopes from 130m OD at the southern end of the site down to 120m OD at the northern end and has a leat flowing along its eastern side from south to north.

The assessment area lies within the Camborne and Redruth Mining District which is part of the Cornish Mining World Heritage Site. It is surrounded on all sides by tin and copper mines of various dates. Approximately 150m to the south is the site of East Uny or Buckets mine and 150m to the north is the site of Wheal Sparnon. Also a tin stream works was located 180m north-west of the site and a blowing house 190m to the north-east. Before the 1860s the majority of the assessment area had been part of Wheal Buckets and was the site of a stamping mill associated with the mine. The remainder of the area was farmland and the whole site is listed as part of Boase's tenement on the Tithe Apportionment of c1840.

During the late 19th and early 20th century there was much urban housing development in the surrounding area, particularly along Falmouth Road. This continued during the 20th century so that the site became surrounded by housing. Some of the 19th century buildings within the site still survive, and the layout has changed only slightly since its use as a smelting works.

Geologically, the site is based on the Mylor slate formation comprising Hornfelsed slate and Hornfelsed siltstone overlain by well drained fine silty soils.

3 Historic Landscape Characterisation

Historic Landscape Characterisation aims to enable the better management of the historic environment and changes to it by dividing the landscape into a number of defined types characterised by certain historic features and processes. Key attributes and components are identified for each type to enable its present historic significance

to be clearly understood and to enable change to be considered in terms of its appropriateness to the area. (Dudley 2008, 17).

Herring *et al*'s 2005 HLC mapping undertaken for the 'Camborne-Pool-Redruth' zone enhanced the broad-based county-wide HLC mapping undertaken in 1994. This update was necessary to better identify the historic character of the urban environment in the Camborne, Pool, Redruth zone, and to guide the management of the ongoing change in this area. (Dudley 2008, 17).

Only a single HLC type was identified within the assessment area which was '20th century settlement'. It should be noted, however, with the benefit of more detailed, site-based assessment, that the assessment area should have been categorised 'Industry Ancillary to Mining'. The site is characterised by the extant buildings and structures within an enclosed yard relating to a 19th century stamping mill site and tin smelting works. Some modern buildings have been added to the site during the 20th century but essentially the site is of 19th century industrial character.

The following text for mining activity has been taken *ad verbatim* from Herring *et al* (2005), though in some instances, it has been necessary for the present assessment to add comments updating the text in relation to the successful inscription of the Cornish Mining Landscape onto UNESCO's World Heritage Site schedule.

3.1 Industry ancillary to mining

Key attributes and components

As it became more dependent on technology, the mining industry required a range of machinery and materials, some of which was supplied by local factories. These tended to be located in the valleys (when water power was used to power machinery) or along road and rail systems (to ease transportation). Foundries produced machinery of all sorts (though the great steam engines were mainly built outside the area at Hayle and Perranarworthal) and there were specialist works producing compressors, drills, fuses, candles etc. Other industries (in HLC Type 21) were less directly related to mining but some were no doubt dependent on the mining industry and population (e.g. sawmills and breweries).

Historical context

Most of the diversification of ancillary industries developed in the later 18th and the 19th centuries as shaft mining developed apace. Each industry has its own history, many nicely tied to fluctuations in tin and copper mining.

Statement of significance

Those who appreciate the complexity of the CPR's unique history will particularly value the remains of these ancillary industries. Some, such as Holmans and Bickford Smiths, are internationally important for innovations that made mining safer and more efficient.

Potential for amenity and education

There are great opportunities to incorporate the histories of these industries, and their surviving remains (such as the North Lights building of Bickford Smiths), into interpretative material for the area.

Condition/survival

Unfortunately, many key structures relating to the ancillary industries have been lost and others are vulnerable (eg the now roofless North Lights building).

Forces for change

Continued redundancy of some buildings and yards makes these vulnerable to demolition and replacement. On the other hand, economic regeneration should bring new industries that could make good and appropriate use of structures.

Priorities for further work

Some of the ancillary industries have had histories prepared, but most have not and there is great potential for both documentary history research and archaeological recording and analysis. There will also be great potential for the integration of the histories of these industries with those of the mines and the local communities.

Historic environment management recommendations

- Considering the importance of mining in generating the fabric and character of the CPR area, there should be a presumption against further disturbance of significant industrial remains.
- Grants to assist consolidation and presentation works should be encouraged.
- Statutory protection of the most important sites and complexes should be extended.

Character of the proposed development area

The assessment area lies in the heart of a mining landscape and is surrounded on all sides by tin and copper mines of various dates. The area itself was once part of Wheal Buckets mine and retains some features and structures relating to this phase of its past. The dominant character is of a 19th century industrial site, in particular that of a 19th century tin smelting works since many of the upstanding structures relate to this phase of the site's history. More recent use of the enclosed yard has resulted in the construction of various modern building and alterations to earlier structures.

4 Historic Designations

There are no Scheduled Monuments or Listed Buildings within the site and it lies outside the Conservation Area for Redruth. However, the whole site does lie within the Cornish Mining World Heritage Site as part of the Camborne and Redruth Mining District. There are no other designations within the area.

5 Planning Policy Background

The following section brings together policies and guidance, or extracts from these, referred to in this report and/or used in the development of the assessment and its methodology.

5.1 Planning Policy Statement 5 (PPS5), 'Planning for the Historic Environment'

Relevant Policies include:

Policy HE9.1 There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Once lost, heritage assets cannot be replaced and their loss has a cultural, environmental, economic and social impact. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, including scheduled monuments,¹⁴ protected wreck sites, battlefields, grade I and II* listed buildings and grade I and II* registered parks and gardens, World Heritage Sites, should be wholly exceptional.

Policy HE9.2 Where the application will lead to substantial harm to or total loss of significance local planning authorities should refuse consent unless it can be demonstrated that:

- (i) the substantial harm to or loss of significance is necessary in order to deliver

substantial public benefits that outweigh that harm or loss; or
(ii) (a) the nature of the heritage asset prevents all reasonable uses of the site; and
(b) no viable use of the heritage asset itself can be found in the medium term that will enable its conservation; and
(c) conservation through grant-funding or some form of charitable or public ownership is not possible; and
(d) the harm to or loss of the heritage asset is outweighed by the benefits of bringing the site back into use.

Policy HE9.4 Where a proposal has a harmful impact on the significance of a designated heritage asset which is less than substantial harm, in all cases local planning authorities should:

- (i) weigh the public benefit of the proposal (for example, that it helps to secure the optimum viable use of the heritage asset in the interests of its long-term conservation) against the harm; and
- (ii) recognise that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss.

5.1.1 PPS5 English Heritage guidance

The English Heritage and DCMS (Department for Culture, Media and Sport) document 'PPS5 Planning for the Historic Environment: Historic Environment Planning Practice Guide' provides guidance on PPS5 and its application.

This refers to the need, for decision-making in response to an application for change that affects the historic environment, of providing and assessing, at a level appropriate to the relative importance of the asset affected, information on the asset and its extent, on its setting, and on the significance of both of these aspects. Section 5, 54 states that

'Heritage assets may be affected by direct physical change or by change in their setting. Being able to properly assess the nature, extent and importance of the significance of a heritage asset and the contribution of its setting is very important....'

Section 5 on Policies HE6 to HE 12, 58, notes among appropriate actions (in point 5)

'Seek[ing] advice on the best means of assessing the nature and extent of any archaeological interest e.g. geophysical survey, physical appraisal of visible structures and/or trial trenching for buried remains.'

5.2 Cornwall Structure Plan

The following policies in the Cornwall Structure Plan relate to the historic environment.

Policy 1

Development should be compatible with:

The conservation and enhancement of Cornwall's character and distinctiveness;

The prudent use of resources and the conservation of natural and historic assets;

A reduction in the need to travel, whilst optimising the choice of modes, particularly opportunities for walking, cycling and the use of public transport;

Through developing the principles of Policy 1 it is intended to integrate environmental values with land use and transport policies, achieving patterns of development that reflect strong environmental protection and stewardship of resources.

Policy 2

Throughout Cornwall, development must respect local character and:

Retain important elements of the local landscape, including natural and semi-natural habitats, hedges, trees, and other natural and historic features that add to its distinctiveness;

Contribute to the regeneration, restoration, enhancement or conservation of the area;

Positively relate to townscape and landscape character through siting, design, use of local materials and landscaping.

The conservation and enhancement of sites, areas, or interests, of recognised international or national importance for their landscape, nature conservation, archaeological or historic importance, including the Cornish Mining World Heritage Site, should be given priority in the consideration of development proposals.

5.3 Former Kerrier Local Plan

Although now part of Cornwall Council, Kerrier District Council's policies listed in its local plan continue to be relevant. Those policies concerning the historic environment are listed below.

The Kerrier Local Plan contains policies relating to the built environment designed to protect the archaeological resource. The relevant objectives being:

4.1

(a) to maintain the local character, distinctiveness and appearance of the built environment, attractive traditional qualities and architectural features of settlements and buildings new and old and to preserve and enhance the archaeological and historical heritage;

(b) to improve public access to and enhance the appreciation of the historical and archaeological heritage and in particular the interpretation of the mining heritage as part of the local culture and particular character and individuality of the area;

(c) to conserve the landscape setting of historic buildings and open areas essential to the character of built-up areas;

(d) to protect Listed Buildings, scheduled Ancient Monuments and other sites of archaeological and historic importance;

The policies relevant to the study area are:

Policy B.EN1: historic heritage, archaeology

Development that would significantly harm sites, buildings and other remains of archaeological and historic importance, or their setting, will not be permitted unless there is a need for the development and the benefits for the community outweigh the archaeological importance. where it affects archaeology that is found to be of national importance, development will only be permitted if the remains can be preserved in-situ without significant harm to them and to their setting; where it affects other sites and on-site preservation is impracticable or unnecessary, the development should include excavation and recording of significant remains and a planning obligation to secure this will be sought.

Policy B.EN4: historic heritage mining remains

Development likely to significantly harm industrial archaeology, mining heritage, historical, industrial and mining buildings and sites, including former mineral railways, tramways, engine houses and chimneys, will not be permitted unless the importance of the archaeology is outweighed by the benefit of the development to the community.

4.20

In addition to the deletions and extensions to the AGHVs defined in the CCLP, the following areas are also now proposed as AGHVs. This is to extend coverage to include areas of historic industrial importance. They are examples of the distinctive historic industrial and mining landscapes of the area. Where there are areas containing large numbers of historic mine buildings, mining remains, associated industrial buildings and transport systems, they are considered to be of historic value and worthy of protection. These are proposed in the CSP. They are shown as proposals on the Proposals Map to determine the detailed boundaries.

(k) St Day/Gwennap Central Mining District (B544): This area lies mostly within Carrick District and only its western edge overlaps into Kerrier. The area reflects the importance of industrial history. It includes former mines, mining landscapes and field systems for miners' smallholdings. It forms part of the Mineral Tramways Area.

5.4 Cornish Mining World Heritage Site

On 13th July 2006 select mining landscapes across Cornwall and west Devon were inscribed as a World Heritage Site by UNESCO, the United Nations Educational, Scientific and Cultural Organisation. This was achieved under the auspices of the World Heritage Convention, adopted by UNESCO in 1972, which provides for the identification, protection and conservation of natural and cultural Sites deemed of Outstanding Universal Value (www.cornish-mining.org.uk).

World Heritage Sites do not at present have statutory protection within the United Kingdom. However many sites and areas are covered by existing designations and many management plans are incorporating the Cornish Mining WHS within them. For instance the Cornwall Structure Plan 2004 has made provision in Policy 2 for the proposed World Heritage Site: 'the conservation and enhancement of sites, areas, or interests, of recognised international or national importance for their landscape, nature conservation, archaeological or historic importance, including the proposed World Heritage Site, should be given priority in the consideration of development proposals....' (World Heritage Site website: www.cornish-mining.org.uk).

In the United Kingdom World Heritage Sites are also afforded protection through Planning Policy Statement 5 (PPS5) (see above).

The following are policies listed in the World Heritage Site Management Plan 2005-2010 (pp150-152):

ISSUE 4 – STRATEGIC FRAMEWORK

Policy 4c Planning authorities should ensure that new development protects, conserves and enhances the Site and its Setting.

ISSUE 5 – INCREASING PROTECTION

Policy 5c Local authorities and other agencies should make full use of the powers available to them for the protection and conservation of the Site.

Policy 5d There is a presumption against the removal of historic mine waste within the Site.

ISSUE 6 – PROTECTING THE SETTING

Policy 6 Developments outside the Site that will adversely affect the outstanding universal value will be resisted.

ISSUE 7 – SUSTAINABLE DEVELOPMENT

Policy 7a Sustainable heritage-led regeneration development will be encouraged and supported.

Policy 7b New development should add to the quality and distinctiveness of the Site by being of high quality design and respectful of setting.

Policy 7c There should be a presumption in favour of retaining and re-using historic buildings which are important components of the Site.

Policy 7d Proposals for the resumption of mining will be supported where they do not adversely affect the outstanding universal value of the Site.

Policy 7e Landscape, nature conservation and agri-environment management regimes should have regard for the authenticity and values of the Site.

ISSUE 8 – CONSERVATION AND MAINTENANCE OF KEY COMPONENTS

Policy 8a The conservation and continuing maintenance of the historic fabric of the Site should be undertaken to the highest standards to ensure authenticity and integrity.

Policy 8b The historic character and distinctiveness of the [WHS] mining landscape should be maintained.

Policy 8c Traditional materials and skills should be encouraged in the maintenance of historic fabric within the Site.

Policy 8d Where the historic fabric within the Site has been lost or compromised through non-authentic materials, inappropriate details and poor workmanship, historic character and detail will be re-introduced wherever and whenever possible.

Policy 8f Key moveable components should be preserved in situ unless relocation will conserve or enhance the outstanding universal value of the Site.

ISSUE 9 – ARCHIVES, COLLECTIONS AND DATA

Policy 9 Archives, collections and data concerning the Site should be curated, catalogued and conserved and made accessible to all.

ISSUE 11 – INCREASING INTELLECTUAL ACCESS

Policy 11c The values and significance of the Site should be communicated to a wide range of educational audiences.

The proposed development site is within the nominated Cornwall and West Devon Mining Landscape World Heritage Site. World Heritage Site Policy 7b states that:

New development should add to the quality and distinctiveness of the Site by being of high quality design and respectful of setting.

Policy 6 – Developments outside the site that will adversely affect its outstanding universal value will be resisted.

Policy 7a – Sustainable heritage – led regeneration will be encouraged and supported.

Policy 7b – New development should add to the quality and distinctiveness of the Site by being of high quality design and respectful of setting.

Policy 7c – There should be a presumption in favour of retaining and re-using historic buildings which are important components of the Site.

6 Site history

There are no known prehistoric sites either within or adjacent to the proposed development area. Prehistoric activity further afield in Redruth is represented by three find-spots which are all approximately 0.5km away. The finds represent both Bronze Age and Iron Age activity in the wider area.

During the medieval period the site appears to have been located within medieval farmland surrounded by small farming settlements such as Treruffe and Trewirgie. There are no known medieval sites within the proposed development area.

A process of map regression helps to understand the recent landscape history of the site. The first identified dated map to show any detail within the proposed development area is the Tithe map for the parish of Redruth c1840 (Fig 3). The map along with the accompanying Apportionment indicates that the area at this date was partly farmland and partly industrial. The Apportionment lists the land owner as James Wentworth Buller and the tenant and occupier as Matthias Boase. The following plots are listed within the area:

Boase's Tenement

- 1042 Lower Meadow
- 1043 House and garden
- 1044 Mowhay
- 1045 Leat meadow
- 1046 Stamps, plot, waste
- 1039 Middle field
- 1040 Ball field, Burrow

It is clear from the Apportionment that by this date there was a stamping mill on the site. Other mid 19th century maps including the Plan of Redruth by Rowe 1842 (Fig 5), the 1854 town plan of Redruth (Fig 6) and the undated surface and underground plan of Huel Buckets (Fig 7) show that the site was part of Wheal Buckets mine during the mid 19th century and that the mine's stamping mill was located here. Only the wheel pit of the mill is shown on all of these plans (Figs 5, 6 and 7) indicating that they do not represent fully the structures that existed within the site at that time. Other features shown on these plans include the existing leat (**site 11**) running through the site from south to north, the access road (**site 28**) running from Falmouth Road (formerly Buller's Row), an adit (**site 36**) running from south to north (Figs 5 and 7) and a building (possibly **site 9**) shown on Rowe's plan (Fig 5).

Wheal Buckets was a 19th century mine, listed as producing copper between 1846 and 1849 (Burt *et al* 1987) in this period it sold 2658 tons of copper ore for £11,130 (Collins, 1988). On an undated plan of Wheal Sparnon Sett (Fig 4) a mine shaft is shown in the northern entrance to the site which is likely to be associated with Wheal Buckets. Presumably the stamps at this date were used for the initial processing of ore from the mine before it was sent to a smelter. It is, however, possible that at this date there was some small scale smelting also taking place within the site and the stamps may have been used for stamping slag from the furnace so that it could be re-smelted.

In Cornwall during the 19th century ore was crushed and concentrated at the mine site. From the early nineteenth century this became an increasingly mechanical process requiring large areas of land with a sloping gradient and a water supply. Ore dressing sites are typically arranged in a 'stepped' layout. On a mine site women and boys broke up ore-bearing rocks using large hammers. The broken rock was taken downhill to sheds in which it was crushed to a fine sand by stamps. These were heavy beams with forged iron heads which were lifted and dropped onto the ore (see

www.historic-cornwall.org.uk/flyingpast/age.html). The stamps were powered either by a water wheel or steam engine.

Water was added to the crushed rock as it was stamped to form a solution from which the tin quickly fell out. Agitating the solution facilitated this separation and from the middle of the nineteenth century this process was carried out using mechanical buddles. These were circular pits with rotating brushes. Material would normally be re-processed to maximise ore concentration. The concentrated ore was then roasted to burn off unwanted impurities such as arsenic and sulphur. This roasting was carried out in furnaces or 'calciners'. The fumes released in the calciner entered a series of chambers on whose walls they condensed. The chambers were interconnected and the arsenic fumes were forced to follow a zigzag path through them. Once the arsenic had condensed as a crust on the chamber walls it was then removed by hand. These structures are known as labyrinths (see www.historic-cornwall.org.uk/flyingpast/age.html). Following this process the concentrated ore could then be sold to a smelting house.

At Wheal Uny in 1859 (immediately to the south of the site) tin was assuming great importance with sales far outweighing the price of copper. The same was true of Wheal Buller where they were also changing from copper to tin (Barton 1965). From 1860 to 1863 the output of Cornish black tin rose by almost fifty per cent and to take advantage of this (and particularly of the tin output from Wheal Uny) the Redruth Tin Smelting Company was set up in 1862 (Barton 1967). The new smelting works was established on the proposed development site replacing the Wheal Buckets stamping mill with a large smelter and collection of ancillary buildings including a new stamping mill.

Tin smelting in Cornwall has a very long history. Reverberatory furnaces were introduced in the 18th century and largely displaced the old blowing houses. Tin smelting became a more centralised and recognisably modern industrial activity, as smelters were set up throughout the county, each dealing with the produce of many local mines. Between 1800 and 1930 a total of 35-40 smelting houses using reverberatory furnaces were working in Cornwall (not all concurrently). During this period they dealt with the entire output of Cornish tin; unlike copper, tin was always smelted within the county.

A reverberatory furnace was a type of kiln in which indirect contact between the heat source and the ore was achieved by means of a network of flues. The reverberatory furnace differed from the old blowing houses in which the ore was mixed with charcoal before firing. The new system reduced the ore by the application of heat alone, so avoiding contaminating the tin, and the heat was provided by coal instead of charcoal (see www.historic-cornwall.org.uk/flyingpast/age.html). There were four furnaces at the Redruth works indicated by the four chimneys shown on the two early photographs of the site (Figs 10 and 11). The northern part of the Redruth smelting house still survives.

The slag that was produced as a by-product during smelting still contained a percentage of tin. In order to obtain a maximum yield the slag was reprocessed, stamped in a mill and then re-smelted. The smelting works stamps used for breaking up the 'hard head' furnace slags for re-smelting were powered by a water wheel. (Barton 1968). Structures associated with the smelting works stamping mill survive within the site.

The First Edition 25 Inch OS map of c1880 (Fig 8) is the earliest map to show the layout of the Redruth Smelting Works. It shows the site with many buildings enclosed within a yard; the western boundary wall (**site 3**) had been established by this date. The following structures with allocated site numbers (see inventory) were present at this date and are depicted on the c1880 OS map: **3, 9, 10, 11, 12, 13, 14, 16, 17, 25, 26, 29, 32 and 33** (see Fig. 12).

The Second Edition OS map of c1907 (Fig 9) shows the smelting works situated within the extent of the enclosed yard that exists today. The following structures were added to the works between c1880 and c1907 and are shown on this map as additions to those shown on the c1880 OS map. They are: **sites 7, 8, 20, 22, 23, 30, 31, 33 and 34** (see Fig. 12 and Inventory).

Few records of the Redruth Tin Smelting Company have survived. Sampson Walters (of Gyllyndune mansion, Falmouth) was the principal proprietor in the Redruth Tin Smelting Company in the 1860s and 70s (Barton 1967). Later proprietors of the Redruth Tin Smelting Company included Lanyon Waters and DW Bain from 1891 (Barton 1967). Walter Bray was the foreman or manager of the works from the 1860s until at least 1878 (Doidge 1866 and Kellys Directory 1878) and the London office for the Redruth Tin Smelting Company was located at Golden Heart Wharf to the south of Upper Thames Street, London.

On 21 March 1887 the West Briton records the following incident at the site:

Accident at Redruth - On Thursday night a youth had his foot badly burned at the smelting works, South Turnpike. Whilst taking a parcel to the works in the darkness, he stepped into a stream of molten slagg. Assistance was soon at hand, and he was speedily extricated from his dangerous position.
<http://listsearches.rootsweb.com/th/read/CORNISH-GEN/2003-11/1068410560>

After 1900, there was a rapid decline in Cornish mining, and this was reflected in a similar reduction in the number of active smelters. By 1919 there were only 5 left in production including the Redruth works. In Cornwall the effect of excess tin smelting capacity after WWI caused Bain's Redruth smelting works to close in 1923 (Barton 1967). Seleggan was the last to close, in 1931.

After the closure of the smelting works the yard was acquired by Cornwall County Council and used as one of their depots. During WWII an air raid shelter was built in the former stamping mill (**site 12**). In the late 20th century the yard was purchased from the County Council by the present owners (Simon Williams pers comm.).

7 Site inventory

The following grades are used in the Cornwall HER and have been used to guide this report:

- S Scheduled Monument (none identified within the project area)
- L Listed Building (none identified within the project area)
- A Site of National Importance
- B Site of Regional Importance
- C Site of Local Importance
- D Non-antiquity

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date construction of	Recommendations/ Condition
1	chute	Extant	A blocked coal/ore chute built into the south-west part of the boundary wall (site 3). It is located at the top of the wall 2m up from the ground and measures 2m wide. It has granite jambs and has been blocked with granite setts. Coal and/or tin ore were tipped from carts into loading bays through this chute accessed via a track on the west side of the wall.	SW70196	41265	C	19 th century	It is recommended that the chute it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
2	Building	Demolished	This is the site of a former lean-to building. The apex of the roof and the location of a former stove can be seen on the north elevation of the boundary wall (site 3). This building is shown as incomplete on the c1907 OS map.	SW70193	41266	C	1880-1907	It is recommended that it is included in a historic building survey of the yard prior to development.
3	Wall	Extant	This is the boundary wall enclosing the western half of the yard. It is a partial retaining wall and measures approximately 3m high within the yard and is approximately 0.5m wide. It is built from granite and slate rubble bonded with a lime mortar.	SW70184	41268	C	1840-1880	It is recommended that the boundary wall is retained as part of any future development. It is also recommended that it is included in a historic building survey of the yard prior to development.

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
								Condition: The structure appears sound.
4	Chute	Extant	A blocked coal/ore chute built into the south-west part of the boundary wall (site 3). It is located at the top of the wall and measures 1.5m wide. It has been blocked with granite setts. Coal and/or tin ore were tipped from carts into loading bays through this chute accessed via a track on the west side of the wall.	SW70180	41270	C	19 th century	It is recommended that the chute it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
5	Chute	Extant	A blocked coal/ore chute built into the south-west part of the boundary wall (site 3). It is located at the top of the wall 2m up from the ground and measures 2m wide. It has granite jambs and has been blocked with granite setts. Coal and/or tin ore were tipped from carts into loading bays through this chute accessed via a track on the west side of the wall.	SW70177	41279	C	19 th century	It is recommended that the chute it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
6	Chute	Extant	A blocked coal/ore chute built into the south-west part of the boundary wall (site 3). It is located at the top of the wall 2m up from the ground and measures 2m wide. It has granite jambs and has been blocked with granite setts. Coal and/or tin ore were tipped from carts into loading bays through this chute accessed via a track on the west side of the wall.	SW70173	41289	C	19 th century	It is recommended that the chute it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
7	Building	Extant	This small rectangular lean-to building was constructed at some point between 1880 and 1907 as part of the smelting works. It is shown on the c1907 OS map and was probably a workshop. It has brick walls, a single door opening and workshop windows. The roof structure is original although the covering has been replaced with modern corrugated cement. The floor is concrete	SW70168	41308	C	1880-1907	It is recommended that the building it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
			except a small area where timber boards cover a pit. There is a blocked opening with brick jambs above the boards suggesting that a machine may have been in use.					
8	Building	Demolished	This is the location of a former lean-to building now replaced with a modern structure. There is evidence of a earlier lower roofline in the north wall. The earlier structure is shown on the c1907 OS map.	SW70165	41317	C	1880-1907	No recommendations.
9	Building	Extant	This building may have been constructed before 1840 since a structure is shown at this approximate location on the Tithe map of c1840. However, it is clear that it had been built by 1880 since it is shown on the First Edition OS map. It is a single storey gable ended building with killas rubble walls bonded with lime mortar and granite jambs and quoins. There are three wide door openings fronting the yard suggesting a possible use as a cart shed and possibly also stabling. The roof covering corrugated cement.	SW70171	41349	B	Pre 1840?	It is recommended that the building is retained and converted for use within any future development. It is also recommended that it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
10	Gateway	Extant	The entrance and drive into the yard from Falmouth Road (formerly Buller Row) was in use while the site was part of Wheal Buckets and it is shown on the Tithe map of c1840. During the site's use as a smelting works two plain granite gate posts were added to this entrance along with two matching granite posts at a new southern entrance (site 22) .	SW70160	41436	C	Pre 1840	It is recommended that the posts are left <i>in situ</i> and that it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
11	Leat	Extant	This leat runs through the site from south to north. The southern half is now culverted but during the 19 th century it was an open feature. The leat predates the Tithe map of c1840. Where visible it measures approximately 1m deep by 1m wide and the sides are revetted with stone	SW70165 SW70222	41437 to 41271	B	Pre 1840	It is recommended that the leat where open (in the northern half of the site) is left <i>in situ</i> Condition: Much of the

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
			(surviving in places).					revetment stonework is missing.
12	Building	Extant	This building is part of the stamping mill associated with the smelting works. Much of the original building here, shown on the c1880 OS map, has been replaced with later alterations. The building is now open internally to building 12a (an early 20 th century extension) but retains its own roof structure (king trusses).	SW70196	41341	B	1840-1880	It is recommended that the building is included in a historic building survey of the yard prior to development. It is recommended that the southern wall is retained and the features within it left visible. It is also recommended that the east (leat side) wall is retained. Condition: The structure appears sound.
12a	Building	Extant	This building <u>is</u> a northern extension of the stamping mill associated with the smelting works. It appears to have been constructed at some point in the first half of the 20 th century. The building is now open internally to building 12 but retains its own roof structure (king trusses).	SW70196	41345	C	Post-1907	It is recommended that the building is included in a historic building survey of the yard prior to development. It is recommended that the east (leat side) wall is retained. Condition: The structure appears sound.
13	Wheel pit	Extant	A former wheel pit remains intact but infilled on the eastern side of the former stamping mill (sites 12 and 16). The water wheel, supplied with water from the leat (site 11), would have driven the stamps inside the building. It seems likely that this stamping and water wheel were constructed when the smelting works were first established in the 1860s.	SW70203	41335	B	1840-1880	It is recommended that the wheel pit is retained within any future development. It is also recommended that it is included in a historic building survey of the yard prior to development. Condition: The structure is presently mostly infilled.

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
14	Gearing pit	Extant	A former gearing pit lies immediately to the west of the wheel pit. Part of the pit is external and now very overgrown.	SW70200	41332	B	1840-1880	It is recommended that the pit is retained within any future development. It is also recommended that it is included in a historic building survey of the yard prior to development. Condition: The structure is overgrown externally.
15	Leat culvert	Extant	At this point (adjacent to the wheel pit) the leat becomes culverted to the south. Here a granite lintel spans the top of the feature.	SW70205	41334	C	20 th century	It is recommended that this feature is retained within any future development. It is also recommended that it is included in a historic building survey of the yard prior to development. Condition: The leat here is overgrown.
16	Building	Extant	This building is part of the stamping mill but may have been used for slag processing before it was sent through the stamps immediately to the north. Alternatively it may have served as an engine and boiler house associated with the chimney (site 17). An engine may have been installed before 1880 to replace the water wheel for powering the stamps. The eastern stone wall is part of the original structure, but the building was extended to the west in the late 19 th century, and most of this building remains intact including some internal walls.	SW70196	41327	B	1840-1880	It is recommended that the historic elements of this building are retained and converted for use within any future development. It is also recommended that it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
17	Chimney	Extant	This chimney is first shown on the c1880 OS map. It is part of the stamping mill associated with the smelting works. It is constructed from granite rubble in the lower part and brick in the upper	SW70199	41319	C	1840-1880	It is recommended that this Chimney is retained within any future development. It is also recommended that it

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
			part. The top section has been rebuilt.					is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
18	Air raid shelter	Extant	This is a WWII air raid shelter built into the base of the retaining wall of the smelting works stamping mill (building 12). It is constructed from corrugated iron and concrete and measures approximately 3m long by 1.5m wide. It retains its original door.	SW70194	41334	B	c1940s	It is recommended that this Building is retained within any future development. It is also recommended that it is included in a historic building survey of the yard prior to development. Condition: The structure is in good condition.
19	Fuel pumps	Extant	These fuel pumps were installed c1950s by Cornwall County Council when the site was in use as a depot.	SW70192	41325	C	Mid 20 th century	It is recommended that the pumps are included in a historic building survey of the yard prior to development. Condition: Good
20	Walls	Extant	This combines two sections of boundary wall on the eastern and south-eastern sides of the yard. They are both constructed from slate and granite rubble bonded with lime mortar and repointed with cement mortar, and both are approximately 1.2m high. Both sections of wall are later in date than the western boundary wall and first appear on the c1907 OS map.	SW70224 SW70223	41313 And 41271	C	1880-1907	It is recommended that these sections of walling are retained within any future development. It is also recommended that it is included in a historic building survey of the yard prior to development. Condition: The walls may require repointing.
21	Sluice	Extant	This is the location of a former sluice gate at the south edge of the yard. A small section of the leat	SW70222	41271	C	19 th century	It is recommended that the sluice is included in a

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
			is open here but continues as a culvert beyond the property to the south. All that remains of the sluice is a vertical iron rod set in the base of one side of the leat.					historic building survey of the yard prior to development. Condition: Good
22	Gatewa y	Extant	This is the south and main entrance to the smelting works from Buckets Hill. By 1907 this had become the main entrance to the site. There are two plain granite gate posts at this entrance and two matching granite posts at a new northern entrance.	SW70215	41269	C	1880-1907	It is recommended that the posts are left <i>in situ</i> and that it is included in a historic building survey of the yard prior to development. Condition: The structure appears sound.
23	Building	Extant	This building was once the manager's office for the smelting works. Although it does not lie within the assessment area, the northern wall forms part of the southern boundary wall and the building is intrinsically linked to the smelting works. It is a grand two storey building built from slate rubble with granite jambs. The north wall has been built directly on top of the existing yard boundary wall.	SW70210	41264	C	1880-1907	It is recommended that the north wall of the former office is included in a historic building survey of the yard prior to development. Condition: Good
24	Wall	Extant	This is a low retaining wall approximately 0.8m high, retaining land to the east. It is constructed from granite setts and lintels. It was built after 1907 since it does not appear on the c1907 and appears to have been constructed after the demolition of the smelting house.	SW70201 SW70213	41319 To 41279	C	20 th century	No recommendations.
25	Building	Extant	This is a surviving portion of the main smelting house built in the 1860s. It is shown on the c1880 OS map. It is a single storey structure with a very large blocked door opening in the north elevation. The south wall and all internal walls are later insertions (mid to late 20 th century). It is built from killas rubble with granite quoins and has	SW70183	41307	B	1860s	It is recommended that the historic fabric of this building (north and west walls) are retained and incorporated into future development. It is also recommended

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
			brick arched window openings. It is very different in form to building 26 (adjoining).					that this building is included in a historic building survey of the yard prior to development. Condition: The structure appears sound and in use as offices.
26	Building	Extant	This is a two storey building adjoined to the west by building 25. It is constructed from slate rubble and has granite quoins and jambs. On the ground floor there is a bay window to the front (north) and another bay window on the east elevation has been removed. The front of this building can be seen from the northern entrance to the site along the drive and is clearly of importance. The fact that it is so different in form to building 25 suggests that it is of an earlier date since building 25 has been built up against it. In addition, its function is also clearly very different. During the period of the smelting works it is likely to have served as an office, but there is a possibility that it predates this and may have been built as a count house for Wheal Buckets.	SW70192	41311	B	1840s?	It is recommended that this building is retained and converted for use in future development. It is also recommended that this building is included in a historic building survey of the yard prior to development. Condition: The structure appears sound and is in use as offices.
27	Building /structures	Docum entary	This is the site of a former stamping mill driven by a water wheel which was part of Wheal Buckets before the construction of the smelting works. The location of the wheel pit and platform are shown on Rowe's plan of Redruth 1842 and the Redruth town plan 1854.	SW70182	41327	C	Pre 1840	Any groundworks in this area should be accompanied by an archaeological watching brief.
28	Road	Extant /Docu mentary	A road is shown on Rowe's plan of Redruth 1842 and the Redruth town plan 1854 running all the way through the site from north to south. The northern end of this is still present.	SW70160 SW70215	41436 to 41269	C	Pre 1840	No recommendations.

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Gr ad e	Date of construction	Recommendations/ Condition
29	Structur es	Docum entary	This is the location of former structures shown on both the c1880 and c1907 OS maps. The rectangular structures may have been settling tanks and the semi-circular structure is possibly part of a buddle for separating ore from the crushed slag which had been processed by the stamps immediately to the south.	SW70187	41361	C	1840-1907	Any groundworks in this area should be accompanied by an archaeological watching brief.
30	Buddle	Docum entary	This is the location of what appears to be a former buddle shown on the c1907 OS map. This was for separating ore from the crushed slag which had been processed by the stamps immediately to the south.	SW70193	41353	C	1880-1907	Any groundworks in this area should be accompanied by an archaeological watching brief.
31	Building	Docum entary	This is the location of a former building shown on the c1907 OS map on the west side of the stamping mill (site 16). Its function is unclear.	SW70188	41332	C	1880-1907	Any groundworks in this area should be accompanied by an archaeological watching brief.
32	Building	Docum entary	This is the location of the former smelting house which was demolished at some point after 1923. It is show on an undated postcard (Fig 10) with four tall square section chimneys indicated that it housed four furnaces.	SW70191	41296	C	1840-1880	Any groundworks in this area should be accompanied by an archaeological watching brief.
33	Building	Docum entary	This is the location of a large building on the eastern side of the smelting house which was demolished at some point after 1923. It was extended to join the main smelting house between 1880 and 1907 and is shown on an undated postcard (Fig 10) to the rear of the smelting house with a vent along the ridge of its roof.	SW70205	41291	C	1840-1907	Any groundworks in this area should be accompanied by an archaeological watching brief.
34	Holding pond	Docum entary	This is the site of a former holding pond shown on the c1907 OS map.	SW70230	41279	C	1880-1907	No recommendations.

Site No.	Site Type	Form	Description	NGR Easting	NGR North ing	Grade	Date of construction	Recommendations/ Condition
35	Shaft	Docum entary	This is the site of a mine shaft shown on an undated plan of Wheal Sparnon Sett (Fig 4). It appears to lie immediately in the northern entrance to the site.	SW70159	41438	C	Pre 1840	No recommendations.
36	Adit	Docum entary	This is the site of an adit shown on Rowe's plan of Redruth drawn in 1842. It is clear that the adit runs through the site from the eastern side of building 9 more or less directly southward and past the southern boundary wall. The depth of the adit is unknown.	SW70178 SW70197	41353 to 41265	C	Pre 1840	No recommendations.

8 Identified Sites

Full descriptions of each of the sites which may be affected by the proposed scheme can be found in the site inventory (**section 7**) alongside individual recommendations for further work.

A total of 37 sites were identified within the assessment area during the desk-based assessment and field visit (see Fig. 12).

In outline the principal archaeological sites identified can be separated into three categories; those predating the smelting works, those associated with the smelting works and those post-dating the works.

As far as we are aware the sites predating the works are likely, in the main, to be of early/mid 19th century date and associated with the site's use as part of Wheal Buckets mine. At this date there was a stamping mill here and the leat was in use. It is also possible that building **26** relates to this phase and may have been in use as the mine count house. These features include both below and above-ground sites. They are listed below:

Sites pre-dating the smelting works (pre 1862): **sites 9, 10, 11, 26?, 27, 28, 35 and 36.**

Sites associated with the period of use as a smelting works, again include both below and above ground structures. Between 1862 and 1923 the site evolved as a major Tin smelting works and included a large smelter house, offices, a stamping mill, processing buildings and workshops all located within and enclosed yard. The sites associated with this phase are as follows:

Sites associated with the smelting works (1862-1923): **sites 1, 2, 3, 4, 5, 6, 7, 8, 9 10, 12, 12a?, 13, 14, 15?, 16, 17, 20, 21, 22, 23, 25, 29, 30, 31, 32, 33 and 34.**

After the abandonment of the smelting works most of the smelter itself and adjoining building were demolished and the site reused as a council depot. The other buildings and structures on site were retained and reused with some alterations. Amongst the significant 20th century additions to the site are a WWII air raid shelter and a set of c1950s fuel pumps. The sites associated with this phase are as follows:

Sites post-dating the smelting works: **sites 12a?, 15?, 18, 19 and 24.**

8.1 Significance of identified sites

Of the sites which have been identified in this report the most significant and imposing are those related to both Wheal Buckets and Redruth Tin Smelting Works. Those who appreciate the complexity of Redruth's unique history will particularly value the remains of ancillary mining industries. These sites are also a significant part of the Cornish Mining World Heritage Site as part of the Camborne and Redruth Mining District. The site contributes directly to the Outstanding Universal Value of the World Heritage Site, having surviving components which belong to the categories 'C1 Mine sites, including ore dressing sites' and 'C3 Ancillary industries'. These components (or sites) comprise structures, buildings and below ground remains which have been identified as 'Designated Heritage Assets' within Planning Policy Statement 5 (PPS5) because of their association with the World Heritage Site.

Tin smelting houses as a monument class are relatively rare but a very important part of Cornwall's industrial infrastructure; there were only ever some 35-40 smelters in total, compared with the many hundreds of individual mines. Survival of smelters has been very poor, even compared to similar classes such as foundries. Presumably the buildings offered little opportunity for adaptive reuse, so few sites survive with significant structures or remains for study. An additional factor which may have a

bearing on the poor survival of the actual smelting houses was the tin residue which tended to accumulate below the furnace hearths; the furnaces were usually demolished and excavated after closure to recover the valuable tin.

Sites which are of regional importance (B) are: **Sites 9, 11, 12, 13, 14, 16, 18, 25 and 26.**

Sites which are of local importance (C) are: **Sites 1, 2, 3, 4, 5, 6, 7, 8, 10, 12a, 15, 17, 19, 20, 21, 22, 23, 24, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36.**

8.2 Potential for other archaeological sites in the study area

Within the assessment area there is low potential for the presence of below-ground remains associated with prehistoric sites.

Because the assessment area is set within the heart of an early mining district remains of features associated with early mining techniques may be present below ground.

There is the potential for the below ground survival of 18th century or earlier landscape features such as field boundaries.

There is high potential for the survival of below-ground industrial features and earlier surfaces associated with the mine and smelting works.

9 Assessment of Impact

Although there are no existing development proposals in place it is envisaged that proposals will be submitted in the near future. Overall a proposed housing development on the archaeological resource is assessed as having a potential impact scored as **negative/moderate**, the residual impact being **neutral** or **negative/minor** if the recommended mitigation is undertaken.

Ground disturbance associated with the construction of new buildings with their associated services could result in permanent, irreversible loss of upstanding or below ground remains of the known archaeological sites within the area, or elements of these.

The scale of impact will vary with the significance of the individual site, and with the proportion of the whole site which would be affected.

The impact on historic buildings and structures within the development area could be scored as **negative/substantial** if the appropriate mitigation is not undertaken.

Groundworks undertaken during any development may impact on the following sites: **Sites 11, 12, 12a, 13, 14, 15, 16, 18, 19, 20, 21, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36.**

10 Potential mitigation strategy

Please note that recommendations for further archaeological work on individual sites are listed in the site inventory table (**section 6**).

The following are some general recommendations and comments put forward by HE Projects based on the general impacts a residential development might have.

Structures suggested for retention and conversion for reuse within any future scheme

The main structures recommended for retention include: the western boundary wall (**site 3**), building (**site 9**), building (**site 12**), wheel pit (**site 13**), gearing pit (**site**

14), building (**site 16**), chimney (**site 17**), air raid shelter (**site 18**), building (**site 25**) building (**site 26**) and gate posts (**sites 10 and 22**).

Archaeological work to be carried out before any other work takes place on site:

A full archaeological building survey should be carried out prior to the commencement of work. This would involve full descriptions, phasing, annotation of plans and archive quality photography. The survey should be carried out once the buildings have been cleared out.

Archaeological work to be carried out as part of future groundworks on site:

Some areas within the site proposed for ground disturbance may require an archaeological watching brief during groundworks or, in more sensitive areas, an archaeologically controlled area strip. The areas recommended for a watching brief if groundworks are required include the area in and around the existing stamping mill **sites 12 and 16**, the site of a former stamping mill (**site 27**), the site of the former smelter and adjoining building (**sites 32 and 33**) and the sites of small structures and buildings associated with the smelting works (**sites 29, 30 and 31**).

11 References

11.1 Primary sources

Plan of Wheal Sparnon Sett, Redruth, undated (Cornish Studies Library)
Plan of Redruth by Rowe 1842 (Cornish Studies Library)
1854 town plan of Redruth (Cornish Studies Library)
Surface and underground plan of Huel Buckets, undated MRO/151
Doidge, JS, 1866. *A Directory of Redruth and its Neighbourhood*
Kelly's Directory: 1856, 1878, 1914
Ordnance Survey, c1880. *25 Inch Map* First Edition (licensed digital copy at HE)
Ordnance Survey, c1907. *25 Inch Map* Second Edition (licensed digital copy at HE)
Ordnance Survey, 2007. *Mastermap Digital Mapping*
Tithe Map and Apportionment, c1840. *Parish of Redruth* (microfiche copy at HE)
World Heritage Site management plan

11.2 Publications

Barton, DB, 1965. *A History of Tin Mining and Smelting in Cornwall*. Exeter
Barton, DB, 1967. *Tin Mining and Smelting in Cornwall*. Truro
Barton, DB, 1968. *Essays in Cornish Mining History Vol 1*. Penzance
Burt, R, Waite, P and Burnley, R, 1987. *Cornish Mines* University of Exeter and the Northern Mine Research Society
Collins, JH, 1912. *Observations on the West of England Mining Region* (1988 reprint by Cornish Mining Classics, Truro)
Dudley, P. 2008, *Trevenson Road Improvement Scheme, Tuckingmill/Pool, Cornwall, Archaeological Assessment* HES report
Herring, P., Newell, K., Tapper, B., Val Baker, M. and Powning, J. 2005. *Camborne-Pool-Redruth: Historic characterisation for regeneration*, HES report 2005R044

Smith, J, 1993. *Kerrier land reclamation scheme East Wheal Basset (Seleggan) Archaeological Assessment* CAU report

11.3 Websites

Undated photograph of the Redruth smelter during demolition:
http://oneguyfrombarlick.co.uk/forum_topic.asp?TOPIC_ID=7218&FORUM_ID=25&CAT_ID=3&Topic_Title=SteepleJack%26%2339%3Bs+Other+Corner&Forum_Title=Misc+History+Topics&whichpage=192 (posted by Rockdrill)

21 March 1887 West Briton article:

<http://listsearches.rootsweb.com/th/read/CORNISH-GEN/2003-11/1068410560>

www.historic-cornwall.org.uk/flyingpast/age.html

12 Project archive

The HE project number is **2011004**

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

1. A project file containing site records and notes, project correspondence and administration.
2. Electronic drawings stored in the directory ..\CAD ARCHIVE\Sites R\Redruth old smelting works assessment 2011004
3. Digital photographs stored in the directory ..\Images\Sites Q-T\Redruth old smelting works assessment 2011004
4. English Heritage/ADS OASIS online reference: cornwall2-97658

This report text is held in digital form as: G:\CAU\HE Projects\Sites R\Redruth old smelting works assessment 2011004\report 2011004

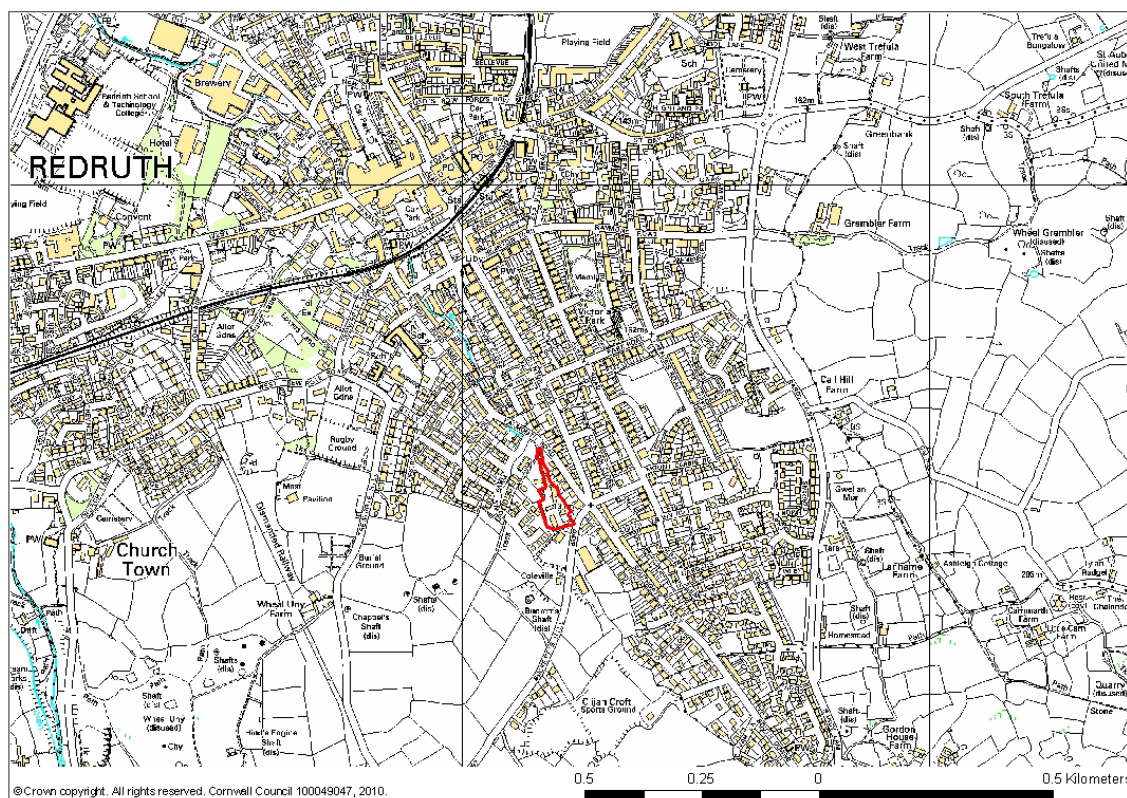


Fig 1 Location map



Fig 2 Modern OS Landline



Fig 3 Tithe Map for the parish of Redruth c1840

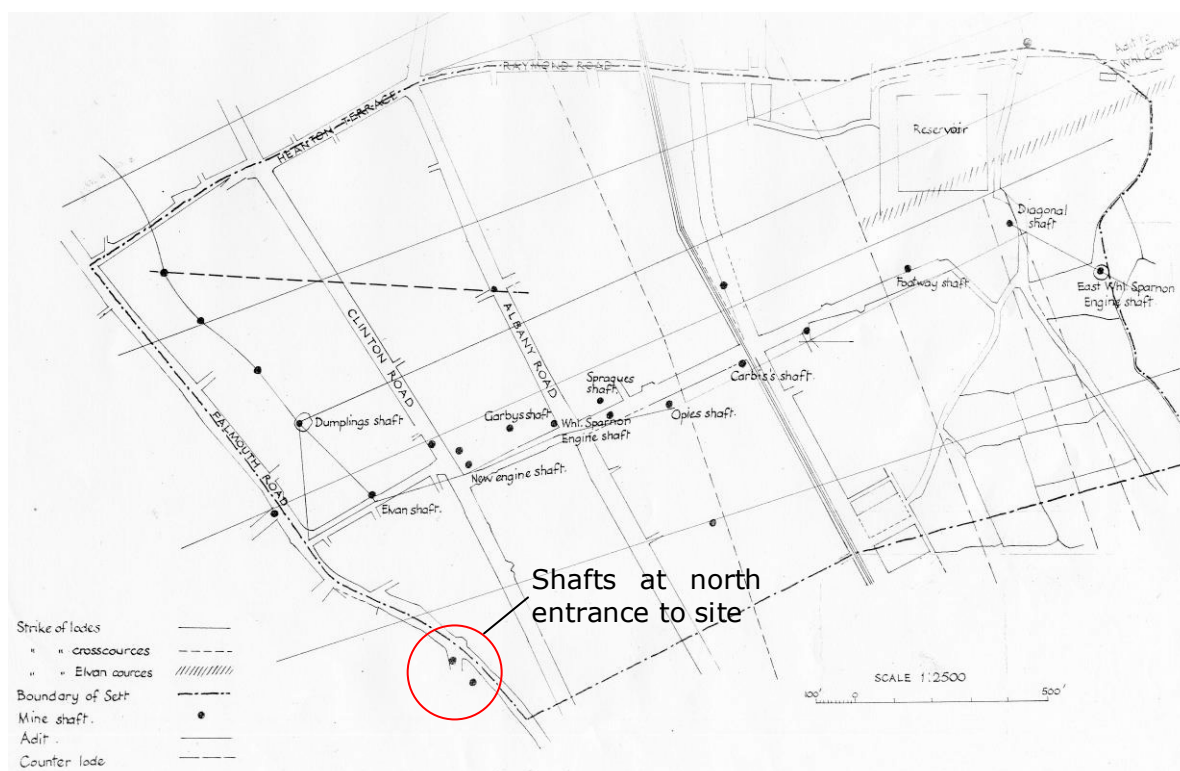


Fig 4 Plan of Wheal Sparnon Sett, Redruth, undated(© Cornish Studies Library, Redruth)

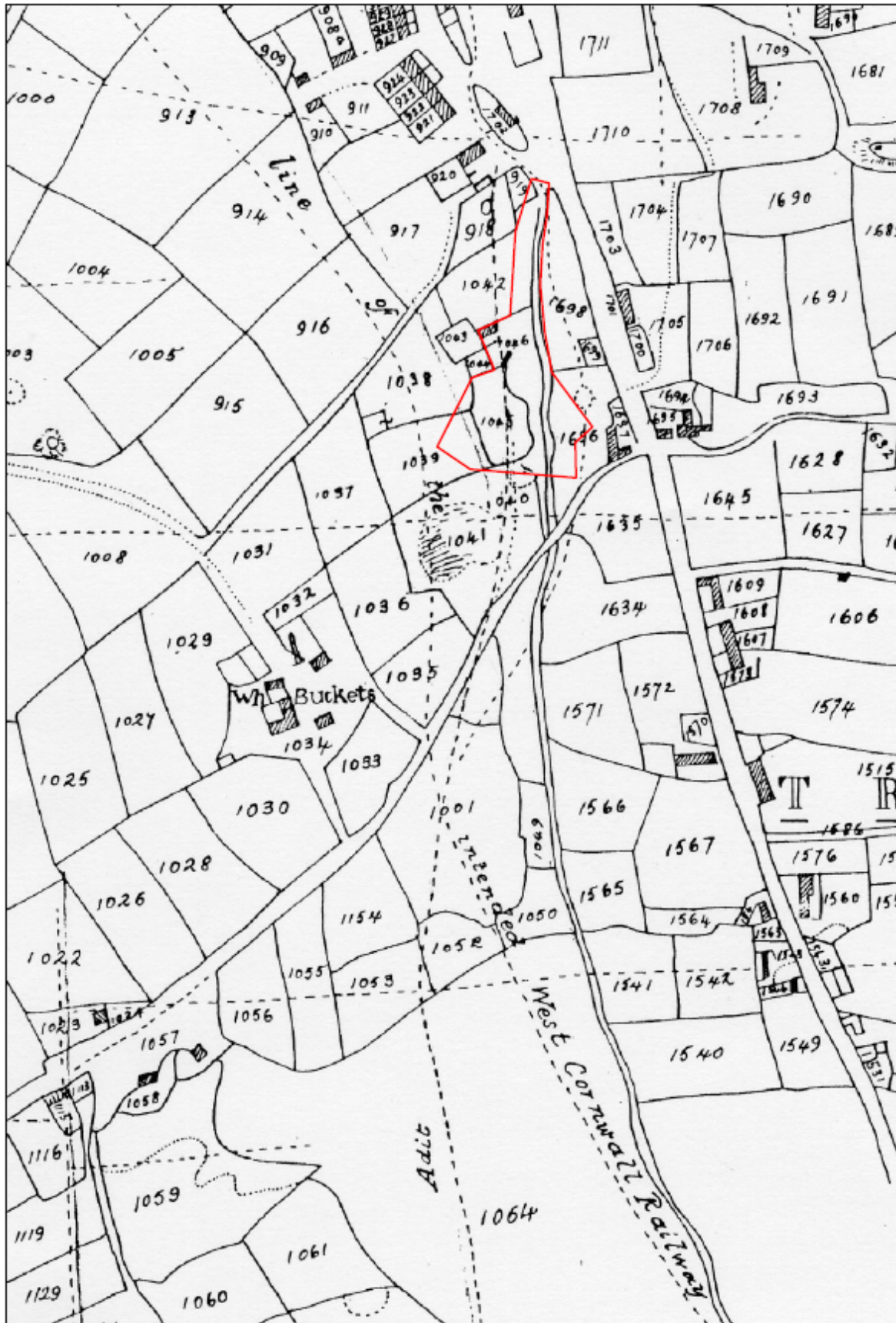


Fig 5 Plan of Redruth by Rowe 1842 showing the course of an adit running through the site (© Cornish Studies Library, Redruth)



Fig 6 1854 town plan of Redruth showing the stamping mill at Wheal Buckets (© Cornish Studies Library, Redruth)



Fig 7 Surface and underground plan of Huel Buckets, undated (©CRO ref: MRO/151)

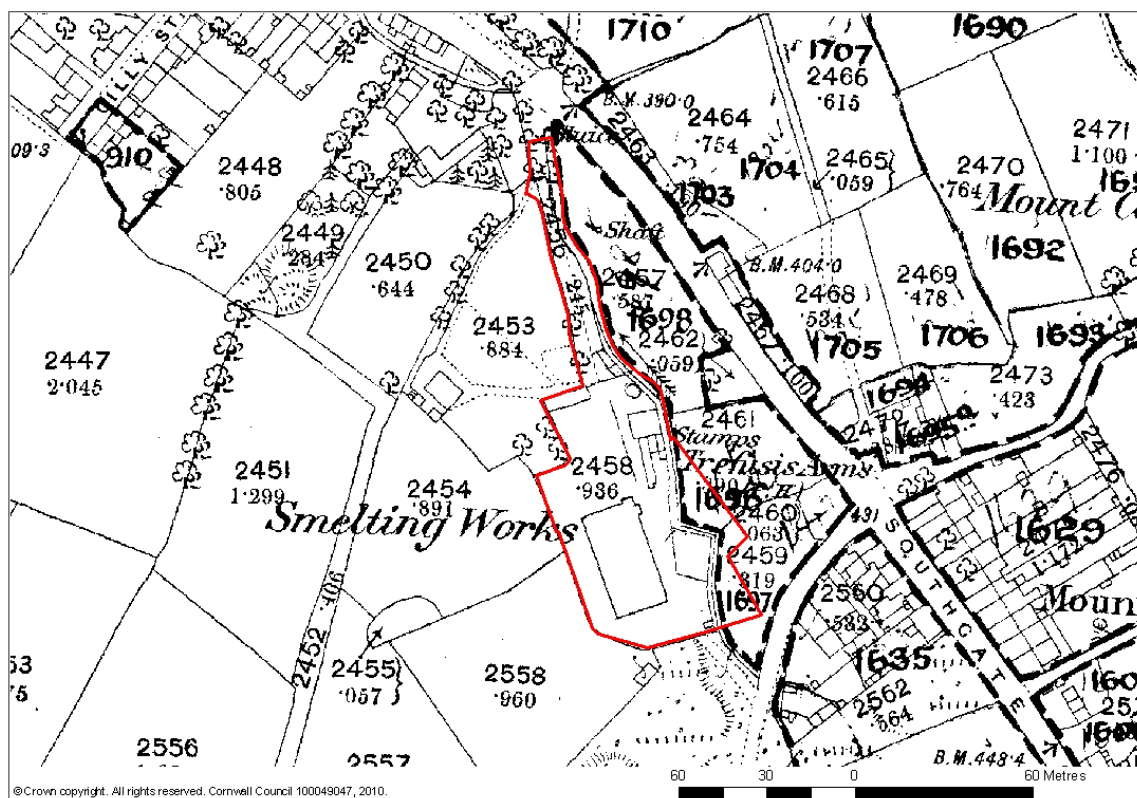


Fig 8 First Edition of the Ordnance Survey 25 Inch Map, c1880

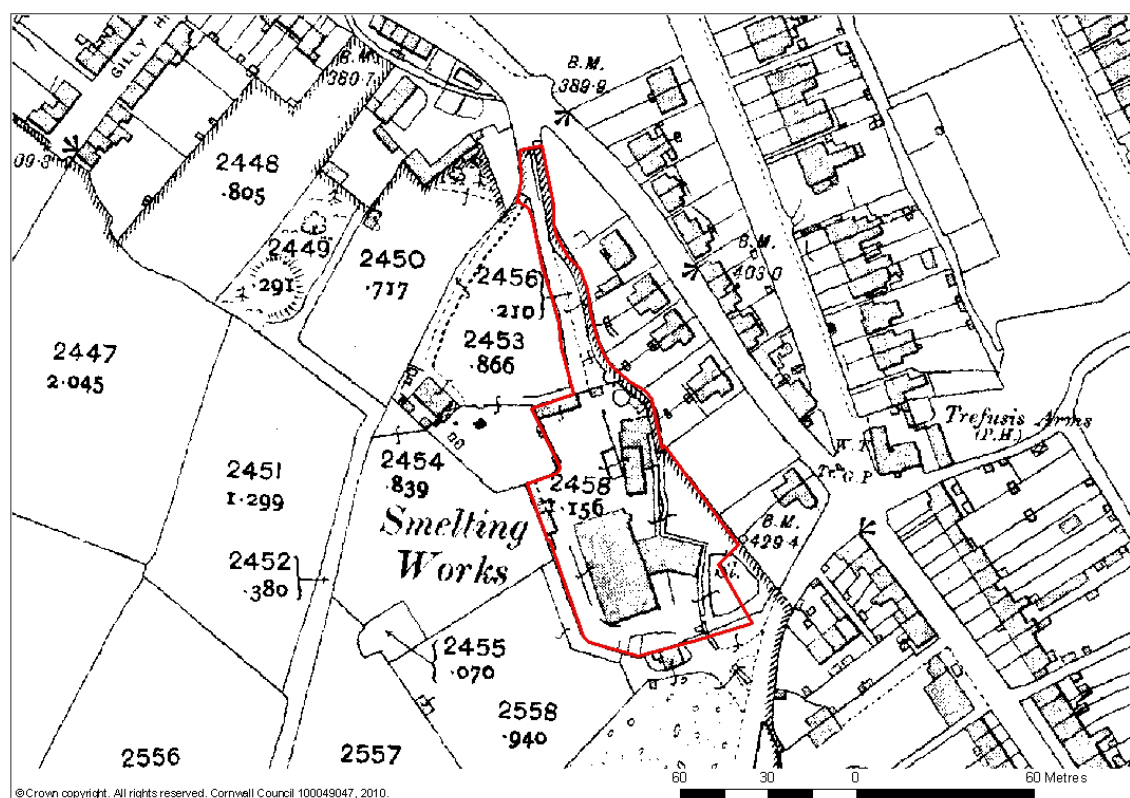


Fig 9 Second Edition of the Ordnance Survey 25 Inch Map, c1907

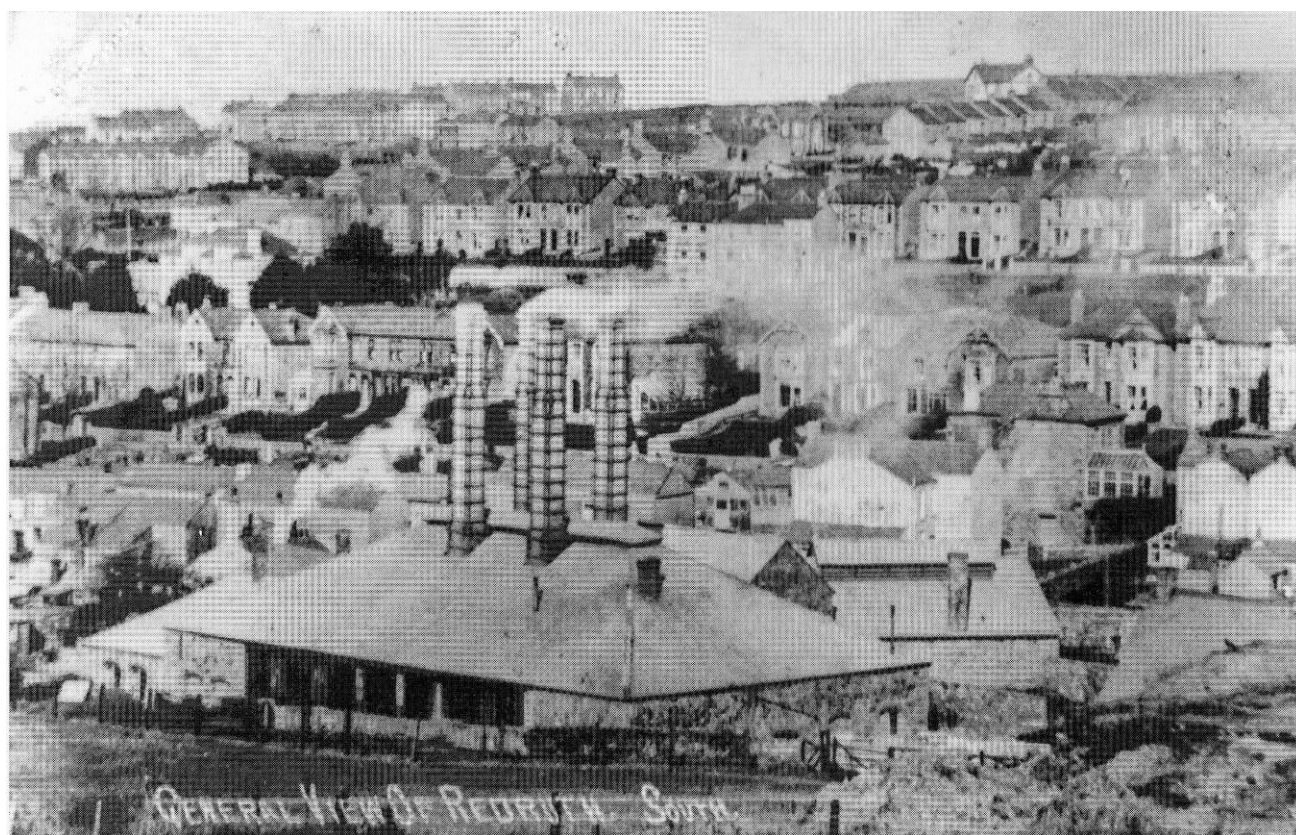


Fig 10 Undated postcard of Redruth with the Smelting Works in the foreground (© Cornish Studies Library, Redruth)

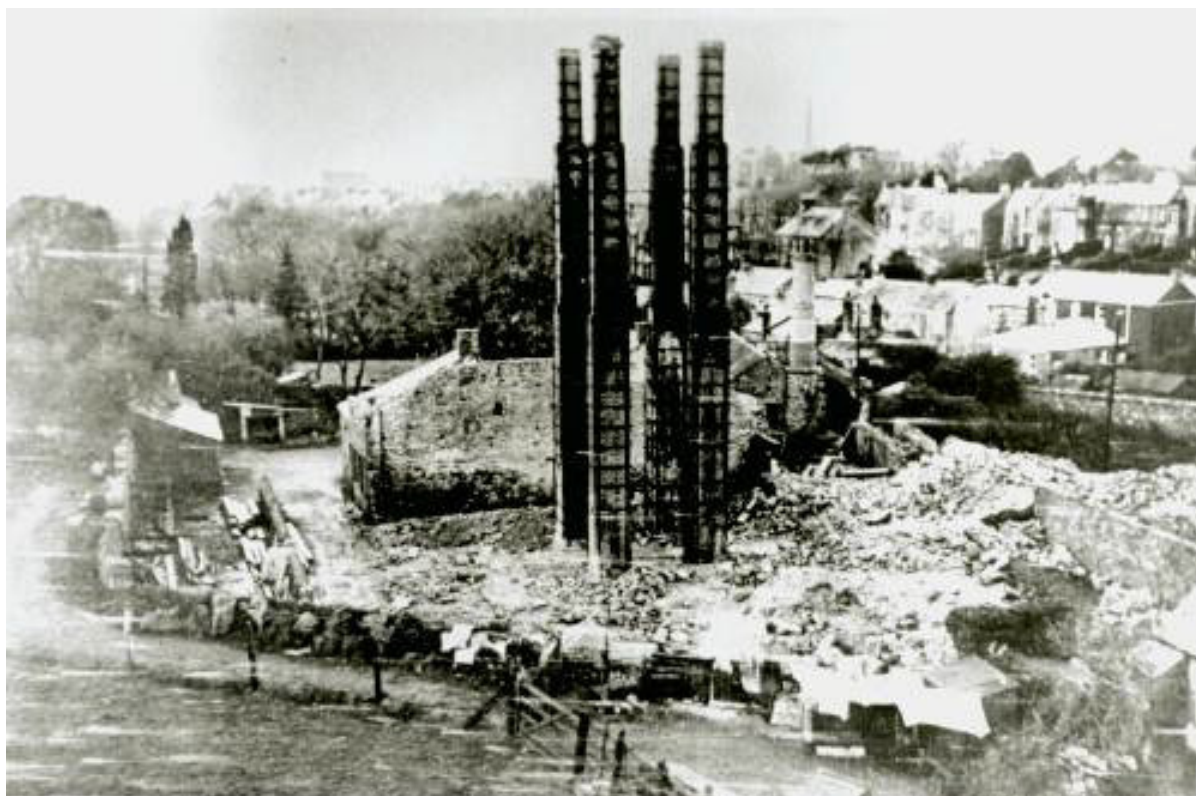


Fig 11 Undated photograph of the Redruth smelter during demolition looking north and showing the four furnace stacks the boundary wall in the foreground (site 3), the surviving chimney (site 17) and surviving part of the smelter (site 25). Posted by Rockdrill

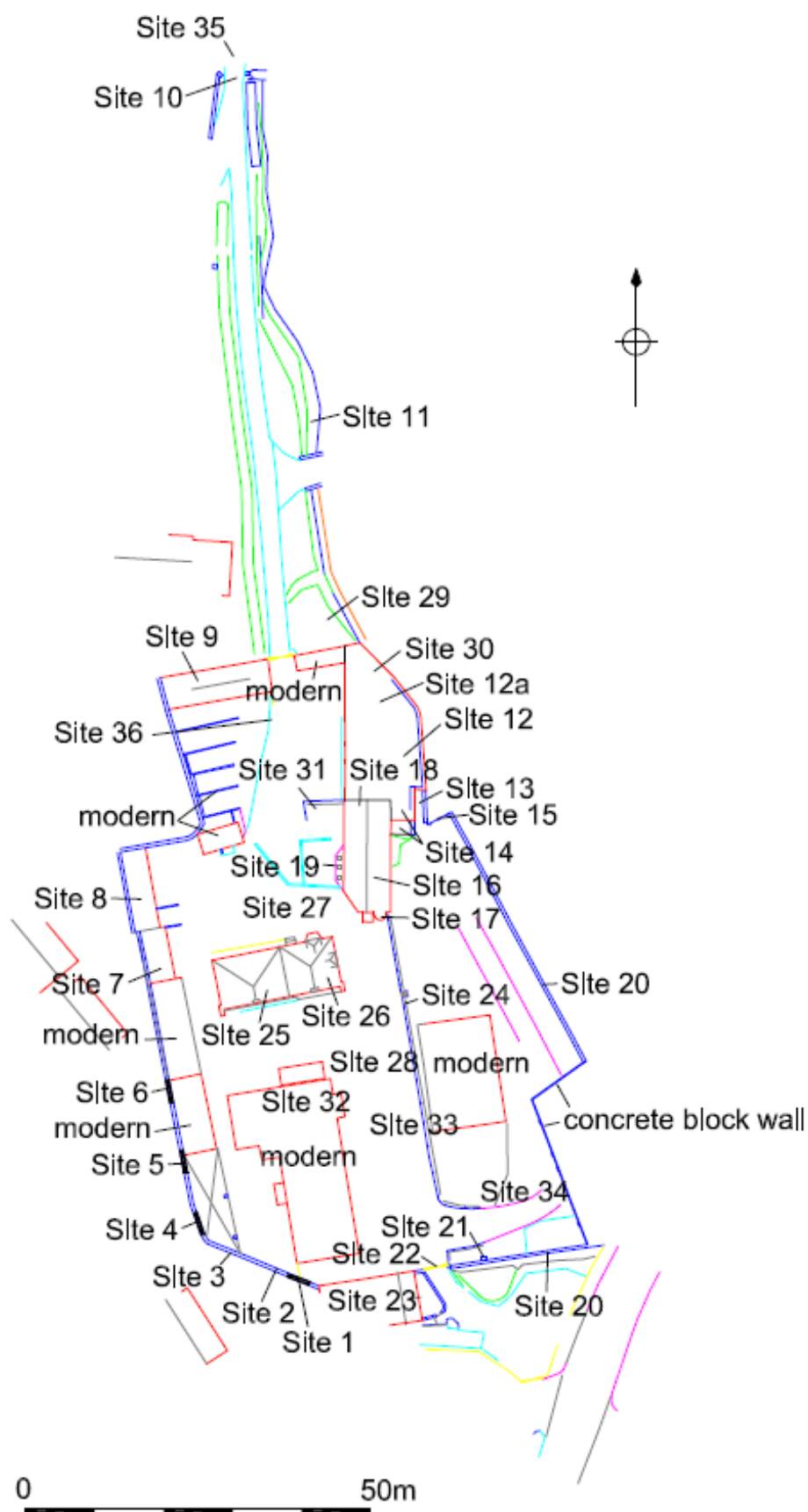


Fig 12: Locations of identified sites (drawing supplied by the client)



Fig 13: Site 1- Coal or ore chute in boundary wall



Fig 14: Site 7- workshop associated with the smelting works



Fig 15: Site 9- building possibly associated Wheal Buckets but in use throughout the duration of the smelting works



Fig 16: Site 11- leat looking north along the driveway



Fig 17: Site 13- infilled wheel pit looking north



Fig 18: Sites 16, 12 and 12a- former stamping mill looking south-east and offices (possibly former count house (site 26)) to the right

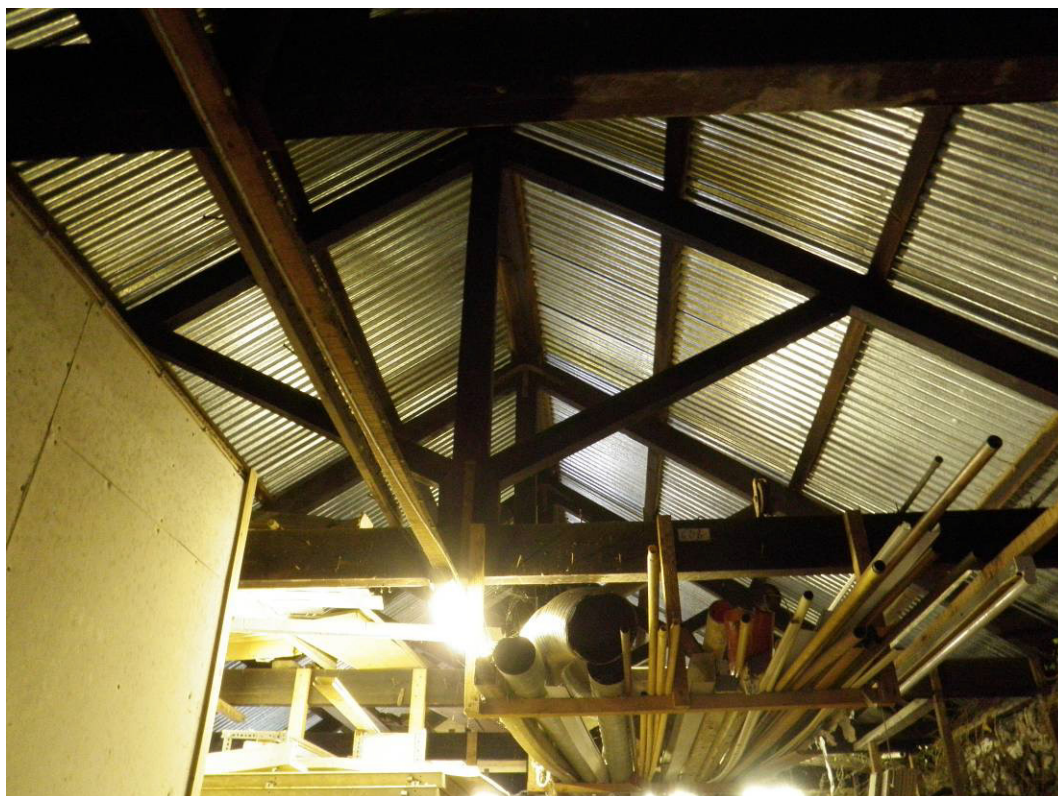


Fig 19: Sites 16- interior of building associated with stamping mill showing roof trusses

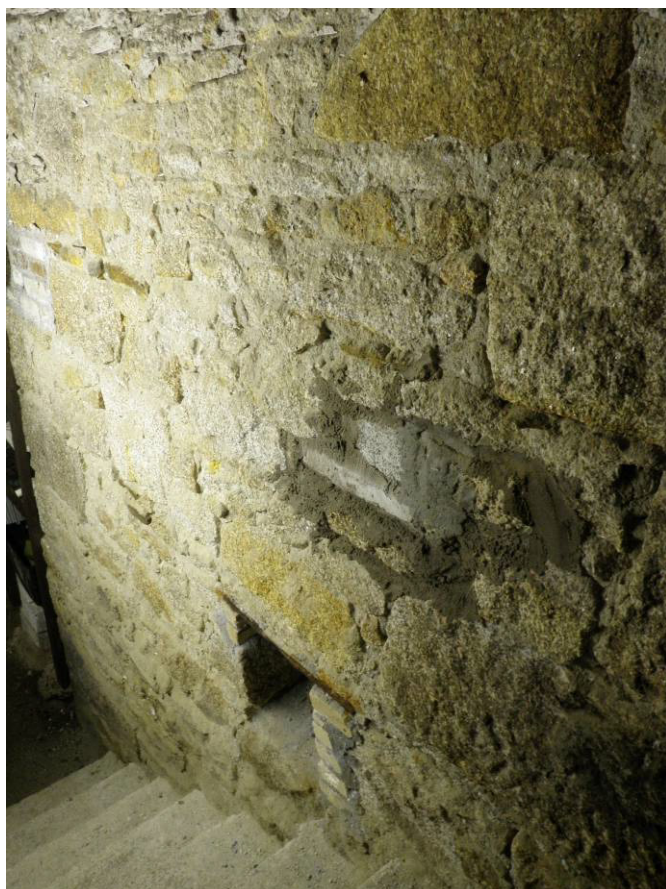


Fig 20: Wall dividing Sites 16 and 12-former location of stamps associated with smelting works



Fig 21: Sites 16 and 17- building associated with stamping mill with adjoining chimney, both associated with the smelting works



Fig 22: Sites 18- air raid shelter built into retaining wall dividing buildings sites 16 and 12



Fig 23: Site 19- mid 20th century fuel pumps



Fig 24: Site 21- remains of sluice gate in leat (site 11) at south end of yard



Fig 25: Site 23- Smelting works manager's office built on top of existing boundary wall



Fig 26: Sites 25 and 26- part of the former smelting house (right) and earlier office or possible count house (left)