



# Hallenbeagle, Scorrier, Cornwall

## Archaeological Assessment



Historic Environment Projects



# Hallenbeagle, Scorrier, Cornwall

## Archaeological Assessment

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## **Acknowledgements**

This study was commissioned by Russell Dodge of BLS Ltd, Truro, and carried out by Historic Environment Projects, Cornwall Council.

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**

Looking south towards the Reade's Shaft engine houses across an area of mine dumps and fly tipping.

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## **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



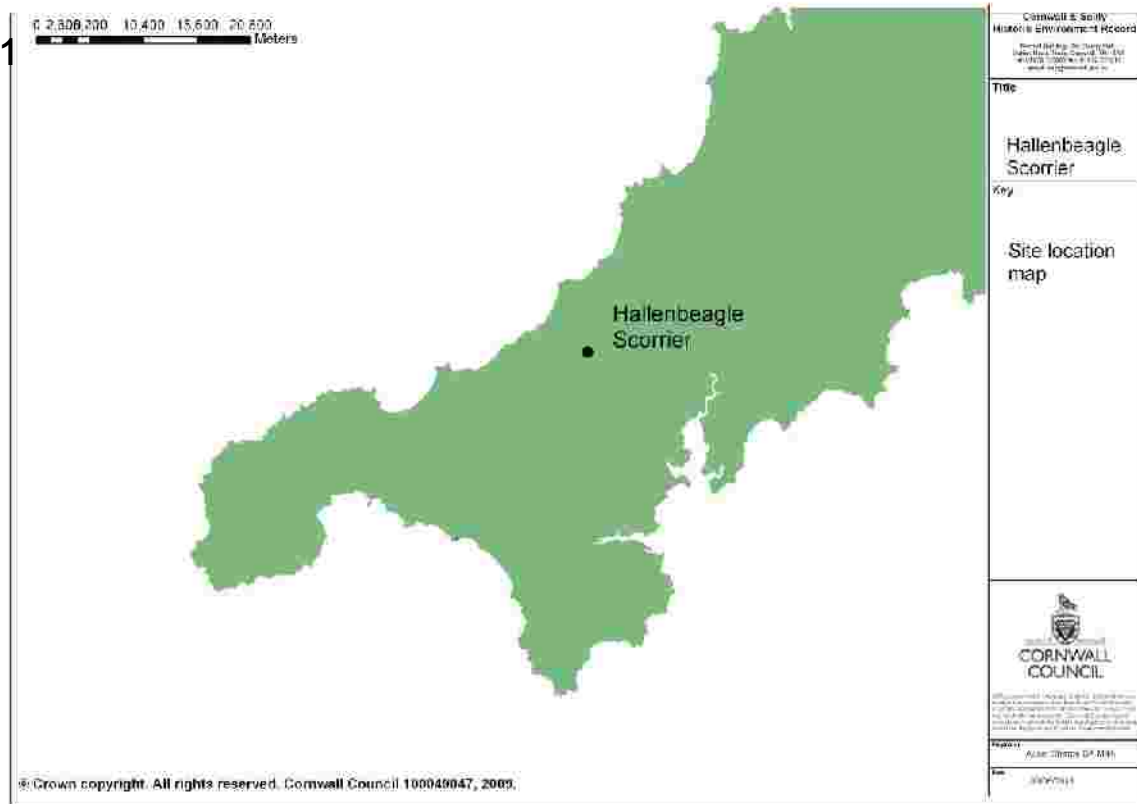


Fig 1. The location of Hallenbeagle, Scorrier.

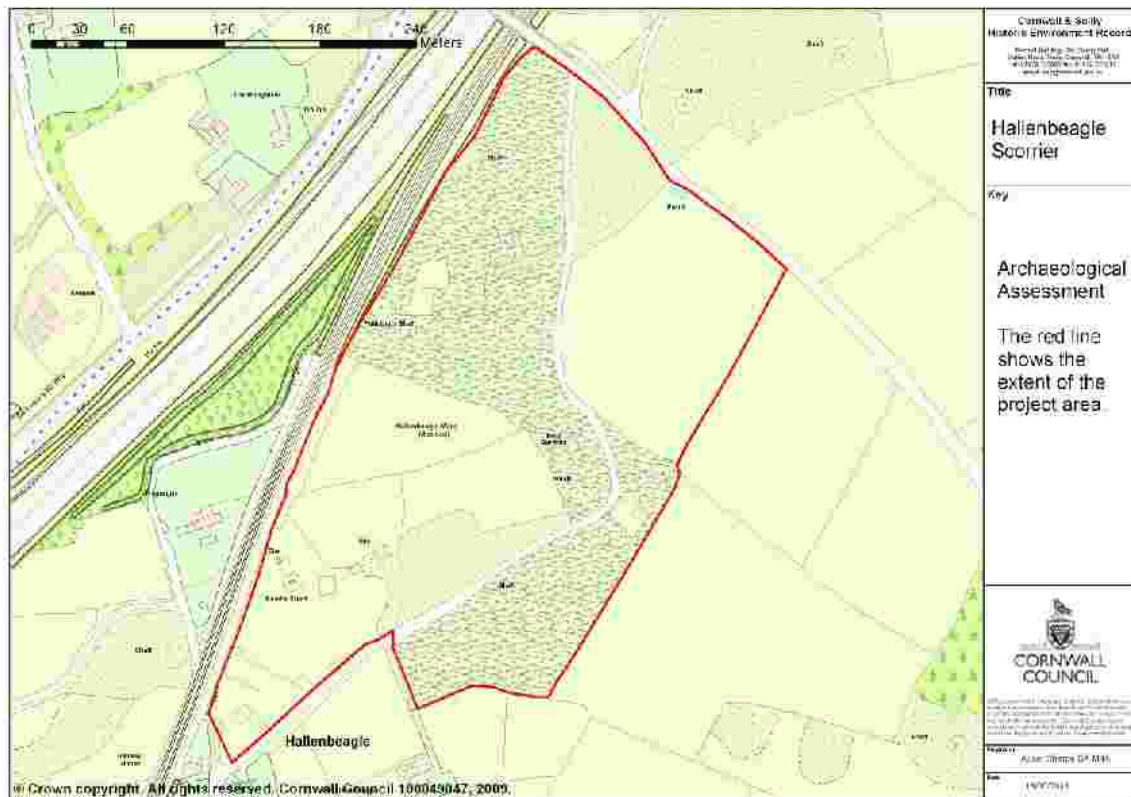


Fig 2. The extent of the assessment area at Hallenbeagle, Scorrier.

## 1 Summary

As a precursor to the redevelopment of the former Hallenbeagle mine site at Scorrier, and in response to a brief prepared by Mr. Dan Ratcliffe, Historic Environment Planning Advice Officer (central Cornwall), Cornwall Council, Historic Environment Projects, Cornwall Council, were asked by Mr. Russell Dodge, Business Location Services, to undertake an archaeological assessment of the site.

A desk-based assessment and walk-over survey of the site were undertaken in late May 2011 in order to determine the survival of documented geological features, to make a record of the site prior to its redevelopment, to determine the likely impacts on site components, historic landscape character and on the adjoining Cornish Mining World Heritage Site and to make recommendations to minimise any negative impacts resulting from the redevelopment proposals.

The assessment revealed that Hallenbeagle had been a significant producer of copper ore during the 18<sup>th</sup> and 19<sup>th</sup> centuries, and had sited a number of significant engine houses. However, the majority of documented mining features on the northern part of the site had been removed as a result of a combination of geological recovery, the deliberate demolition of mine buildings, the partial landscaping of the site at the end of WWII when the site was identified as being suitable for a transit camp for US Army troops awaiting embarkation to the D Day beaches in Normandy and as a result of its subsequent occupation by travellers. A group of intact late 18<sup>th</sup> century smallholdings occupied the central part of the site. To the south of these, two ruinous standing engine houses are Listed Grade II, these being set within the context of an area which had, since the late 19<sup>th</sup> century been operated as a sawmill, and in the later 20<sup>th</sup> century as a now-derelict concrete batching plant. The whole of the site is characterised by areas of fly-tipping and the disposal of industrial waste.

It was concluded that, within the southern part of the site, the two surviving engine houses are significant landscape features and should be retained within a suitable curtilage. There is also some potential for the survival of the sub-surface remains of early mine buildings adjacent to the shafts within the northern part of the site, together with those of an early, undocumented copper smelting furnace. The assessment recommends that a watching brief should be allowed for during the groundworks which will be required during the early stages of the redevelopment of the site, that due consideration should be given to the layout of the proposed industrial and retail development to ensure that the Listed engine houses are suitably respected and that the impacts on the adjoining World Heritage Site are minimised.

## 2 Introduction

### 2.1 Project background

In May 2011, given that groundworks to prepare the former mine site at Hallenbeagle, Scorrier for phased development were proposed, Dan Ratcliffe, Historic Environment Planning Advice Officer (Central Cornwall) undertook a review of the existing site surveys and noted:

*'An earlier assessment of the site has been undertaken by IHC consultants (Williams, undated) however this work does not accord to relevant professional standards for an archaeological desk based assessment (e.g. IfA 2002). Areas not covered by the original assessment which are vital for a proper and rounded understanding of its cultural heritage value include the pre-industrial land use, the identification of further shafts and mining remains not noted but clearly identifiable during a site walkover in 2011, the development of the agriculturally enclosed areas of the site and the post industrial transition of the site to settlement occupation first through the apparent engineering works reported to have taken place during WWII and the more recent settlement activity.'*

And

*'An archaeological assessment will be required as the final stage of a phased programme of archaeological works to discharge condition 16 of planning consent MC04/0836/07/B. The assessment will inform the development of a strategy for mitigation recording of the site prior to construction works taking place.'*

Mr Ratcliffe prepared a brief to guide this work (Appendix 1), issuing it to Business Location Services Ltd of Truro (agents for the development) on 07/04/2011. This was supplied to Historic Environment Projects, Cornwall Council, who produced a Written Scheme of Investigation (WSI) to meet the brief (Appendix 2) on 08/04/2011, providing this to BLS Ltd together with a cost schedule. An instruction to proceed with the work was issued by Hallenbeagle Developments Ltd. on 18 May 2011.

### 2.2 Aims

As set out in the brief, the site specific aims are to:

- Draw together the historical and archaeological information about the site.
- Review and analyse historic map evidence for the site.
- Advise on whether historic/architectural features should be retained.
- 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 and develop a methodology for it
- Inform whether palaeo-environmental sampling would be required.
- Produce 'statements of significance' for all designated historic assets, that are identified as potentially impacted on by the current proposals. Where currently undesignated assets are identified their likely significance should be indicated i.e. 'national', 'regional' or 'local'.
- Make a photographic record of the site and significant features in their current condition.
- Produce a revised WSI for further archaeological recording during site clearance and preparation works.

## 2.3 Methods

All recording work has been undertaken according to the Institute for Archaeologists *Standards and Guidance for Archaeological Investigation and Recording*. Staff will follow the IfA *Code of Conduct* and *Code of Approved Practice for the Regulation of Contractual Arrangements in Archaeology*. The Institute for Archaeologists is the professional body for archaeologists working in the UK.

### 2.3.1 Desk-based assessment

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

- Cornwall HER
- Images of England online listed buildings database
- Early maps and photographs (see Section 12.1)
- Published histories (see Section 12.2)
- Historic maps, including
  - Joel Gascoyne's map of Cornwall (1699)
  - Thomas Martyn's map of Cornwall (1748)
  - OS 1 inch survey (c1810)
  - Kenwyn Tithe map (c1840)
  - 1<sup>st</sup> and 2<sup>nd</sup> Editions of the OS 25 inch maps (c1880 and c1907)
- Modern maps
- Archive mine plans in the Cornwall Record Office (see Section 10.13)
- GIS databases recording geology, soil types, Historic Landscape Character, Designations, Rights of Way &c.
- The 2001 archaeological assessment of the site carried out by IHC Consultants.

### 2.3.2 Fieldwork

- A brief walkover survey was undertaken to check and record features indicated on historic maps and plans, and to record any previously undocumented elements of the site on a base map drawn up during the preliminary desk based assessment. Features were located using a hand held GPS unit where required.
- Key views in and out of the site were noted and photographs of views and relevant site detail recorded using a high resolution digital camera.

### 2.3.3 Post-fieldwork

#### Archive deposition

An index to the site archive has been created and the archive contents prepared for long term storage, in accordance with HE standards.

The archiving comprises the following:

1. All correspondence relating to the project, the WSI, a single paper copy of the report together with an electronic copy on CD, stored in an archive standard (acid-free) documentation box
2. The project archive will be deposited initially at ReStore, and in due course (when space permits) at Cornwall Record Office. A copy of the digital archive, including photographs, will be incorporated into the Cornwall and Scilly HBSMR.

## Report distribution

A paper copy and a digital (PDF) copy of the report, illustrations and any other files will be deposited in the Cornwall HER. A paper copy of the report will be distributed to the client together with a digital version for inclusion in the EIA document.

Once the application becomes part of an active detailed planning application, copies of the report will be distributed to local archives and national archaeological record centres.

## 3 Location and setting

The site is located immediately to the east of the Cornwall main railway line just to the north-east of Scorrier. It is centred at SW 72744 44731 at an average height of 120m OD and is orientated between south and south-west. The underlying geology consists of the mid to late Devonian Porthtowan Formation, part of the Gramscatho Group of metamudstones and metasandstones with a dyke of Permian felsite traversing the northern part of the site; the soils are of the Manod group – shallow loams over slates and siltstones.

## 4 Designations

The engine house and a detached chimney (formerly associated with a now-demolished whim engine house) in the southern part of the Hallenbeagle site are listed Grade II. Hallenbeagle is bordered to the east and south by the Mining World Heritage Site (Fig 15).

## 5 Site history

Hallenbeagle was a former copper mine near Scorrier in the parish of Kenwyn which also produced small amounts of tin and arsenic. It was probably first started in or around 1701, when this area of North Downs was being prospected (Hamilton Jenkin 1979), though work does not seem to have begun in earnest here until several decades later. Its heyday was during the late 18<sup>th</sup> century and early 19<sup>th</sup> century, when it was one of a group of important mines near Scorrier whose of copper from relatively shallow levels was prodigious. The mine name appears to derive from the Cornish *Hal an bugel* – Shepherd's Moor.

The mine was re-worked, though much less successfully, during the mid 19<sup>th</sup> century, when it employed about 200 people; from 1835-46 the mine produced 30,850 tons of copper ore. Its sett was bounded by those of Wheal Ros al Chance and Boscawen Mine, and like these, it was drained via the Great County Adit, which at Hallenbeagle is reported by Cornwall Consultants to be at 24m OD. Collins (1912) reported that at the end of 1838 the mine was 'producing fairly' and around this time was employing about 200 men. The mine was shown as active in 1840 on the K Tithe Map (Fig 4), when an engine house was depicted on Engine Shaft in the northern part of the development area. This may originally have housed a very unusual inverted double-acting beamless engine designed and installed by James Watt in 1795, though it is noted that Watt was building a further engine for Hall eagle in 1797. A 70" cylinder pumping engine at Hallenbeagle was for sale in 1848. The mine worked four lodes: North Lode, worked from King's Shaft (now beneath the A30), Engine Shaft (in the northern part of the proposal area), Stone Shaft and Eastern Shaft (just to the north-east of the proposal area); Read's Lode was worked from Read's eade's or Reed's) Shaft where there are the remains of a pumping and winding engine house, as well as three un-named shafts and Jeffrey's Shaft (Read's Shaft being just to the south of the proposal area, two of the un-name shaft lying on its fringes; Jeffrey's Shaft and the other un-named shaft are just to its south-east). Other lodes worked were Oats Lode, worked from Oat's Shaft just to the south-east of the proposal area and South Lode, developed by a number of shafts to the south of the proposal area.

The mine had a somewhat patchy history during the 19th century, the mining historian Joseph Yelloly Watson in 1843 reported that Hallenbeagle '*... in Kenwyn, near*

*Chacewater, is returning large quantities of ore, but barely paying the expenses of working; about two hundred persons are employed — the monthly cost averages £1,500 — and the machinery on the mine is valued at £4,500. From June 1834 to June 1842, the mine returned seventeen thousand one hundred and forty-eight tons of ore yielding £77,604 2s 5d' (Yelloly Watson 1843).*

Some twenty-two years later Thomas Spargo said of Hallenbeagle '*... in Kenwyn, Cornwall, in 6,000 shares. Secretary, Mr. Edward King, 22A Austin Friars. Manager, Captain Edward Richards, St. Agnes. Lord, Viscount Falmouth. Dues, 1-24th. Depth of adit, 50 fathoms. Under adit, 50 fathoms. Pumping-engine, 60-inch, at work. Winding-engine, 22-inch, at work. 70 men, 37 females, and 30 boys employed; total, 137 persons. Rocks, clay-slate, and elvans. Copper Ore Sold in 1864 - 737 tons 14 cwt. 0 qrs sold for £4,282 10s. 6d.'*

*'The present Company commenced operations in 1864, and time has been occupied in preliminary works chiefly. This sett was a part of at Wheal Busy United. The prospects are good. The name "Hallenbeagle" was, a few years ago, the name of the mine now called "Boscawen." Great Wheal Busy 'was so very large as to render a tripartite division desirable, and that has been accomplished. This seems to be a fair speculation in a great mining county; nevertheless, the granites are rather too far in the background to render this site a fancy locality; scientific geology seems to point to depth as the goal of success for the Great Busy range of mines.'* (Spargo 1865).

Mine plans for Hallenbeagle are few and event these do not provide complete information about the surface layout of the mine. A re version of the 1840 Kenwyn Tithe Map is amongst papers dating between 1728 and the 1820s forming part of the evidence submitted in case relating to a mid-19<sup>th</sup> century dispute between the Laurence family and Lord Falmouth over the rights to tin dues from Creegbrawse (LR82). Hallenbeagle is shown on this map and appears to include an engine house and other structures in the northern part of the site adjacent to Engine Shaft.

Abandoned Mine Plan R151A/2 in the County Records Office shows an arrangement of pumping and whim engine houses (together with another L-shaped building) in the area around Reade's Shaft. Notably, the whim engine house is shown sited to the south of the shaft, rather than to its east. This plan dates to 1859. A further plan showing the shafts, levels and adits at Hallenbeagle (MRO 96B) drawn by James Henderson at 10 fathoms to the inch is also clearly drawn up post-1859, as it includes the route of the West Cornwall Railway near Reade's Shaft. The L-shaped building to the south of the shaft was shown, but not any of the engine houses.

Hallenbeagle continued to work during the later 19<sup>th</sup> century, at times as part of Boscawen Mine and in the later part of the mid-19<sup>th</sup> century as part of Great Wheal Busy. By 1870, Collins (1912) reported that the lower levels of the mine had been abandoned and that only ten miners were being employed, these retrieving copper, tin and arsenical ores from the adit or from waste dumps.

By 1878 the mine was depicted by the OS as abandoned (Fig 7, its landscape covered with spreads of mine waste and accompanied by a number of ruined engine houses. By 1907 (Fig 8, the northern engine houses had been demolished and the north-eastern part of the site had been reclaimed to agriculture. An extensive sawmill which had developed on the southern part of the site during the 19<sup>th</sup> century remained active into the early years of the 20<sup>th</sup> century. Following the closure of the sawmill, the area around Read's Shaft was subsequently modified to site a small-scale concrete plant, this now being abandoned and derelict.

An extensive area within the Hallenbeagle mine complex in which spoil tips, shafts and any other mining features have been bulldozed flat is visible on air photographs (particularly those taken in 1946 by the RAF) and was plotted as part of the NMP. This type of wholesale clearance of this type found between Chacewater, St. Day and Scorrier. At Hallenbeagle it seems mainly to have been confined to the northern part of the site, though is identical to that at Wheal Busy and United Downs where landscaping

of this type is associated with the establishment at those sites of temporary bell tent camps accommodating troops in the build-up to D-Day. At Hallenbeagle wartime aerial photos show no sign of any tents or buildings so it seems likely that the site was cleared as a proposed camp but in the event was never used.

By 2005 (CCC aerial photographic evidence, Fig 12) the central and north-eastern areas of the wider site had been reclaimed to agriculture and the southern parts of the site were in scrubby heathland (Figs 20-21). The north-eastern part of the wider mine site (Zone 4 on the site development proposals dated 01/10/2010) remained in agricultural use, whilst the north-western part of the site (the northern part of Zone 1 on the October 2010 plan) and the central eastern part of the site (Zone 5) were occupied by a number of static caravans and their curtilages (Figs 20-22); the southern part of Zone 1 was occupied by a number of smallholders' fields first shown on the 1809 OS mapping (Figs 3, 27). The south-eastern part of the site (Zone 6) had scrubbed in, as had the southern corner of the site (Zone 3) and the area around Read's engine houses (Zone 2) (Figs 34-40, 45-6, 48).

Mapping undertaken by Cornwall Mining Services Ltd for a previous assessment of the site shows the locations of the shafts in and surrounding this site (see Fig 19), there being runs of shafts on Reed's Lode and Oats Lode to the south; Pinger's Shaft in the middle part of the site, like Kings' Shaft to its west, is on a further lode, whilst Engine Shaft in the northern part of the site (together with its near neighbours, Flat Shaft to the west and Stone's Shaft to the east) is on Hallenbeagle Lode. It should be noted that there is some disagreement in sources which name the lodes at Hallenbeagle, Dewey (1923) citing the Hallenbeagle Lode (also worked in Wh. Rose, Wh. Hawke and Wh. Messar), South Lode, Raby's Lode and Williams' Lode, whilst Dines (1953) mentions North Lode, South Lode, Reed's Lode and Oats Lode. Dines indicates that North Lode was worked from the following shafts: King's, Engine (to 67fm below adit), Stone's and Eastern. No shafts are mentioned on South Lode, but Reed's Lode was worked from Reed's (Reade's) Shaft and Veffrey's (Jeffrey's) Shaft. Oats' Lode was worked from Oats' Shaft and by crosscuts.

The Cornwall Historic Landscape Character mapping (Fig 14) shows the site as lying within a very extensive tract of Recently Enclosed Land – an area of former downland bounded by Truro, St. Agnes and Redruth which was brought into cultivation as miners' smallholdings during the late 18<sup>th</sup> and early 19<sup>th</sup> centuries during the very rapid expansion of copper mining which occurred during this period, resulting in a massive increase in the mining population requiring dwellings. Parts of the site are shown as Upland Rough Ground, though this should probably be re-mapped as formerly industrial land.

## **6 Previous archaeological work**

The Hallenbeagle site was the subject of a 2001 archaeology and cultural heritage chapter in an Environmental Impact Assessment undertaken by IHC Consultants (Williams, n.d.).

The area at and surrounding Hallenbeagle was also included within a study of the wider Wheal Busy landscape (Sharpe 1989 ECO331), the Mineral Tramways scoping project (Sharpe et al 1990), the Mineral Tramways Conservation Management Plan (Buck 2006 ECO1185), the World Heritage Site mapping, nomination document and management plan (WHS team 2005); it was also considered in the light of the proposed English Nature HEATH Project (ECO2644) and during the consideration of development proposals for the site (ECO1333 and ECO3081).

The north-western part of the Hallenbeagle site, proposed for redevelopment by Corny Environmental Ltd., was the subject of an EIA archaeology chapter written by Historic Environment Projects, Cornwall Council in May 2011 (Sharpe 2011).

## 7 Archaeological results

### 7.1 Results of desk based assessment

As well as documentary research, a process of map regression was undertaken to better understand the historical development of the site and the former locations of the structures which were sited on it. The key sources used in this process were:

- The 1809 Ordnance Survey 1<sup>st</sup> Edition 1" to the mile mapping
- The *circa* 1840 Kenwyn Tithe Map
- A broadly contemporary map, based on the Tithe Map, but showing mine setts at this date (CRO MRO 151/A)
- A pair of mine surface plans apparently dating to *circa* 1850, prior to the construction of the present arrangement of engine houses at Reade's Shaft (CRO MRO 151/A/2)
- The *circa* 1877 Ordnance Survey 1<sup>st</sup> Edition 25" to the mile County Series mapping
- The *circa* 1907 Ordnance Survey 2<sup>nd</sup> Edition 25" to the mile County Series mapping
- 1946 RAF vertical aerial photographs
- 1999 Cornwall County Council vertical aerial photography
- 2005 Cornwall County Council vertical aerial photography
- The modern Ordnance Survey digital MasterMap

No structures were shown on the 1<sup>st</sup> Edition OS 1" mapping, though this does depict blocks of smallholdings within the downland, and labels this area 'Wheal Rose'. A roadway is shown traversing the central part of the site from east to west (Fig 3).

By 1840, a group of four buildings were shown in the northern part of the site adjacent to Old Engine Shaft (Fig 4). Only one of these can be identified with any certainty, this being a pumping engine house at the north-western corner of this group, occupying the same position as the pumping engine house on the subsequent 1877 OS 25" mapping. Though not necessarily representing the same structure its location adjacent to Old Engine Shaft makes its identification secure. The focus of mining operations was evidently within this part of the sett at this date and the other buildings are likely to represent store buildings, carpenters shop and smithy perhaps a count house. The smallholdings to the south seem to have expanded slightly from the area shown (albeit in rather imprecise form) in 1809.

By *circa* 1859, the focus of the mine appears to have moved to the south, adjacent to Reade's Shaft. The mine plans (Figs 6 and 7) show three buildings. The southernmost, L-shaped in plan, is also shown on the 1<sup>st</sup> and 2<sup>nd</sup> Editions of the OS 25" mapping, and its footprint survives to this day in the south-western part of the site. In 1878, structures within this area were labelled 'Saw Mills', though it is unclear to which of the structures shown at this date this appellation related. The same label is applied to this group of buildings in 1907. It is unclear, however, what this was the function of this L-shaped structure *circa* 1859. Adjacent to the western side of Reade's Shaft a pumping engine house with a large boiler house were shown on the 1850 mapping. The engine house does not occupy the same footprint as that shown adjacent to this shaft in 1877, and is clearly therefore its predecessor. To its south, this plan also shows a winding engine house and boiler house, aligned on Reade's Shaft. Again, this is not at the location occupied by the whim engine house shown on the 1877 mapping (that surviving in part today), and again represents a predecessor structure.

In 1877, the mine had closed down only a few years before (Fig 8). Whilst the L-shaped structure to the south-west survived, being labelled with a narrow, elongated building



to its north-east as 'Saw Mills', the engine houses shown on the 1859 plans as serving Reade's Shaft had disappeared and had been replaced by the structures which survive on the site today. The pumping engine boiler house had already been demolished by this date, though is likely to have occupied more or less the same footprint as that shown adjacent to the earlier engine house in 1859; to the immediate south-west of the shaft a rectangular feature on this mapping is likely to have been a surface balance bob pit. The whim engine house to the north-east of the shaft seems likely to have retained its boiler house, and the whim loadings were also depicted. To the south of the whim engine house, a large rectangular roofed structure was also labelled as 'Saw Mills'.

In the northern part of the site, adjacent to Old Engine Shaft, the OS in 1877 depicted a pumping engine house (*'Engine House, Ruin'*) to the south of the shaft – the associated boiler house to its east had been demolished; to its north-east was a whim engine house aligned on the shaft – the adjacent boiler house (on the northern side of this house) had also been demolished.

Elsewhere on the site the OS depicted two large reservoirs, one in the north-eastern corner of the site, the other near its centre. These would have provided a source of water for the boilers serving the beam engines, but might also have served the dressing floors. The location of the copper dressing floors is, however, uncertain. There are spreads of mine waste across the whole of the northern part of the site (additionally extending to the area around Stone's Shaft towards Boswellen Mine to the north). Copper dressing floors of the period were typified by a series of sheds within which the (mainly) female workforce broke and sorted the ore. None are shown on the 1877 mapping and it must be assumed that they had been demolished to recover useful timberwork; their sites are likely to have been within the northern part of the site, probably to the south-east of Old Engine Shaft.

By 1877, the smallholding occupying the central part of the site had been bisected by the development of the West Cornwall Railway, which had a siding at this location, possibly to serve the saw mills. One additional field had been added to the smallholding on its northern side, perhaps to compensate for the loss of land resulting from the development of the railway.

The arrangement of structures around Reade's Shaft in 1907 (Fig 9) is considerably more complex than had previously been the case. No mining had taken place at this site over the three decades which had elapsed since the previous mapping, and it must be assumed that the majority of the structures depicted by the OS at this date relate to a considerably expanded sawmill. The L-shaped building which had appeared on maps and plans since about 1850 was again shown, though with a number of small extension buildings. To its north, the elongated building which first appeared on the 1877 mapping was in use, and had been extended to the north, south and south-west. This was evidently the core of the sawmill, the elongated structure probably forming the main sawing shed. To its north-east, facing the roadway through the site was another elongated roofed building, again very likely part of the sawmill complex, whilst to the south of Reade's Shaft itself were three substantial new buildings, again probably part of the sawmill complex. The pumping engine house evidently survived as a roofless ruin.

New structures had also appeared by this date near the ruined whim engine house to the east of Reade's Shaft. The functions of these structures are, however, somewhat enigmatic. They consist of a large rectangular structure to the west and an L-shaped building to the south-east which incorporated a chimney on its south-western corner and a hollow triangular structure between these to the north. These are not labelled in any way, but in plan they most closely resemble an arsenic recovery works incorporating banks of calciners, a flue and their associated condensing labyrinths. It may well be that the mapping records buildings constructed during a relatively short-lived and poorly documented episode of dump recovery, perhaps the later stages of that noted by Collins (1912) as having taken place during the 1870s.

In the northern part of the site, the large reservoir to the north-east had disappeared by this date, presumably as a result of the agricultural improvement of the enclosure within which it lay. The two ruined engine houses which had served Old Engine Shaft had been completely demolished. Elsewhere on the site abandoned shafts had mostly been hedged around as a safety measure and a further siding had been added on the eastern side of the railway.

The quality of the 1946 aerial photography for this area of Cornwall is somewhat patchy. In the southern part of the site, the large L-shaped building survived as a roofed structure, as did that to the south of Reade's Shaft though that adjacent to the site road seems to have lost its roof, as had the elongated building nearby. The evidence suggests that the sawmill was still in operation at this date, though working on a much smaller scale than four decades before.

The northern part of the site shows evidence for considerable disturbance, very likely in part as a result of the documented dump recovery operations, but also possibly resulting from groundworks undertaken by the US Army in 1944 to establish a (probably never-used) transit camp for D-Day troops of the US Army. Pininger's Shaft is clearly open, whilst there also appears to be a large cratered hole within the dumps at Old Engine Shaft.

Between 1946 and the late 1980s a concrete batching plant was established at Hallenbeagle, occupying the open space between Reade's Shaft and the site road at the southern end of the site. A number of concrete block-built or steelwork supported structures were erected at this date, resulting in the demolition or adaptive reuse of many of the former sawmill buildings and the creation of a large concrete-surfaced yard in the area to the south of Reade's Shaft. Following the abandonment of this business, some structures were demolished. The remainder were unroofed and abandoned.

The 1999 and 2005 CCC APs and the OS MasterMap show the site in its present form. In recent decades travellers have established mobile homes in the northern part of the site, and have created associated paddocks and garden plots. Substantial parts of the site scrubbed in and there is evidence for fly tipping and for the disposal of materials associated with the concrete batching plant in the area to the north-east of Reade's Shaft. Some of the buildings associated with the abandoned concrete batching plant still stand; others, especially those which incorporated structural steelwork, have been demolished.

## **7.2 Results of walkover survey**

A site walkover survey was undertaken on 20 May 2011, at which time the northern and north central parts of the site were still occupied by travellers. Full access to all areas of the site was not, therefore, possible. The site has recently (April 2011) been enclosed within security panel fencing impeding access to some of its peripheral areas, and whilst scrub clearance has taken place over most of the site, the area to the south-west of Reade's Shaft has not been fully treated in this fashion, again limiting the possibilities for detailed survey. Within several areas of the site considerable quantities of fly tipped material and rubble/rubbish deriving from the operations and the closing down of the concrete batching plant occupy the surface of the site, in some areas obscuring the locations of documented structures. Most of the mine shafts have been backfilled or closed using Clwyd Caps (during Carrick District Council's mid-1980s 'Operation Minecap'); subsidence was noted on almost all of the backfilled shafts.

The survey also confirmed that several phases of level levelling and other groundworks have taken place within the northern and east central parts of the site, in part as a result of the reworking of dumps recorded as having taken place in the final years of operation of the mine (Collins 1912), in part as the result of the probable levelling of the northern part of the site by the US Army in 1944, and as a result of the activities of the Operation Minecap team during the 1980s and most recently to debar further traveller access to the northern parts of the site.

### **The northern section of the site**

With the exception of an undisturbed heathy 20m wide buffer strip flanking the main line railway to the west, the ground in the north-western end of the site consists of levelled mine waste from which the covering scrub has recently been removed. There also appears to have been some recent mechanical levelling of the ground surface within this area. As a result there are no surface traces of the whim engine houses known to have served Engine Shaft beyond a scatter of bricks and some coal in the ground surface in the general location occupied by the whim engine houses. The levelled ground immediately to the east of the remains of the Engine Shaft dump does, however, include an area measuring 7m x 3m which is exhibiting indications of subsidence – probably an indication of an undocumented shaft or an area of probable slope collapse similar to that found immediately to the south-west of Engine Shaft, where a very large area is subsiding. No traces were found of the buildings documented to the south of Old Engine Shaft on the 1840 Tithe Mapping.

This north-western part of the site is also notable for a scatter of copper slag, this suggesting that some processing of the ore may have taken place on site, possibly during the 18<sup>th</sup> century. The northern hedge defining the smallholding fields, created between 1840 and 1878 (Tithe Map and OS map evidence) includes further substantial amounts of copper slag in parts of its build which tends to confirm this hypothesis.

The area immediately to the east of the site entrance includes the remains of a large dump of material. This is located over the strike of Hallenbeagle Lode between Engine Shaft to the west-south-west and Stone's Shaft to the east-north-east, though does not seem to be associated with either and may indicate the location of an undocumented shaft. Alternatively, this may alternatively represent spoil bulldozed from the surrounding area and heaped up in this corner of the site during 1946. Recent excavation into this material to create the site fence and gate show the dump to consist of mixed material and not wholly of mine waste. There are very considerable amounts of fly-tipped rubbish in this area, but no surface indications of archaeological features.

The enclosure which forms the north-eastern part of the site was evidently returned to agriculture between 1877 and 1907 and is currently being used as horse pasture. It is still just possible to detect the outlines of the large mine reservoir which was sited here though it has clearly been infilled and its surrounding banks have probably been extensively ploughed down.

### **The central part of the site**

The central part of the northern end of the site is currently occupied by mobile homes, sheds and temporary dwellings (Figs 20-22). As well as a number of the travellers' horses, there are a large number of aggressive tethered dogs in this area, limiting access to this area. On its western edge are the remains of the large waste dump associated with one of the shafts of the mine (Fig 23) – the (probable whim) shaft itself being enclosed within the remains of a low safety hedge constructed of mine waste, whilst the shaft itself was covered with a Clwyd Cap during the 1980s, and is blocked (Fig 24). The eastern part of the spoil dump has been excavated away or has subsided as the result of the collapse of the collar of Engine Shaft. These activities may have removed part or all of the pumping engine houses formerly sited here, together with associated structures such as boiler houses, chimneys, coal yards, boiler ponds, leats, store buildings &c. This area has been invaded by Japanese knotweed, which it is proposed to eradicate by the excavation and screening of all soils down to bedrock.

Immediately to the south-west of the remains of the surviving section of spoil dump a very substantial collapse of ground has occurred, presumably through the deterioration of old support work in near-surface stopes and of Engine Shaft itself. The ground here continues to subside, and has been used as a rubbish disposal site. The presence of this area of collapsed ground indicates the likelihood that extensive areas of the Hallenbeagle Lode were mined away very near to surface and that there is a strong potential for ground instability along the lode strike to the east-north-east.

Pininger's Shaft is located at the south-western corner of this part of the site. The shaft itself was covered with a very large Clwyd Cap during the 1980s, but this has been adapted as a children's den by being covered over with a blue plastic tarpaulin, and it is not clear whether the shaft is open under this or is blocked (Fig 28). Dense scrub vegetation prevented access to the shaft to check its condition. The remains of a substantial waste dump surround the shaft opening, though material from the dump has been partially removed on its eastern side. No structures are documented as being located near this shaft though the substantial amount of spoil in the adjacent dump indicates that it would have been served by a nearby whim, though whether this was horse operated or steam operated is unknown.

Within the area occupied by the mobile homes, no evidence was noted for archaeological features including the southernmost of the former mine reservoirs. It should be noted, however, that the mobile home at SW 72796 44674 in the south-eastern part of this area is located very close to a mine shaft documented on modern OS maps as being enclosed within a shaft hedge (the shaft is clearly shown on Figs 8-9 and Fig 2). Part of the shaft hedge survives immediately to the north-east of the caravan, but no sign of the shaft opening was visible, nor any indications of a Clwyd Cap. The nature of the shaft closure is unknown. There is some potential for other undocumented mine shafts or for large near-surface stopes (mined out areas of lodes) within other parts of the northern half of the site.

#### **The smallholdings in the central part of the site**

The central part of the site is occupied by miner-smallholder's fields which were first documented on the 1809 OS 1" to the mile mapping, and were shown on the 1840 Kenwyn Tithe Map (Fig 4) as being associated with the cottage immediately to the west of the railway line. The holding would have been bisected during the construction of the West Cornwall Railway line in 1852, and an occupation road was installed to allow the farmer to access his land to the east of the railway. This is still in use today.

The fields are defined by low (average 1.25m high x 1.6m width) Cornish hedges whose facings are predominantly of mine waste, though which contain substantial amounts of copper slag in some stretches (particularly the northern face of the western part of the hedge defining the northern field which was added between 1840 and 1878). These fields were laid out on former heathland unaffected by mining activity which lay between the outcrops of Hallenbeagle Lode to the north and Reed's Lode to the south, hence their orientation parallel to the lode strikes. To the south, adjacent to the spoil dump created through the sinking and working of Oats Shaft, Jeffrey's Shaft and an un-named shaft, one field boundary curves to accommodate this feature, indicating that the shafts were in use prior to 1809. Along their western edges the fields are bounded by modern stock fencing, there being a strip of scrubby ground between this fence and the adjacent railway cutting. An overgrown railway siding lies immediately to the west of the fields, this having been the site of a small, single platform station and upside signal box serving Scorrier which was constructed during the 1890s and which was formally abandoned during the 1960s Beeching cuts.

The interiors of the fields are level, being close-grazed horse pasture (Figs 27). With the exception of two linear ditches 0.5m wide and 0.2m deep which run across the northern field roughly parallel to the nearby northern hedge and from Reade's whim engine house northwards across the two adjoining fields to the boundary of the railway line, they are featureless. The function of these two low trenches is uncertain, though the westernmost might represent the course of a former leat serving the boilers at the engine house (Fig 35).

#### **The southern section of the site**

The southern, rather overgrown part of the Hallenbeagle site contains the Grade II Listed pumping and winding/crushing engine houses which formerly served Reade's Shaft, the southern focus of the mine, this being the area from which the mine was worked during the later decades of the 19<sup>th</sup> century. Adjacent are the sites of a number

of early mine shafts and their associated spoil dumps, together with the probable site of a late 19<sup>th</sup> century arsenic works, constructed during a short phase of dump reclamation following the closing down of mining operations underground, and the documented sites of two other engine houses, these appear to have been at work in 1859.

Also within the southern part of the site are some ruins which represent the site of a sawmill complex which developed in the last decades of the 19<sup>th</sup> century and continued to operate into the early 20<sup>th</sup> century; these are now sadly very ruinous and overgrown. A number of buildings were constructed as part of the concrete batching plant which was established here in the later decades of the 20<sup>th</sup> century, this representing the last industrial use of this part of the site, which in recent years has become a focus for large scale rubbish dumping and fly tipping.

### **7.3 Site inventory**

See Figs 49-51.

#### **1. Site of whim engine house SW 72772 44892**

A possible whim engine house was shown at this location on the 1840 Kenwyn Tithe Award mapping (Fig 4), though is not identified as such in the associated apportionment. A whim engine house (marked as 'Ruin') measuring 6.5m x 5.5m in plan was shown aligned on one of the shafts to its south-west on the 1<sup>st</sup> Edition of the OS 25" mapping dating to 1877 (Fig 8). Its boiler house, which would have been to its north, had already been demolished; the engine house had been demolished by 1907. Its site is marked by a scatter of bricks amongst bulldozed rubble, though there may be some potential for the survival of its foundations.

#### **2. Area of subsidence, probably on the site of shaft (CMS25) SW 72750 44889**

A more or less rectangular area of subsidence measuring 7.0m x 3.0m at this location is sited over the outcrop of the Hallenbeagle Lode and may represent the collapse of the fills of an undocumented ventilation shaft or an area stope collapse. Given its fairly regular shape it is also possible that this is the result of the backfilling of a site investigation trench. This area should be investigated to determine the reason why the ground is subsiding and, if mine workings are found, treated to make it safe.

#### **3. Site of pumping engine house SW 72732 44866**

A pumping engine house was shown at this location on the 1840 Kenwyn Tithe Award mapping (Fig 4). This substantial pumping engine house, measuring 9.5m x 6.85m in plan, was most probably for a 70" engine (Ken Brown's list No 556) and was shown occupying the same site on the 1<sup>st</sup> Edition OS 25" map (Fig 8) aligned on a shaft immediately to its north-east. Its boiler house, which would have been to the east of the engine house, had been demolished by 1877; the engine house had been completely demolished by 1907. Engine Shaft is now marked by the site of a very substantial subsidence hollow, and there are no indications of a building ever having been sited to its south-west, though there may be some potential for the below-ground survival of its foundations.

#### **4. 18<sup>th</sup> century pumping engines serving Engine Shaft approximately SW 72731 44874**

Ken Brown notes three other early engines which are likely to have served Old Engine Shaft, and whose houses would have been located at or near the site of that shown on the 1<sup>st</sup> Edition of the OS 25" mapping. These are KB 557, a 52" double-acting Watt engine erected in 1796 – a most unusual engine in that it was mounted directly over the shaft and drove the pumps via side rods. The engine appears to have been short-lived and may have replaced another 52", acquired from Wheal Chance. It was reported as 'worn out' in 1794 (Barton). This in turn was replaced by KB 558 a 45" cylinder engine from Trevaskus mine. One of these may be the westernmost of the buildings shown on

the 1840 Kenwyn Tithe Map near the location of later pumping engine houses and measuring 8.75m x 8.0m in plan.

#### **5. Whim shaft SW 72732 44883 (CMS9)**

Set on the top of a remnant dump of heathy spoil between the edge of the development site and the railway cutting, a small Clwyd Cap (Fig 24) marks the site of the shaft worked by the whim engine depicted on the 1<sup>st</sup> Edition OS 25" mapping. This appears to be separate from Engine Shaft, which seems to have been sited just to the south, adjacent to the pumping engine house. The shaft is filled at surface, and its depth and condition below ground are unknown.

#### **6. Pumping shaft SW 72731 44873 (CMS10)**

The principal pumping shaft for the mine appears to have been sited immediately to the north-east of the pumping engine house shown on the 1<sup>st</sup> Edition 25" mapping, and was therefore at the location currently marked by a very substantial subsidence of ground adjacent to the whim shaft spoil dump. The large hollow at this site suggests that the shaft collar has run in at surface and is still subsiding. The shaft appears to have been used as a rubbish dumping site for many years, and the outline of the shaft opening has now been lost.

#### **7a-c. Three buildings associated with Old Engine Shaft SW 72872 44848, SW 72792 44876 and SW 72769 44867**

The 1840 Kenwyn Tithe Map (Fig 4) shows four small buildings to the south-east and east of Engine Shaft, the westernmost of which was almost certainly a pumping engine house. The functions of the other three are uncertain. The northern pair were both shown as having small enclosures or yards on their northern sides. These appear to be the only mine buildings shown on the Tithe Map (though industrial structures were often omitted since they were not subject to tithing), and are likely to represent the mine smithy, carpenters' shop and office, though one of these structures might have been an early whim engine house.

No traces of these buildings could be found at their documented sites, though foundation courses may survive below ground level.

#### **8. Northern mine reservoir SW 72893 44788**

The adoption of beam pumping and winding engines on Co mines necessitated the securing of adequate supplies of water to feed their boilers. The condensate was often recycled. At Hallenbeagle, two large reservoirs were mapped by the OS in 1877 (Fig 8), one in the north-eastern part of the site, one near its centre. The larger of the two, probably serving the engines on Engine Shaft, but possibly also providing water to the dressing floors was in the north-east of the site, was aligned north-north-east to south-south-west and measured 50m x 14.5m in plan. The source of the water to fill the pond is unclear – no associated leats were shown by the OS. As the reservoir was set on the highest ground on the site, it is likely that it was filled with water pumped from the mine.

The reservoir had been infilled by 1908 and the land it had occupied returned to agriculture. It is still just possible to discern the site of the reservoir as an elongated shallow hollowed area in the north-eastern part of the field.

#### **9. Site of possible proposed WWII US Army camp centred SW 72782 44865**

An area of disturbed, levelled ground and associated bulldozed roadways visible in the northern part of the site on the 1946 RAF aerial photographs (Fig 10) was interpreted by the National Mapping Programme (NMP) aerial photograph plotting team as evidence for groundworks having been undertaken in preparation for the creation of a camp for US Army soldiers awaiting embarkation to the Day beach on the Normandy coast. Apparently no evidence for a huddled encampment can be seen on 1944 RAF

photographs of the site, and it was concluded that the camp was never utilised, unlike those at Wheal Busy and near Threemilestone.

#### **10. Pinger's Shaft SW 72647 44788 (CMS11)**

Pinger's Shaft is set between Engine Shaft and Reade's Shaft on the western boundary of the site. The shaft does not seem to have been worked by an adjacent engine. It is now marked by a large conical depression within a partly-surviving spoil dump, and has been covered with a large Clwyd Cap, presumably during the 1980s Carrick District Council 'Operation Minecap'. This in turn has been covered with a blue tarpaulin, and may be currently in use as a children's den (Fig 28). The condition of the shaft beneath the cap is unknown as it is now not possible to gain access to the Clwyd Cap from the spoil mound. An original safety wall 1.0m high surrounds the shaft cone for most of its circumference.

#### **11. Southern mine reservoir SW 72797 44702**

The southern mine pond, measuring 24m x 20 in plan on the OS 1<sup>st</sup> Edition 25" mapping (Fig 8) was probably fed from the larger example upslope to the north-east and is likely to have fed the boilers for the various engines sited around Reade's Shaft. This reservoir survived until at least 1907 (OS map evidence), though would have been long disused by this date. The pond measures 28m x 25m on this later mapping, suggesting that it had been enlarged between 1877 and 1907, possibly to provide a water source for dressing operations during a period of waste dump re-working following the closure of the mine.

No traces of this feature could be found.

#### **12. Possible copper smelting site SW 72752 44927**

A scatter of large pieces of copper slag visible on and incorporated in the disturbed ground surface in the north-western part of the site (Fig 25) hints at the operation of an undocumented small-scale copper smelting works at Hallenbeagle, almost certainly during the 18<sup>th</sup> century. The majority of the slag is found within this area, suggesting that the smelter lay nearby, though a section of the northern face of the boundary of the smallholding field at SW 72666 44753 to the south is constructed of this material.

No structural evidence for the site of the smelter was found, though may be exposed during groundworks associated with the redevelopment of the site. If this is the case, the site would be of considerable significance, and should be fully recorded before it is destroyed.

#### **13. Shaft to north-east of smallholders' fields (CMS12) SW 72747 44758**

This shaft is not shown on either the 1<sup>st</sup> or 2<sup>nd</sup> Editions of the OS 25" mapping, and its location is derived solely from the Cornwall Mining Services plan supplied by BLS Ltd, where it is marked 'Shaft 12'. It does not appear to be on any known lode structure and is 15m away from the course of the Count Adit, to which it might have connected, and have served as a ventilation/development shaft.

The location indicated for this shaft lies within the heart of the travellers' encampment, within the north-eastern arc of a 17.5m diameter circular horse paddock. No traces of the shaft now show at surface.

#### **14. Smallholders' fields centred SW 77684 44683**

Smallholdings appear to have been developed across North Downs during the late 18<sup>th</sup> century as a response to the need to house the greatly enlarging mining population as copper mining activity within this area began to expand exponentially during this period. This group of fields were shown on the 1809 OS 1" mapping (Fig 3). They were again shown in 1840 on the Kenwyn Tithe mapping (Fig 4), consisting of eight fields aligned west-south-west to east-north-east (following the trend of the strike of the local lodes), and surrounding a smallholders' cottage, outbuildings, yards and gardens.

By 1877, the railway had cut through this smallholding, and perhaps in response to this, an additional field had been added to the group its northern side to the east of the railway line (field 185 on Fig 8), The arrangement of fields and structures remained unaltered in 1907 (Fig 9).

The cottage group survives (as 'Tregargus') to the west of the railway line, though some of the outbuildings have gone, but the field arrangement remains the same today as it did a century ago. Copper smelting waste (slag) has been incorporated into the northern facings of the western end of the northernmost hedge defining these fields.

#### **15. Shaft to east of smallholders' fields (CMS13) SW 72800 44675**

This shaft is shown on both the 1<sup>st</sup> and 2<sup>nd</sup> Editions of the OS 25" mapping (Figs 8 & 9) as 'Old Shaft', being depicted as within a surrounding hedge in 1907. Cornwall Mining Services show this shaft as sunk to the level of the C Adit, and connected to it via a short tunnel running from the east of the shaft to the drainage adit.

In 2005, the site of the shaft was an area of scrub adjacent to the track through the site, but the site walkover revealed that a static caravan has been sited over the southern part of the shaft, and that only a short length of the abandonment hedge which formerly surrounded it has survived, this representing the northern arc of the original surrounding walling.

#### **16. Reade's whim and crusher engine house SW 72671 44635**

A whim engine house was erected here at some time between 1859 and 1867, possibly replacing one documented as having been sited to the south of Reade's Shaft in 1859 (MRO/151/A). The building housed a 22" cylinder engine which not only wound from Reade's Shaft but also drove a copper crusher. The engine is documented as having been for sale in 1867 (Ken Brown pers. comm.). The engine house is shown as derelict and roofless on the 1877 OS mapping (Fig 8). Its plan is not easy to interpret, though the whim loadings were evidently on its northern side and the copper crushing rolls were probably to the south of these. The boiler house probably to the north of the engine house, but seems to have been demolished by this date. By 1907 (OS mapping, Fig 9), the loadings and copper crusher had been demolished and the engine house was abutted by a possible arsenic works.

Until very recently, little was visible of this engine house barring its chimney, the remainder of the surviving remains of this structure being covered in vegetation. Some of this has now been cleared, making survey slightly more easy (Figs 34 & 35). The engine house seems to have measured somewhat over 7.15m long and 5.45m wide, and survives to a maximum of 5.75m high. Whilst substantial parts of the rear wall survives, the side walls are progressively truncated to the west, and the bob wall has either collapsed or been demolished. This western section of the engine house remains covered in scrub and cannot at present be surveyed. The house was constructed of granite and killas rubble, with granite quoining. The windows seem to have been arch-headed, with splayed reveals and with three courses of brick headers, the only survivors being those above the small cylinder opening on the rear wall. The chimney was built into the north-eastern corner of the building, is of rubble masonry with brick drip coursing and upper section. The building is Listed Grade II.

The building requires the removal of scrub from its walls and surroundings to determine its conservation requirements. These are likely to include full repointing in a lime-based mortar, limited reconstruction to confer structural stability and the installation on a lightning conductor. It is particularly important that the proposed redevelopment of the site does not unnecessarily impinge on this building, nor cut from it. It is also recommended that the conserved engine house (together Reade's pumping engine house) should be within the context of an amenity area, accessed by or from the Mineral Tramways path and bridleway network.



#### **17. Possible shaft adjacent to Reade's whim (CMS16) SW 72666 44621**

This shaft is not shown on either the 1<sup>st</sup> or 2<sup>nd</sup> Editions of the OS 25" mapping, and the only source is the Cornwall Mining Services plan, where it is labelled as 'Shaft 16'. The shaft does not appear to have been sunk on lode, though may have accessed the shallower workings of Reed's Lode. Its depth is unknown.

The shaft site lies within an area of scrub covering a roughly level area to the south-west of Reade's whim engine house. There are no traces of this feature at surface.

#### **18. Jeffrey's Shaft (CMS15) SW 72711 44654**

Jeffrey's Shaft is not shown on either the 1<sup>st</sup> or 2<sup>nd</sup> Editions of the OS 25" mapping, though is shown on the 1859 mine plan (Figs 6 & 7). The shaft appears to have been sunk on the underlie of Reed's Lode, this dipping to the north to intersect the 16 fathom, 23 fathom and 33 fathom levels of the mine. Cornwall Mining Services plan shows the shaft extending on the dip of the lode to meet the 40 fathom and 53 fathom levels of the workings on this lode.

There are no traces of the shaft at surface (Fig 32), though its spoil dump evidently determined the southern boundary of the smallholding fields at this point, so it dates to at least 1840, and is likely to have been one of the shafts worked during the 18<sup>th</sup> century operations of the mine.

Faint traces of a level grassy circular area can be seen within the mine dumps at the documented location of the shaft.

#### **19. Oat's Shaft (CMS15) SW 72729 44631**

Oat's Shaft (which bafflingly is not sunk on Oat's Lode) was shown as 'Old Shaft' on both the 1<sup>st</sup> and 2<sup>nd</sup> Editions of the OS 25" mapping, being shown as being used within an abandonment hedge on the 1907 mapping and open in 1946 (Fig 10). Cornwall Mining Services plan suggests that it was sunk on the intersection of the probable outcrop of Reed's Lode and a roughly north-south trending cross-course. There are no indications of its depth.

The shaft is marked by an infilled Cotoneaster-covered 2.0m diameter Clywd Cap on the overgrown spoil dump to the north-east of Reade's Whim engine house (Fig 33).

#### **20. Shaft to SW of Jeffrey's Shaft (CMS28) SW 72697 44646**

Like Oat's Shaft not far to the east, this shaft seems to have been sunk on the outcrop of Reed's Lode, and given its proximity to its neighbour, is likely to have been developed during the 18<sup>th</sup> century. No detail concerning its depth is recorded.

The shaft site lies on the south-western edge of an elevated dump of mine spoil which has been covered with waste from the concrete batching plant. There are no indications of the shaft at surface.

#### **21. Shaft SSE of Oat's Shaft (CMS18) SW 72749 44604**

This shaft, shown on both the 1<sup>st</sup> and 2<sup>nd</sup> Editions of the OS 25" mapping (on the latter the shaft being enclosed within an abandonment hedge) is shown by Cornwall Mining Services as being over a notable kink in the 23 fathom level of the workings on Oat's Lode. It is likely, therefore, to have been sunk more levels vertically to this level, and may, as a result, be of later date than those not far to the north, which were sunk on the underlie of Reed's Lode.

Most of the spoil dump surrounding this shaft, shown as a discrete mound in 1877 and as a reduced mound in 1907, has now been removed (Fig 31). The RAF aerial photograph shows the shaft as open in 1946 (Fig 10). Only small parts of the abandonment hedge now survive to the south of the shaft on the surviving dump material, which is up to 3.75m high. The site of the shaft is visible as a slightly subsided area within the spread spoil to the north of this, suggesting that the shaft has not been formally capped.

**22. Large hollowed area, possible backfilled shaft SW 72694 44552**

A slightly hollowed area 8.0m in diameter surrounded by a roughly circular annular dump 1.6m high lies just to the south of Oat's Shaft, close to the outcrop of Oat's Lode. It is possible that this represents evidence for an early shaft, though it is equally possible that it is no more than a fortuitous arrangement of disturbed dump material.

**23. Hollowed area, possible backfilled shaft SW 72743 44591**

A hollowed area 6.0m in diameter and 1.0m deep with near-vertical sides is sited close to the boundary of the site at this location, which is at or very close to the outcrop of a lode to the south of Oat's Lode as shown on the Cornwall Mining Services plan.

There is little spoil adjacent to the hollow, though the surrounding area shows signs of disturbance, including what appear to be a number of backfilled test pits. If this is a hollow it is likely to be early in date.

**24. Possible arsenic works SW 72692 44618**

Developed between 1877 and 1907 (OS map evidence, Figs 8 & 9), a group of buildings formerly sited to the south-east of Reade's whim engine house consisted of a large rectangular building measuring 23m x 10m in plan and an L-shaped building to its south-east measuring 17m x 13m in plan which seems to have had a chimney on its south-western corner, the two buildings being linked by a sub-triangular structure. This group of buildings in part occupy the northern of the 'saw mill' buildings depicted on the 1877 OS mapping.

In the absence of labelling on the OS mapping, this group of structures (which are not shown on any other site plan) are difficult to interpret. However its plan suggests that of an arsenic works incorporating a bank of calciners (to the north-west), flues (the triangular structure) and a small condensing labyrinth with attached chimney (to the south-east). It is possible that this probably short-lived group of structures might have been erected during the late 19<sup>th</sup> century during the re-working of the spoil dumps on the site to process the arsenical ores and produce a saleable product. By 1907, the mapping suggests that this operation had closed down.

This area, immediately adjacent to the Jeffrey's and Oat's Shaft dumps is now partly occupied by the north-eastern part of the concrete plant yard, partly by relatively recently deposited waste material extending the shaft dump to the west, this material incorporating the mixer butt from a concrete lorry (Fig 30). No traces of any structures could be found at this location, and it seems likely that they were demolished many years ago.

This area (especially that currently covered by the extended spoil dump) has the potential for significant residual arsenic contamination if it is the case that an arsenic works here was demolished and no remediation of the site was carried out. It is possible that its foundation courses may survive beneath the spoil dump.

**25. Shaft SW of Reade's whim (CMS21) Approximately SW 72655 44587**

Not shown on any other source other than the Cornwall Mining Services plan, this shaft is located just to the south of the central point between Reade's Shaft and Reade's whim engine house in what is now a levelled yard. The shaft is shown as being more or less on the predicted outcrop of Reade's Lode, though no depth is indicated.

There are no traces of the shaft at this site.

**26. Building shown on 1880 OS mapping to the south of Reade's whim SW 72682 44595**

This roofed structure shown on the 1<sup>st</sup> Edition 25" mapping (Fig 8) to the south of Reade's whim measured 28m x 11.75m in plan and is assumed to have been part of the saw mill complex. It had been demolished by 1907 and has left no surface traces.

#### **27. Concrete plant building SW 72656 44626**

This small structure, measuring 7.0m x 4.5m in plan and associated with the former concrete works is sited to the west of Reade's whim engine house and is built against the field hedge. It is of single cell construction and has externally rendered blockwork walls averaging 2.5m high. The structure is roofless, original flat roof probably having consisted of built up felt on a timber sheets. The original function of the building is unknown.

#### **28. Concrete plant vehicle workshop SW 72638 44616**

Sited between Reade's whim engine house and Reade's pumping engine house, this derelict and roofless rendered blockwork structure (Fig 37) is 2.5m high to the east and 2.25m high to the west, and measures 11.5m x 9.75m in plan. Internally it is divided into two bays by a blockwork wall, the northern bay containing a partly-infilled vehicle inspection pit 4.0m long and 1.3m wide, suggesting that this was the garage and vehicle maintenance building for the concrete plant.

#### **29. Hopper base SW 72662 44609**

Measuring 5.0m x 4.0m, an infilled steel hopper set flush with the concrete yard surface was found at this location. It is assumed that it was associated with the disused concrete plant, but its former function is unknown.

#### **30. Concrete plant building SW 72649 44571**

Set on the southern side of the yard formerly occupied by the concrete plant, this small roofless block-built structure (Fig 36) measuring 4.0m x 2.0m and having a projecting porch at the eastern end of its northern elevation seems likely to have been the toilet block associated with the redundant concrete plant. It would have originally been flat roofed.

#### **31. Concrete plant building SW 72643 44566**

Measuring 7.5m x 3.75m in plan, the function of this rendered blockwork building on the southern side of the yard (Fig 36) occupied by the former concrete plant is uncertain. Internally, it is divided into thirds by block walls, these forming two rooms at the east and west ends of the building; the central third is further subdivided into small compartments.

#### **32. Concrete plant building (removed) SW 72615 44599**

A large structure supported on RSJ's set into the ground surface and having had a concrete floor formerly stood to the south-west of Reade's Shaft (Fig 44). The building has been demolished, leaving only the stumps of the RSJ's protruding from the ground surface. These can be traced along the southern wall of the building for 15m and along the eastern wall line for 6.0m. The building appears to have been 10m wide.

It is unclear whether this is the building which appears at this location on the 1946 RAF aerial photograph (Fig 11). If this is the case, the surviving evidence represents only the southern half of the original structure, the northern section having been lost to the coning of the adjacent Reade's Shaft.

A concrete ramp 10m long and 3.5m wide originally led the building from its southern side near its western end. This appears to be visible on the 1946 AP.

#### **33. Reade's pumping engine house SW 72613 44627**

The current pumping engine house adjacent to Reade's Shaft (Figs 29, 42-43) appears to have been at least the second serving this shaft (see below). Constructed at an unknown date (though probably after 1859) for a 60" cylinder pumping engine which was moved to Perran Wheal Virgin in 1870, this was the principal pumping engine on the southern part of the Hallenbeagle sett during the period during which it was active.

The engine house was shown on the OS 1877 mapping (Fig 8, when the mine had recently closed) as lacking its boiler house, which would have been sited immediately to its west. A surface balance bob housing or mounting is shown just to the south-west of the engine house. By 1907 (Fig 9), the shaft had been enclosed within a safety hedge, overlying the balance bob, and a series of sawmill buildings had been constructed to its east and south.

The engine house is a prominent landmark in the local landscape and more than once featured in British Rail promotional literature. Measuring 9.45m by 6.75m in plan and standing to 12.5m high, the engine house is constructed of killas rubble masonry with granite quoining. The house is rather sparsely provided with windows, there being two above the cylinder arch on its northern elevation, one lighting the bob loft on the western side and on the middle floor and driving floor to the east. All are square headed with timber lintels, as are the girder openings. The cylinder door to the north is arch-headed with four courses of flush-set brickwork, as also the plug door to the south. The sole plate timber on the head of the bob wall is inset into the lining walls to either side. The masonry for the condenser housing protrudes from the face of the bob wall at the former ground level, but coning of the shaft now leaves this feature unsupported (Fig 40).

Internally, the engine house displays some unusual features such as the large number of sockets incorporated into the walls, these suggesting that the first floor support joists ran laterally rather than longitudinally (as is usually the case) – there are no joist pockets in the inner face of the bob wall. The many (often decayed) timbers incorporated into the wall to spread the working load and introduce a certain amount of flexibility into the structure reflect early 19<sup>th</sup> century construction practice, but (with the many wall pockets) now increasingly contribute to the structural instability of the building. Some missing stonework was found as a result of the decay of timberwork (Fig 41), the wing walls are beginning to lean inwards due to the loss of support which would have been conferred by the sole plate timbers and significant cracking was noted in the rear (north) wall and the eastern wall (Fig 42). The chimney is incorporated into the north-west corner of the engine house and incorporates a brick drip ring and upper section. The western wall of the engine house incorporates the boiler house door, but no evidence for roof flashing associated with the boiler house was recorded on this wall. The building is Listed Grade II.

The building requires a range of works to make it safe, stable and accessible. This should include full repointing to all wall faces in a lime-based mortar, limited reconstruction to confer structural stability where masonry has been lost, repairs to the stack brickwork, the replacement of all failing timbers, the provision of structural support for the bob wall and condenser housing as part of shaft safety, the provision of a means of access to the interior of the building via the cylinder arch and the construction of a fence-type barrier on the southern edge of the cylinder plat to protect visitors from falling into the cock pit, together with the installation of a lightning conductor. Listed Building Consent will be required for these works.

It is particularly important that the proposed redevelopment of the site does not unnecessarily impinge on this building, nor detract from it. It is also recommended that the conserved engine house (together with Reade's whim engine house) should be within the context of an amenity area, accessed by or from the Mineral Tramways path and bridleway network.

#### **34. Reade's Shaft (CMS17) SW 72616 44619**

Reade's or Old Engine Shaft is shown on plans and maps from 1859, becoming, during the later periods of operation of the mine, its principal pumping shaft, and siting its later pumping and winding engine houses. Cornwall Mining Services show the shaft to have been more or less vertical and connecting to at least the 33 fathom level of the mine. The shaft was shown as sunk to the 33 fathom level on MRO/151A in 1859 (Figs 6 & 7), but also connecting to the 16 fathom and 23 fathom levels; in 1877 (Fig 8) it was

named as 'Read's Shaft', adjacent to the disused pumping engine house and a probable surface balance bob pit to its west-south-west. An associated spoil dump extends to the south-south-east of the shaft at this date. In 1907 (Fig 9) the shaft was enclosed within an abandonment hedge, whilst the spoil dump had become the site of some of the sawmill buildings.

The shaft collar has clearly collapsed, resulting in substantial coning of the surrounding ground and adjacent spoil dump (Fig 40), this also having undercut the masonry protruding from the bob wall of the engine house which supported the condenser. This large shaft hollow has been extensively used for rubbish disposal, and with the exception of a fragment of the masonry which housed the surface balance bob on the south-western side of the shaft, no significant detail is now visible within it. There are no indications that this shaft has been formally plugged or capped, and it is likely that it is simply blocked near surface with accumulated rubbish.

The removal of the rubbish choking the shaft will be necessary as a precursor to any safety works. If it is found that the shaft is open beneath this material, it is recommended that a grille or accessible cap is installed over the shaft opening and a level equivalent to the base of the condenser housing in order to provide suitable structural support to this feature and to the base of the bob wall. The masonry of the surface balance bob housing should remain visible following these works.

### **35. Earlier site of Reade's pumping engine house and boiler house SW 72602 44623**

Mine plan MRO/151A (Fig 7) dating to 1859 clearly shows a pumping engine house and an adjacent large boiler house and its incorporated chimney set to the west of Read's Shaft, the only source to depict these structures. This may well record the building erected to house the ex Black Dog Shaft (Wheal Busy) pumping engine which was moved from Hallenbeagle to Boscawen Mine in 1861, and was later moved to Van Mine. An alternative possibility is that this map records an engine house which was planned to pump Reade's Shaft, but was not built at this location.

This pair of structures are something of a mystery, since the pumping engine house which now stands next to Reade's Shaft was constructed in the mid 1860s, only a few years after the date of the 1859 plan. The re-siting of engine houses adjacent to pumping shafts is not unknown, this usually having taken place due to the recognition that the original site was likely to be prone to subsidence, as may have been the case in this instance, where the original site may have been too close to the lode outcrop.

No trace of the engine house is visible at surface, though this area has been subjected to considerable re-organisation and disturbance over the past century and a half. It is possible that the foundations of the engine house may still exist and may be revealed during the redevelopment of this part of the site. An archaeological watching brief should be allowed for during any ground works in this area.

### **36a-c. Three buildings to the south of Reade's Shaft in 1907 SW 72614 44602, SW 72614 44607 and SW 72656 44626**

Three structures which appear to be associated with the expanded sawmills in 1907 (Fig 9) were sited at the northern edge of the open area to the south of Reade's Shaft. The first of these, measuring 18.0m x 17.5m may be that represented by the large shed at this location on the 1946 AP and by the building footprint indicated by the cut-off RSJ's found here in the concrete surface (Fig 44), but it is unlikely that an industrial building of this type would have survived for many decades, and it seems more likely that there have been a succession of buildings or more or less the same size on this site during the 20<sup>th</sup> century.

The second building, just to the east measured 11m x 8.0m in plan, and was set on the south-eastern edge of the Reade's Shaft dump. This has left few traces, its site having been covered over by the concrete plant yard.

The third building measured 17.5m x 8.0m and occupied site to the east again against the nearby field hedge. This location is now occupied by the ruinous remains of one of the concrete plant buildings.

### **37. Earlier site of Reade's whim engine house SW 72630 44585**

Mine plan MRO/151A dating to 1859 (Fig 7) also shows a whim engine house, boiler house and chimney sited to the south of Reade's Shaft aligned on it. Like the contemporary pumping engine house to the west of the shaft, this was not listed by Ken Brown, and might never have been constructed, given that Reade's whim was built only a few years after the date of this plan on a site to the east-north-east of the shaft.

The site of this group of structures lies to the south of the shaft in an area occupied by the yard associated with the derelict concrete plant. It is possible that the foundations of the engine house may survive, and may be revealed during the redevelopment of this part of the site. An archaeological watching brief should be allowed for during any ground works in this area.

### **38. Tank SW 72623 44553**

A trapezoidal, rendered rubble masonry tank measuring 12.25m along its longest (NW-SE) axis, 7.25m on its north-western side and 3.5m on its south-eastern side is set just to the north-east of one of the former sawmill buildings on the south-eastern boundary of the site (Fig 38). The base of the tank is partly infilled with rubbish, but it appears to originally have been 2.0m deep. It is buttressed externally with blockwork piers and was braced internally by two iron ties with pattress plates, the south-easternmost of which has survived.

This feature seems to have been added to the sawmill complex between 1877 and 1907, probably as part of the expansion of this works. The most likely function of this feature would have been as a holding tank – either for water required within the works or possibly for tanning liquid. The base of the tank is covered in rubbish and fly tipped material.

### **39. North-eastern saw mill building SW 72643 44566**

An elongated roofed structure facing onto the access road on the eastern side of the site and measuring 40m x 8.0m in plan, with an extension measuring 9.0m x 3.5m in plan at the western end of its northern elevation is shown on the 1907 OS 25" mapping on an area of the site which had been blank in 1877. This building was evidently part of the sawmill complex, though what function it served is unclear. The building had been demolished by 1946 (AP evidence) and its site is now occupied by the southern part of the concrete plant yard, on which are sited two small concrete-constructed buildings. It is possible that its foundations courses may survive.

### **40. Central saw mill building SW 72598 44560**

An elongated building measuring 54m long and 5.0m wide extended more or less east-west across the southern part of the Hallenbeagle site in 1877 (Fig 8), evidently part of the sawmill complex and probably the principal sawing shed. In 1907 (Fig 9), this structure had been considerably extended, a building measuring 13.5m x 4.25m in plan having been added on its northern side at its western end. Another extension measuring 32.5m x 8.5m had been added to its southern side to the west, whilst a further extension to the south again measured 26m x 6.0m in plan. This seems to have been the heart of the sawmill complex at both dates. A wall edging the lane to the east linked this building to the L-shaped building to its south-west.

The majority of this building has been demolished (Fig 46), only its ivy-covered rubble masonry and brick northern wall standing to anything like its original height. The wall to the south-west appears to have been replaced in blockwork, but has now been demolished. The extension to the north is now represented by the remains of a wall return; the remainder has been demolished and over-dumped, though the lower course of its walling may survive. The extension to the south lay within an area which is now

concrete surfaced and which appears to have been remodelled during the period when the concrete plant was operational, whilst the extension to the south-west again, paralleling the railway line, is now represented by the collapsed lower courses of its western wall. At the western end of the core of the building are a granite machinery plinth and a large iron bolt set into the floor (Fig 47), which may originally have mounted part of the saw machinery. The building seems likely to have been substantially demolished by 1946 (AP evidence).

The wall edging the roadway and linking this building to its neighbour to the south-west is 1.6m high, constructed of masonry, though repaired in blockwork (Fig 45). This is a significant surviving feature in this part of the site and as such it should be repaired and conserved.

#### **41. Southern L-shaped saw mill building SW 72950 44531**

The southernmost of the buildings documented as being of the 19<sup>th</sup> and early 20<sup>th</sup> century sawmill complex is first depicted on a mine plan dating to about 1859 (MRO/1515A, Fig 6), when it was probably one of the service buildings for the mine, possibly its serving as its sawmill and carpenters' shop. In 1877 (Fig 8), the building had gained two lean-to extensions to the south, measured 21m x 11.75m in plan and was labelled as part of the sawmill complex. By 1907 (Fig 9) additional small extensions had been added to the building. The RAF 1946 AP (Fig 11) shows the building in more or less this form, roofed and in use, the roof on the western section of the building being hipped at either end, the eastern being gable-ended. Although the modern OS mapping shows the building as still preserving its former plan, it appears to have been substantially demolished in recent years. Only the eastern part of the building survives, and here only in part, the eastern being the best preserved. Concrete incorporated into the building suggests that it was extensively modified in the period during which the concrete works occupied the Hallenbeagle site.

#### **42. Yard entrance SW 72569 44531**

The original entrance to the southern part of the Hallenbeagle mine site and that subsequently serving as the principal means of access to the sawmill complex and the later concrete plant was in the south-western corner of the site. Until the construction of the main line railway in the mid-19<sup>th</sup> century this entrance led off a roadway linking Scorrier and Blackwater; following this the road seems to have been effectively closed to through traffic, though both the 1877 and 1907 OS mapping show what probably represents an occupation crossing linking the two sections of road.

There appears to have been an open, triangular area to the south-west of the L-shaped building, which may originally have fronted onto this. This has now scrubbed in completely and its periphery is defined by a derelict fenceline, but at its northern corner there a tarmac roadway leading into the site can still be seen.

## **8 Significance**

The Hallenbeagle site was formerly part of an extensive area of almost wholly unenclosed downland which extended from the west of Redruth northwards to St. Agnes and eastwards to the outskirts of Truro. During the 18<sup>th</sup> century, rich copper mines developed on the southern parts of this area, and the rapidly expanding mining population was initially accommodated in smallholdings scattered across the downs. The exploitation of the copper lodes continued throughout the 18<sup>th</sup> century, some pioneering beam engines being established at these mines which were eventually linked up by the Great County Adit drainage system. During the 19<sup>th</sup> century, however, the principal focus for industrial activity moved westwards to the mines around Camborne-Redruth, and although some significant activity continued at sites such as Great Wheal Busy or Hallenbeagle, the southern part of the downs became fossilised in its late 18<sup>th</sup> century form.

Despite some minor changes, this continued to be the case until the 1940s, when some former mine sites were levelled to accommodate camps for US Army servicemen in

transit to the D Day beaches. In the post-war years, improvements to the transport infrastructure, the landscaping of former mine sites to create industrial estates and a golf course, together with the re-working of spoil dumps has eroded much of this late 18<sup>th</sup> century landscape character, leaving islanded blocks of smallholdings, scattered miners' cottages and scrubby areas containing shafts, remnant mine dumps and occasional ruined engine houses. These areas, Hallenbeagle being a typical example, have become prone to fly tipping and occupancy by travellers, and are often targeted for 'improvement' to agriculture, or as sites for industrial estates; parts of the landscape containing these mixes of smallholders' fields and cottages, mining features and reverting downland are increasingly rare within the modern landscape of Cornwall.

Given that they were amongst the relatively small group of copper mines that were exploited at the dawn of the industrial era, such sites also have considerable (sub-surface) potential for the preservation of archaeological evidence relating to early phases in the development of steam technology – several early beam engines are documented as having been sited at Old Engine Shaft, Hallenbeagle.

The survival of engine houses at Hallenbeagle is also important. Out of an estimated 2500 engine houses constructed in Cornwall from the mid-18<sup>th</sup> century to the early 20<sup>th</sup> century, less than 200 survive, and many of these are only fragmentary ruins. The Grade II Listed pair at Hallenbeagle are therefore members of a small and important group of technologically and historically important structures.

The presence of significant quantities of copper slag landscaped spoil near Old Engine Shaft and incorporated into the facings of the northern boundary of the smallholders' fields suggests the presence of an undocumented copper smelter in the northern part of the Hallenbeagle site. Given that, from the late 17<sup>th</sup> century, most Cornish copper was being transported to, at first Bristol and south Gloucestershire and subsequently to Swansea for smelting, this is likely to be an early site. Only a few copper smelters are documented within Cornwall itself, these being at Polrudden near St. Austell and at St. Ives during the 1690s, at Penpoll, Phillack between 1710 and 1735, at Lenobrey, St. Agnes for a few months in 1721 and at Carn Entral, Camborne between 1750-1756, this being relocated to Copperhouse, Hayle 1756-1819. Early copper smelting also evidently took place at Roundwood Feock. Given that it took 30 tons of coal to smelt one ton of copper ore it became clear that it was far more economic to transport the ore to Swansea for smelting than to bring huge amounts of coal to Cornwall for this purpose. ([http://eprints.worc.ac.uk/293/5/5.\\_Ch\\_4.pdf](http://eprints.worc.ac.uk/293/5/5._Ch_4.pdf))

It is clear, however, from the field evidence at a number of early copper mines in Cornwall that some undocumented smelting activity took place, Hallenbeagle evidently being amongst these. The site of the smelter is unknown, though it seems likely to have been in the northern part of the project area, whilst the amount of slag found on site suggests that it would have been small-scale and probably short-lived. If the remains of this smelter survive as sub-surface archaeology at Hallenbeagle, these represent an important and little-studied site type which should be recorded.

## **9 Impacts on the historic landscape**

Two general types of archaeological impact associated with developments of this type have been identified: those during the construction phase and those during the operational phase.

### **9.1 Scale and duration of impact**

The impacts of a development on the historic environment may include positive as well as adverse effects. For the purposes of assessment these impacts are evaluated on a seven-point scale:

positive/ substantial

positive/ moderate



positive/ minor

neutral

negative/ minor

negative/ moderate

negative/ substantial

Additionally **negative/ unknown** is used where an adverse impact is predicted but where, at the present state of knowledge, its degree cannot be evaluated satisfactorily (this is usually applied to sub-surface archaeological features, or to documented features which have not been previously evaluated by trenching and/or geophysical survey techniques).

The assessment also distinguishes where possible between **permanent** and **temporary** effects, or between those that are **reversible** or **irreversible**, as appropriate, in the application of the scale of impacts.

## 9.2 Potential and residual impacts

Potential adverse impacts may be capable of mitigation through archaeological recording or other interventions. Where appropriate, both 'potential' and 'residual' impacts are given; that is, expected impacts 'before' and 'after' such work. A proposed mitigation strategy is outlined below in Section 10.10.

## 9.3 Assessment of impacts during construction

Site preparation works will include capping or other surface works to mine shafts within the site, the removal and disposal of rubbish and other waste materials presently on site and the landscaping of the site prior to the installation of roadways, services and foundation works for structures on the site.

Given that most of the shafts on this site have, in the past, coned in due to the collapse of the collaring which supported loose ground above bedrock, capping operations to stabilise them and make them safe are likely to extend beyond the footprint of their original openings, and have the potential to result in the destruction of any surviving remains of engine houses or other associated surface structures. There are known to have been several phases of engine house construction at Hallenbeagle, though not all of these are well documented. No remains of the documented engine houses (other than those serving Reade's Shaft) survive at surface, and their locations are mapped.

The impacts on the surface remains directly associated with the mine shafts are judged to be **negative/ unknown/ permanent** without mitigation (see below) and **negative/ minor/ permanent** should appropriate mitigation be carried out.

The landscaping and other associated works proposed for the site are likely to result in the loss of stratified archaeological deposits, the remains of engine houses and other documented and undocumented structures such as leats, horse whims, dressing floors, mine buildings and a copper smelter.

The impacts on these other buried remains within the development site are judged to be **negative/ unknown/ permanent** without mitigation (see below) and **negative/ minor/ permanent** should appropriate mitigation be carried out.

The proposals will also result in the removal of surviving elements of a miners' smallholding dating to the late 18<sup>th</sup> century or early 19<sup>th</sup> century which is shown on the 1809 OS mapping (Fig 3). These impacts are judged to be **negative/ moderate/ permanent** without mitigation and **negative/ minor/ permanent** should appropriate mitigation be carried out.

## 9.4 Assessment of potential impacts during operation

Immediately bordering, as it does to the north and east, the boundary of the Cornwall and West Devon Mining Landscape World Heritage Site, it is inevitable that the development at Hallenbeagle will have some impact on this significant landscape, inscribed in 2006. These impacts will be primarily visual. Although the engine houses on Reade's Shaft were not included within the boundary of the World Heritage Site given that proposals for the development of this site have already been drawn up by the time of the WHS Bid process, they are considered to be significant components within the surrounding landscape which contribute to the Outstanding Universal Value (OUV) of the WHS. The development will also result in changes to the setting of the World Heritage Site as defined by English Heritage's guidance on settings for heritage assets (English Heritage 2010).

The visual impacts on the World Heritage Site will be limited, however, by topography (given the location of the development area) and the screening provided by existing woodland and scrub vegetation, existing agricultural boundaries and the vegetation growing on them, and by the tree screening proposed around the periphery of the development site. The impacts on the WHS are thus classed as **negative/ minor/ permanent**.

Impacts on Listed Buildings will be limited to those at Reade's Shaft immediately to the south of the development area. Despite proposed tree screening around the periphery of the WTS, the chimney and remains of the whim engine house will immediately adjoin the boundary of an open car parking area forming the south of the WTS, whilst the pumping engine house will lie only a short distance to the south again. The development will very substantially remove the context for and alter the setting of these designated buildings, occupying as it will, much of the site of the former Hallenbeagle Mine, of which they were constituent parts. The proposals will not only result in the removal of the former mine dumps and open space adjoining the engine houses, but also the miners' smallholdings which are very much part of their contemporary landscape. This will result in visitors being less able to read this landscape as one moulded by mining activity, whilst the engine houses will be islanded as decontextualised monuments.

The linear screening proposed for the southern end of the Cory WTS will introduce a boundary type not hitherto found in this area and one which will not refer to the former heathland character of the site. Given that there will be no direct physical impact on the Listed Buildings, these are judged to be **negative/ moderate/ permanent** (given that the eventual reversion of the Cory WTS site at the end of its life to heathland is unlikely).

## 9.5 Assessment of impact on historic landscape character

The development of this site as a waste transfer station will inevitably result in a significant change of character for part of the mosaic of heathland, smallholdings and mining features which formerly characterised this area. However, industrial and other recent development within the neighbouring landscape has resulted in a gradual transformation of the character of this area through the construction of large sheds for light industry and retailing, together with elements relating to the upgrading of the transport infrastructure. As a result, only relatively small pockets of landscape which retain the former character of the area now survive – one of these being centred on Hallenbeagle.

The construction of a large, covered waste transfer station with its associated services, parking and other open space areas at Hallenbeagle will remove a significant area whose appearance still partially reflects its landscape history as downland, mining land and miners' smallholdings. Although poorly treated by its occupants over the past five decades still retains its open, undeveloped character in its present state, retains the potential to revert to heathland. This will no longer be possible once the

development takes place; the original Historic Landscape Character of this site will thus be lost. This impact is assessed as **negative/ moderate/ permanent**.

It should also be noted that the Cory WTS proposals are but one element in a masterplan for further areas of the Hallenbeagle site to the east and south which will result in the loss of further areas of former industrial landscape, heathland and smallholders' fields, as well as development in areas to the east and south of the Reade's Shaft site with its surviving engine houses.

## **9.6 Suggested mitigation measures**

Given that it is known that the area of Hallenbeagle mine proposed for development sited at least two 18<sup>th</sup> century Watt-designed engines, one of these being of a highly unusual design, together with a pair of mid-19<sup>th</sup> century engines (one for pumping, one for winding), it is recommended that an archaeological watching brief is undertaken during any shaft capping or other safety works on site. Although levelling of the site by the US Army in 1944 has removed what remains of the surface evidence for structures adjacent to the shafts, the foundation levels of these buildings may well survive. There have been very few opportunities to record and study the physical remains of 18<sup>th</sup> century engine houses to date, and the works proposed at Hallenbeagle provide a rare opportunity to increase our understanding of the development of steam technology on Cornish mines as well as for early small-scale copper smelting in Cornwall.

Following discussion with consultees (see above), the following mitigation measures are proposed:

- An archaeological watching brief should be allowed for in addition to any ground preparation or safety works at and adjacent to mine shafts and areas of ground collapse on the Hallenbeagle site. Due allowance should be made for the recording of any buried structures which may be revealed.
- An allowance should be made for an archaeological watching brief during landscaping works within the north-western part of the site with the aim of locating and recording the early copper smelter which it seems likely was sited here.
- A record should be made of the cross sections of sample hedges making up the smallholders' fields at Hallenbeagle, including those incorporating copper slag.
- Archaeological evaluation of the shallow trench traversing the fields adjacent to Reade's whim should be undertaken using a number of trial trenches.
- Adjustments to the site boundary of the waste transfer station should be made in the area adjacent to the Grade II Listed Reade's whim engine house to provide it with a suitable buffer zone against the new development and to reduce impacts on its setting.
- Careful design of boundary and screening features associated with the waste transfer station site will be necessary to limit impacts on the nearby Cornish Mining World Heritage Site.

## **9.7 Residual impacts**

Evolving changes to the Historic Landscape Character of this area are described in Sections 10.6.6 and 10.9 above. Whilst the particular characteristics of this part of the Hallenbeagle site which reflect its former HLC have been significantly eroded by developments which have taken place since 1944, some of these are theoretically reversible (by the relocation of the travellers' site, clearance of fly-tipped rubbish and heathland reversion measures on the former mining land). The development of the waste transfer station removes this possibility.

The Cornish Mining World Heritage Site relies on its integrity, authenticity and the retention of its Outstanding Universal Value (OUV) through the appropriate

management not only of key structures, sites and landscapes within its boundaries, but also those which form its landscape context. Within the landscape adjacent to the Hallenbeagle site the boundary of the WHS is formed by the main line railway, to the west of which the landscape is characterised by evolved 18<sup>th</sup> century smallholdings, amongst which there are a small number of modern industrial or retail sites. The development of the waste transfer station (and the other developments proposed for the remainder of the Hallenbeagle site) will form a substantial part of modern landscape immediately abutting the WHS. Although it is important that the boundary between the development and the WHS is carefully designed to reduce these impacts, some degree of residual impact is inevitable.

Given the scale and type of the groundworks which will be required to prepare the Hallenbeagle site for its new use, all near-surface archaeology within the site will be destroyed. Given that it seems probable that Hallenbeagle contains evidence of this type for undocumented sites, it is unlikely that any watching briefs during landscaping and safety works will be able to record all significant evidence for the development of the site. A permanent loss of archaeological information relating (in particular) to early mining activity and for small-scale copper smelting at Hallenbeagle is therefore inevitable as a residual impact.

## 10 Conclusions/ discussion

Until 1944, the Hallenbeagle site typified the local mining and smallholding landscape, having evolved during the 18<sup>th</sup> and 19<sup>th</sup> centuries as a significant focus for copper mining and allied activities, including small-scale copper smelting. During the later 19<sup>th</sup> century, these activities finally ceased at Hallenbeagle and for half a century most of this site, like much of the surrounding landscape, became fossilised.

At Hallenbeagle, however, landscaping and dump removal during 1944 and subsequently have substantially eroded many of the above-ground elements which give such sites their character and importance. The site eventually became a venue for fly-tipping and became settled by travellers and for the past few decades has been identified as a preferred site for industrial and retail development. Given this zoning within former local plans, Hallenbeagle was excluded from the Cornish Mining World Heritage Site in 1985.

Despite the rather poor quality of the site and the erosion of most upstanding historic features, the development of the Cory Environmental waste transfer station (and the other proposed adjacent developments) will have relatively significant impacts on the remaining sub-surface archaeology, on local Historic Landscape Character and on the setting of the immediately adjacent WHS. Whilst a range of measures have been recommended to mitigate some of the impacts of the development on the historic environment, there will inevitably be some residual impacts.

## 11 References

### 11.1 Primary sources

- 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 Kenwyn* (microfiche copy at HE)
- Plans held by the Cornwall Record Office

- LR/82 – 1728 plan of the Hallenbeagle and Wheal Chance setts (not locatable in the archive)

- MRO/R96B – Mine plan of East Downs in the mid-late 19<sup>th</sup> century (photo negatives only available)
- MRO/R151A – Mine plans of Great Wheal Busy and Hallenbeagle (mid-late 19<sup>th</sup> century)
- MRO/R151A/2 – Surface and underground plan of Hallenbeagle (mid-late 19<sup>th</sup> century)
- MRO/258/1 – Surface and underground plan of Hallenbeagle in the mid-late 19<sup>th</sup> century (not locatable in the archive)

## 11.2 Publications

Barton, D.B. 1969, *The Cornish Beam Engine*, Newton Abbot

Buck, C. 2006, *Conservation Management Plan for the Mineral Tramways Project Sites and Trails*, Cornwall Archaeological Unit report 2006R006

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

Cornish Mining World Heritage Site Team 2004, *Nomination of the Cornwall and West Devon Mining Landscape for inclusion on the World Heritage List*, Cornwall County Council

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Dewey, H. 1923, *Memoirs of the Geological Survey. Special Reports on the Mineral Resources of Great Britain, Vol XXVII: Copper Ores of Cornwall and Devon*, HMSO

Dines, H.G. 1953, *The Metalliferous Mining Region of South-West England*, HMSO

English Heritage 2010, *The setting of heritage assets: English Heritage Guidance*, consultation draft

Hamilton Jenkin, A.K. 1979, *Mines and Miners of Cornwall, 3: The Redruth Area*, Bracknell

Lean, T. 1839, *On the steam engines in Cornwall*, reprinted 1969, Newton Abbot

Sharpe, A. 1989, *Wheal Busy: the Archaeological Impact*, Cornwall Committee for Rescue Archaeology report 1989R006

Sharpe, A., Smith, J. and Jenkins, L. 1990, *The Mineral Tramways Project*, Cornwall Archaeological Unit Report 1990R028

Sharpe, A., Lewis, R., Massie, C. and Partners, 1991, *Engine house assessment: Mineral Tramways Project*, Cornwall Archaeological Unit Report

Spargo T. 1865, *The Mines of Cornwall, IV: The Redruth Area*, reprinted Truro 1961

Yelloly Watson, J. 1843, *A Compendium of British Mining*, London

## 11.3 Websites

<http://www.imagesofengland.org.uk/> English Heritage's online database of Listed Buildings

[www.cornish-mining.org.uk](http://www.cornish-mining.org.uk) The website of the Cornwall and West Devon World Heritage Site

[http://eprints.worc.ac.uk/293/5/5.Ch\\_4.pdf](http://eprints.worc.ac.uk/293/5/5.Ch_4.pdf) - A useful history of copper smelting in Britain

## **12 Project archive**

The HE project number is 2011051

The project's documentary, photographic and drawn archive is housed at the 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. Digital photographs stored in the directory R:\Historic Environment (Images)\SITES.E-H\Hallenbeagle Assessment 2011051
3. English Heritage/ADS OASIS online reference: cornwall2-103226
4. This report text is held in digital form as: G:\Historic Environment (Documents)\HE Projects\Sites\Sites H\Hallenbeagle assessment 2011051

## Appendix 1: Brief for archaeological assessment

Date: 07/04/2011

Site: Hallenbeagle Mine, Scorrier

Application Number: MCO04/0836/07/B

Historic Environment Planning Advice Officer: Dan Ratcliffe

Planning Case Officer: Nigel Brabyn

This brief is only valid for six months. After this period the Historic Environment Planning Advice Officer (HEPAO) should be contacted. The contractor is strongly advised to visit the site as there may be implications for accurately costing the project.

### Contractors Written Scheme of Investigation (WSI)

No ground works are to be undertaken until the HEPAO and the Local Planning Authority (LPA) have approved the archaeological contractor's WSI.

#### 1 Introduction

This brief has been written by the HEPAO and sets out minimum requirements for an archaeological assessment of the site of Hallenbeagle Mine, Scorrier.

An archaeological assessment will be required as the first stage of a phased programme of archaeological works to discharge condition 16 of planning consent MC04/0836/07/B. The assessment will inform the development of a strategy for mitigation recording of the site prior to construction works taking place.

#### 2 Site Location and Description

The site is located in Scorrier near Redruth immediately adjacent to the West Coast Main Line between London and Penzance. It consists of agricultural enclosures currently utilised as permanent pasture and former industrial land characterised by mine waste. The north of the site has developed as a semi permanent settlement of mobile homes with established areas of gardens, stock enclosures and yards. Much informal flytipping has taken place around the site. Vegetation has recently been cleared, presumably in preparation for redevelopment.

#### 3 Planning Background

This site is believed to benefit from existing planning permission MC04/0836/07/B.

Planning condition 16 placed on this decision obliges the developer to appoint an archaeological contractor prior to the commencement of operations on site in order that they may afford access to the site during site works to undertake archaeological investigations according to an archaeological written scheme of investigation agreed in advance by the Local Planning Authority. This brief outlines the scope of assessment necessary in order to develop an appropriate scheme of recording.

#### 4 Archaeological Background

A number of records on the Cornwall and Scilly Historic Environment Record pertain to this site.

##### 34021 HALLENBEAGLE MINE

Hallenbeagle mine is shown on Thomas's map of 1819 and Symons's map of 1860. This mine was at one time worked with Wheal Andrew and Boscawen Mine

and was later included with Great Wheal Busy United. Between 1835-46 the mine sold 30,576 tons of copper ore and was about 100 fathoms below adit.

Reade's 60-inch House (34021.01) (b4, E555) (SW 7268 4464) was built before 1870 and housed a 60-inch pumping engine. A prominent structure beside the railway line at Scorrier, this house measures 9.45m by 6.75m in plan by 12.5m high. The large chimney which retains its upper section is in the nearside rear corner, but there are no remains of the boiler house which must also have been on the nearside. Cracking of the stonework is evident on the side and rear walls due to deterioration of the timber lintels (h1, b5).

Reade's Whim House (34021.02) (b4, P554) (SW 7268 4464) was constructed before 1867 to house a winding and crushing engine of size. The house, now in a very ruinous state, measures at least 7.15m by 5.45m in plan and survives to 5.75m high. The bob wall has collapsed but the chimney survives and retains its upper brickwork (h1, b5).

In 1865 126 people were employed and equipment included a 70" pumping engine and 22 " winding engine erected on Read's Shaft. These engine houses may be seen at SW 72609 44629 and SW 72673 44636. Saw are marked at SW 7269 4461 and SW 7260 4455 on the 1878 1st Edition OS map. Two chimneys, an engine house, another building, and a line of shafts with associated spoil tips are visible on air photographs (p1) and were plotted as part of the NMP. The site has been cut through by the A30 b pass and the mainline railway.

#### 34021.03 HALLENBEAGLE ENGINE HOUSE

Reade's engine house situated on the site of Hallenbeagle, which had a whim engine. It was recorded in the 1st Edition 1:2500 OS map. It is a Listed building.

#### 53830 HALLENBEAGLE - Modern military camp

An extensive area within the Hallenbeagle mine complex (34021) in which spoil tips, shafts and any other mining features have been bulldozed flat is visible on air photographs (p1) and was plotted as part of the NMP. This type of wholesale clearance is identical to that at Wheal Busy (53831-53834) and United Downs (53921) associated with the establishment at those sites of temporary bell tent camps accommodating troops in the build-up to D-Day. At Hallenbeagle there is no sign of any tents or buildings so it seems likely that the site was cleared as a proposed camp but was never used in the event.

An earlier assessment of the site has been undertaken IHC consultants (Williams, undated) however this work does not accord relevant professional standards for an archaeological desk based assessment eg.IfA 2002). Areas not covered by the original assessment which are vital for a proper and rounded understanding of its cultural heritage value include the pre-industrial land use, the identification of further shafts and mining remains not noted but clearly identifiable during a site walkover in 2011, the development of the agriculturally enclosed areas of the site and the post industrial transition of the site to settlement occupation first through the apparent engineering works reported to have taken place during WWII and the more recent settlement activity.

## 5 Requirement for Work

Ground works may disturb extant and buried archaeological remains. In order to understand the site and its potential for recording archaeological remains an assessment is required. This would involve a desk based assessment including a map regression plus a walk over survey of the extant remains of the site. This would provide evidence for any recommendations for archaeological recording.

The site specific aims are to:



- Draw together the historical and archaeological information about the site.
- Review and analyse historic map evidence for the site.
- Advise on whether historic/architectural features should be retained.
- 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 op a methodology for it
- Inform whether palaeo-environmental sampling would be required.
- Produce 'statements of significance' for all designated historic assets, that are identified as potentially impacted on by the current proposals. Where currently undesignated assets are identified their likely significance should be indicated i.e. 'national', 'regional' or 'local'.
- Make a photographic record of the site and significant features in their current condition.
- Produce a revised WSI for further archaeological recording during site clearance and preparation works.

## 6 General Guidance

- 6.1 The archaeological contractor is expected to follow the code of the Institute for Archaeologists (IfA).
- 6.2 All of the latest Health and Safety guidelines shall be ed on site.
- 6.3 Terminology will be consistent with the English Heritage Thesaurus.

## 7 Results

- 7.1 The full report including all specialist assessments of artefact assemblages shall be submitted within a length of time (but not exceeding six months) to be agreed between the applicant and the archaeological contractor, Cornwall Council Historic Environment Service and the Cornwall ord Office or Royal Cornwall Museum. A further digital copy shall be suppl CD-ROM preferably in 'Adobe Acrobat' PDF format.
- 7.2 The archaeological contractor will undertake the English Heritage/ads online access to the index of archaeological investigations (OASIS).
- 7.3 This report will be held by the Cornwall and Scilly Hi Environment Record (HER) and made available for public consultation.
- 7.4 The report must contain:
- A concise non-technical summary of the project results.
  - The aims and methods adopted in the course of the investigation.
  - A discussion of the archaeological findings in terms of both the site specific aims and the desk based research.
  - A location map, a drawing showing those areas examined as part of the archaeological recording, and copies of historic maps and plans consulted and any archaeological plans and sections. All plans shall be tied to the national grid.
  - All specialist reports and assessments.
  - A summary of the archive contents and date of deposition.
  - A copy of the brief and the approved WSI will be included as an appendix.

## 8 Archive Deposition

- 8.1 An ordered and integrated site archive will be prepared in accordance with: *Management of Research Projects in the Historic Environment (MoRPHE) English Heritage 2006* upon completion of the project. The requirements for archive storage shall be agreed with Royal Cornwall Museum.

- 8.2 Where there is only a documentary archive this will be deposited with the Cornwall Record Office as well as the Courtenay Library of the Royal Institution of Cornwall.
- 8.3 A copy of the report will be supplied to the National Monuments Record (NMR) Swindon.
- 8.4 A summary of the contents of the archive shall be supplied to the HEPAO.
- 8.6 Only on completion of 8.1 to 8.5 (inclusive) will there be a recommendation for the discharge of any archaeological recording condition.
- 9 Monitoring**
- 9.1 The HEPAO will monitor the work and should be kept regularly informed of progress.
- 9.2 Notification of the start of work shall be given preferably in writing to the HEPAO at least one week in advance of its commencement.
- 9.3 Any variations to the WSI shall be agreed with the HEPAO, preferably in writing, prior to them being carried out.

## **13 Appendix 2: Written Scheme of Investigation**

Client: Business Location Services Ltd

Client contact: Russell Dodge

Client tel: 01872 222 777

Client email: infor@bls.co.uk

### **Site history**

Hallenbeagle was a former copper mine near Scorrier in the parish of Kenwyn which also produced small amounts of tin and arsenic. Its heyday was during the late 18<sup>th</sup> century and early 19<sup>th</sup> century, when it was one of a group of important mines near Scorrier whose output of copper from relatively shallow levels was prodigious. The mine was re-worked, though much less successfully, during the mid 19<sup>th</sup> century when it employed about 200 people; from 1835-46 the mine produced 30,850 tons of ore. It continued to work during the later 19<sup>th</sup> century, at times as part of Boscawen Mine and in the later part of the mid-19<sup>th</sup> century as part of Great Wheal Busy. Its sett was bounded by those of Wheal Rose, Wheal Chance and Boscawen Mine and like these, it was drained via the Great County Adit, which at Hallenbeagle was only 24m below surface.

The mine was shown as active in 1840 on the Kenwyn Tithe Map, when an engine house was depicted on Engine Shaft in the northern part of the development area. This may originally have housed a very unusual inverted engine designed and installed by James Watt in 1795, though it is noted that Watt was building a further engine for Hallenbeagle in 1797. A 70" cylinder pumping engine at Hallenbeagle was for sale in 1848. The mine worked four lodes: North Lode, worked from King's Shaft (now beneath the A30), Engine Shaft (in the northern part of the proposal area), Stone Shaft and Eastern Shaft (just to the north-east of the proposal area); Read's Lode was worked from Read's (Reade's or Reed's) Shaft where there are the remains of a pumping and winding engine house, as well as three un-named shafts and Jeffrey's Shaft (Read's Shaft being just to the south of the proposal area, two of the un-named shaft lying on its fringes; Jeffrey's Shaft and the other un-named shaft are just to its south-east). Other lodes worked were Oats Lode, worked from Oat's Shaft just to the south-east of the proposal area and South Lode, developed by a number of shafts to the south of the proposal area.

By the end of the 19<sup>th</sup> century the mine was depicted as abandoned, its landscape covered with spreads of mine waste and accompanied by a number of ruined engine houses. By 1907, the northern engine houses had been demolished and the north-eastern part of the site had been reclaimed to agriculture. A sawmill developed on the southern part of the site during the late 19<sup>th</sup> century remained active into the early years of the 20<sup>th</sup> century, the area of the former mine around Read's Shaft subsequently being modified to site a small-scale concrete plant.

By 2005 (CCC aerial photographic evidence) the central and north-eastern areas of the site had been reclaimed to agriculture and the southern parts of the site were in scrubby heathland and scrubby woodland. The north-eastern part of the wider mine site (Zone 4 on the site development proposals dated 01/10/2010) remained in agricultural use, whilst the north-western part of the site (the northern part of Zone 1 on the October 2010 plan) and the central eastern part of the site (Zone 5) were occupied by a number of static caravans and their curtilages; the northern part of Zone 1 was occupied by a number of smallholders' fields first shown on the 1809 OS mapping. The south-eastern part of the site (Zone 6) had scrubbed in, as had the southern corner of the site (Zone 3) and the area around Read's engine houses (Zone 2).

The engine house and a detached chimney (formerly associated with a now-demolished whim engine house) in the southern part of the Hallenbeagle site are listed Grade II. Hallenbeagle is bordered to the east and south by the Scorrier Mining World Heritage Site.

The mine is located immediately to the east of the Cornwall main railway line just to the north-east of Scorrier. It is centred at SW 72740 44727 at an average height of 75m OD. The underlying geology consists of the mid to late Devonian Porthtowan Formation, part of the Gramscatho Group of metamudstones and metasandstones.

### **Project Background**

This site is believed to benefit from existing planning permission MC04/0836/07/B. Planning condition 16 placed on this decision obliges the developer to appoint an archaeological contractor prior to the commencement of operations on site in order that they may be afforded access to the site during site works to undertake archaeological investigations according to an archaeological written scheme of investigation agreed in advance by the Local Planning Authority. A brief provided by Dan Ratcliffe, Cornwall Council Historic Environment Planning Advice Officer (2011) dated 07/04/2011 outlines the scope of assessment considered necessary in order to develop an appropriate scheme of recording.

This states a requirement for work as follows:

'An earlier assessment of the site has been undertaken by IHC consultants (Williams, undated) however this work does not accord to relevant professional standards for an archaeological desk based assessment (e.g. IfA 2002). Areas not covered by the original assessment which are vital for a proper and rounded understanding of its cultural heritage value include the pre-industrial land use, the identification of further shafts and mining remains not noted but clearly identifiable during a site walkover in 2011, the development of the agriculturally enclosed areas on the site and the post industrial transition of the site to settlement occupation first through the apparent engineering works reported to have taken place during WWII and the more recent settlement activity'.

'Ground works may disturb extant and buried archaeological remains. In order to understand the site and its potential for recording archaeological remains an assessment is required. This would involve a desk based assessment including a map regression plus a walk over survey of the extant remains of the site. This would provide evidence for any recommendations for archaeological recording'.

## **Project extent**

The project area consists of the eastern half of the Hallenbeagle redevelopment area, and is centred at SW 72471 44743.

## **Previous archaeological work**

An archaeological assessment of the area was undertaken by IHC consultants (Williams undated) as part of an Impact Assessment accompanying application for planning permission MCO4/0836/07/B. As noted above, it has been considered that this does not conform to recognised professional standards for this type of work. In May 2011 HE Projects produced an archaeological chapter for an EIA document to be submitted with a planning application for the establishment of a waste transfer station to be operated by Cory Environmental on the western part of the site.

## **Project aims and objectives**

As set out in the brief, the site specific aims are to:

- Draw together the historical and archaeological information about the site.
- Review and analyse historic map evidence for the site.
- Advise on whether historic/architectural features should be retained.
- 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 and develop a methodology for it
- Inform whether palaeo-environmental sampling would be required.
- Produce 'statements of significance' for all designated historic assets, that are identified as potentially impacted on by the current proposals. Where currently undesignated assets are identified their likely significance should be indicated i.e. 'national', 'regional' or 'local'.
- Make a photographic record of the site and significant features in their current condition.
- Produce a revised WSI for further archaeological recording during site clearance and preparation works.

## **Research questions**

To determine the history of landscape development for an area characterised by former heathland, smallholdings, early copper mining and subsequent occupation by the military during the run-up to D Day.

## **Working methods**

All recording work will be undertaken according to the Institute for Archaeologists *Standards and Guidance for Archaeological Investigation and Recording*. Staff will follow the IfA *Code of Conduct* and *Code of Approved Practice for the Regulation of Contractual Arrangements in Archaeology*. The Institute for Archaeologists is the professional body for archaeologists working in the UK.

### *Desk-based assessment*

A desk based review of available information will be carried out to inform the assessment. This will comprise:

- Published sources
- Historic maps, including
  - Joel Gascoyne's map of Cornwall (1699)
  - Thomas Martyn's map of Cornwall (1748),
  - OS 1 inch survey (c1810)
  - Kenwyn Tithe map (c1840),
  - 1<sup>st</sup> and 2<sup>nd</sup> Editions of the OS 25 inch maps (c1880 and c1907)

- Modern maps
- Archive mine plans in the Cornwall Record Office
- Databases recording geology, soil types, Historic Landscape Character, Designations, Rights of Way

#### *Fieldwork*

- A walkover survey will be undertaken to check and record features indicated on historic maps and plans, and to record any previously identified elements of the site on a base map drawn up during the desk based assessment. Newly-discovered features will be located using a hand held GPS unit.
- Key views in and out of the site will be noted and photographs of views and site detail recorded using a high resolution digital camera and, where appropriate, archive B&W photography.

#### *Post-fieldwork tasks*

An ordered and integrated site archive will be prepared in accordance with: *Management of Research Projects in the Historic Environment (MoRPHE) English Heritage 2006* upon completion of the project. The requirements for archive storage shall be agreed with either the Royal Cornwall Museum or Cornwall Record Office (as appropriate). Where there is only a documentary archive this will be deposited with the Cornwall Record Office as well as the Courtenay Library of the Royal Institution of Cornwall.

A summary of the contents of the archive shall be supplied to the HEPAO.

The brief states that only on completion of the above (inclusive) will there be a recommendation for the discharge of any archaeological recording condition.

The archiving will comprise the following:

3. All correspondence relating to the project, the WSI, a single paper copy of the report together with an electronic copy on CD, stored in an archive standard (acid-free) documentation box
4. The project archive will be deposited initially at ReStore, and in due course (when space permits) at Cornwall Record Office.

#### *Report*

This will contain:

- A concise non-technical summary of the project results.
- Introduction/background/terms of reference
- The aims and methods adopted in the course of the investigation.
- A discussion of the archaeological findings in terms of both the site specific aims and the desk based research.
- A short statement of archaeological significance, in terms of importance, rarity, local character, educational and academic value.
- A statement of requirements for further work (including the proposed watching brief).
- A location map, a drawing showing those areas examined as part of the archaeological recording, and copies of historic maps and plans consulted and any archaeological plans and sections. All plans shall be tied to the national grid.
- All specialist reports and assessments.
- A summary of the archive contents and date of deposition.

- A full and properly referenced bibliography.
- Project archive
- A copy of the brief and the approved WSI will be included as an appendix.

### **Product**

The study will result in the following outputs:

1. Annotated plan of the site.
2. Survey field notes and descriptions
3. Archive quality black and white photographic negatives and 7x5" prints (archived according to the Historic Environment's guidelines)
4. Digital photographs (archived according to the Historic Environment's guidelines) and supplied to the client on CD.
5. An indexed collection of historic documentary materials and references
6. An entry in the English Heritage/ads online access to the index of archaeological investigations (OASIS).
7. A written report (as above).
8. A WSI for the proposed watching brief.

A digital copy of the report, illustrations and any other files will be held in the Cornwall HER, and will be supplied to the client on CD or other suitable media.

Copies of the report will also be distributed to local archives and national archaeological record centres, and will be made available for public consultation.

### **Copyright**

Copyright of all material gathered as a result of the project will be reserved to Historic Environment, Cornwall Council. Existing copyrights of external sources will be acknowledged where required. Use of the material will be granted to the client.

### **Freedom of Information Act**

As Cornwall Council is a public authority it is subject to the terms of the Freedom of Information Act 2000, which came into effect from 1st January 2005.

HE will ensure that all information arising from the project shall be held in strict confidence to the extent permitted under the Act. However, the Act permits information to be released under a public right of access (a "Request"). If such a Request is received HE may need to disclose any information it holds, unless it is excluded from disclosure under the Act.

### **Timetable**

The study is anticipated to be commenced during April. HES will require adequate notice before commencement of work, in order to allow allocate field staff time and arrange other logistics.

### **Monitoring**

The HEPAO will monitor the work and should be kept regularly informed of progress.

Notification of the start of work shall be given preferably in writing to the HEPAO at least one week in advance of its commencement.

Any variations to the WSI shall be agreed with the HEPAO, preferably in writing, prior to them being carried out.

## Historic Environment, Cornwall Council

Historic Environment Projects is the contracting arm of Historic Environment of Cornwall Council (HE). HE employs some 20 project staff with a broad range of expertise, undertaking around 80 projects each year.

HE is committed to conserving and enhancing the distinctiveness of the historic environment and heritage of Cornwall and the Isles of Scilly by providing clients with a number of services including:

- Conservation works to sites and monuments
- Conservation surveys and management plans
- Historic landscape characterisation
- Town surveys for conservation and regeneration
- Historic building surveys and analysis
- Maritime and coastal zone assessments
- Air photo mapping
- Excavations and watching briefs
- Assessments and evaluations
- Post-excavation analysis and publication
- Outreach: exhibitions, publication, presentations

### Project staff

The project will be carried out by HE field staff and will be managed by a nominated Senior Archaeologist who will:

- Discuss and agree the detailed objectives and programme of each stage of the project with the field officers, including arrangements for health and safety.
- Monitor progress and results for each stage.
- Edit the project report.

### Contract

HE Projects is part of Historic Environment, Cornwall Council. If accepted, the contract for this work will be between the client and Cornwall Council.

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

### Standards

HE follows the Institute for Archaeologists' Standards and Code of Conduct.

As part of Cornwall Council, HE has certification in BS9001 (Quality Management), BS14001 (Environmental Management), OHSAS18001 (Health, Safety and Welfare), Investors in People and Charter Mark.

### Health and safety statement

HE follows the Council's *Statement of Safety Policy*. For more specific policy and guidelines HE uses the manual *Health and Safety in Field Archaeology* (2002) endorsed by the Standing Conference of Archaeological Unit Managers.

Prior to carrying out on-site work HE will carry out a Risk Assessment.

### Insurance

As part of Cornwall Council, HE is covered by Public and Employers Liability Insurance.



Fig 3. The Hallenbeagle site superimposed onto the 1809 OS 1" to a mile mapping, which depicts a landscape of mines, smallhold

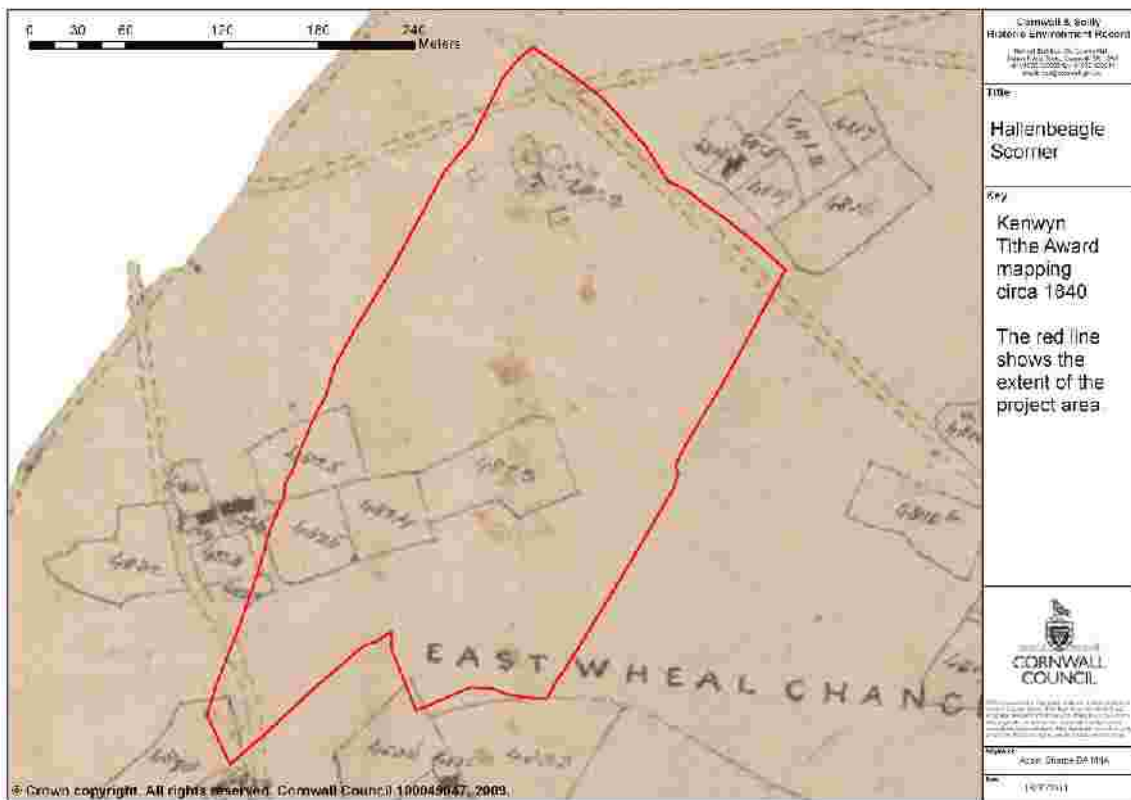


Fig 4. The Hallenbeagle site boundary superimposed onto the 1840 Tithes Map, which shows the block of smallholdings in the southern part of the site and the mine buildings to the north.





Fig 5. A sett plan in the Cornwall Records Office (CRO). Based on the Kenwyn Tithe Map, this shows the mine buildings at the northern end of the site.

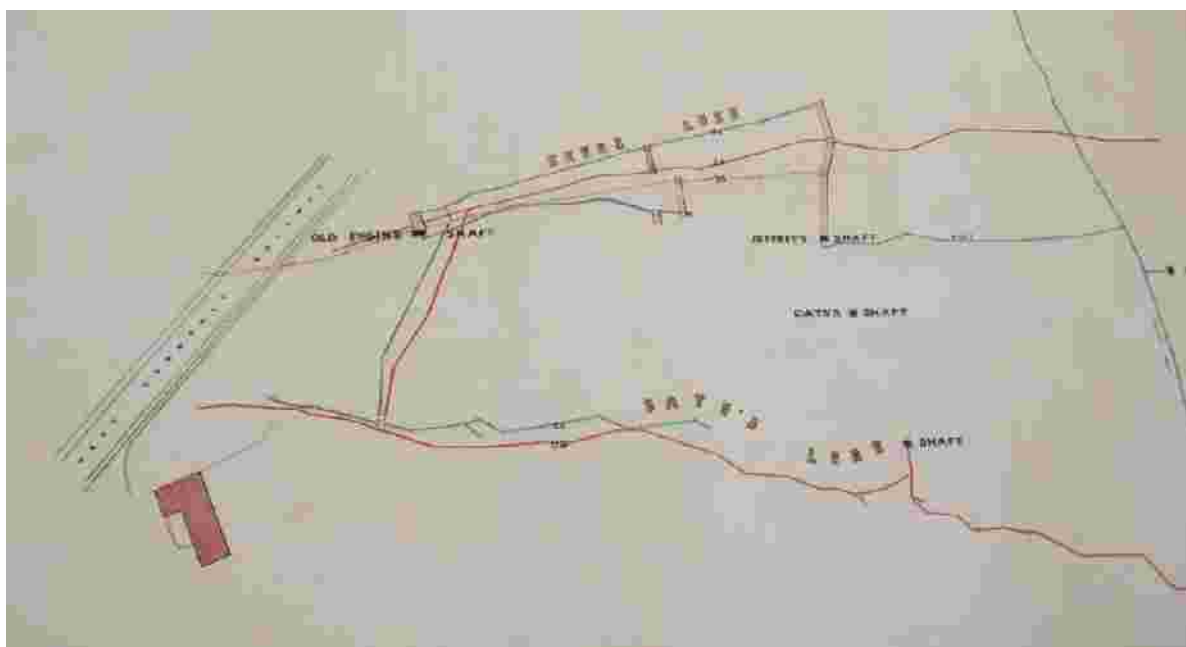


Fig 6. Part of a mine plan in the CRO dating to circa showing workings on Reed's and Oat's Lodes. Reade's Shaft is shown as 'Old Engine Shaft'. The only structure depicted is the L-shaped building in the southern part of the site [41].

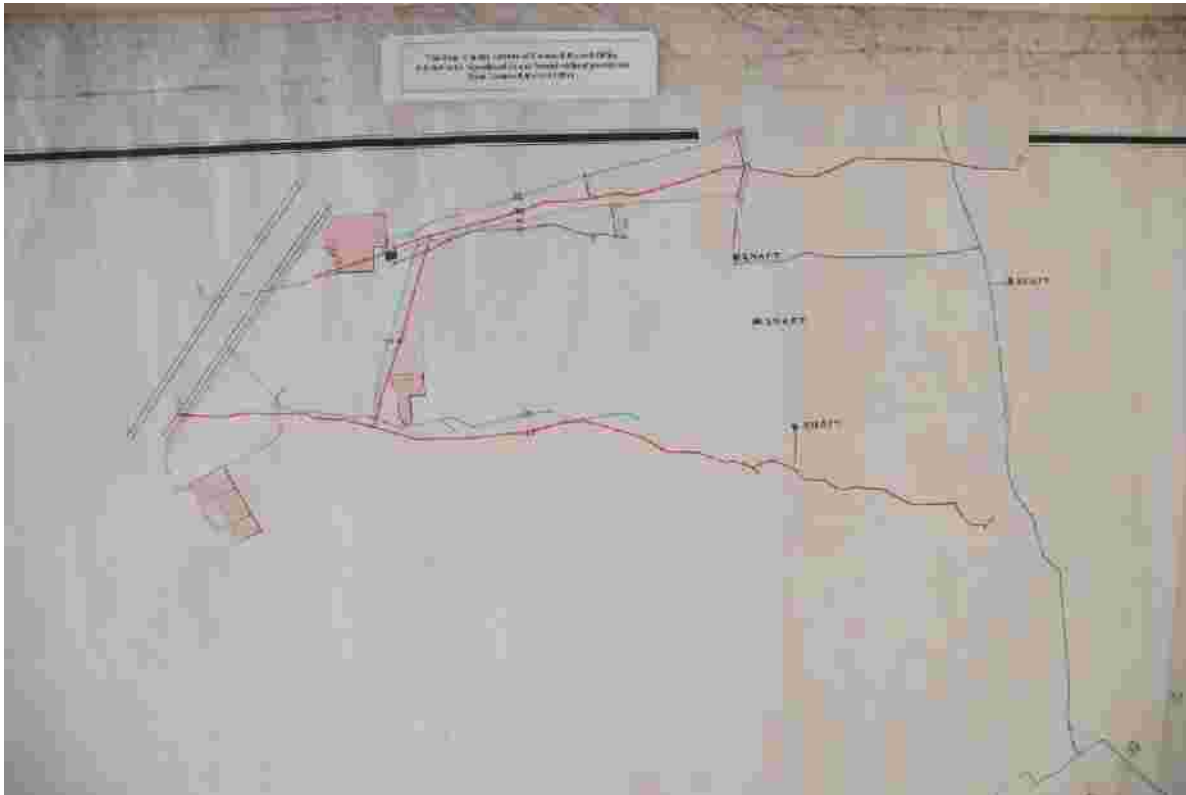


Fig 7. Another circa 1859 plan in the CRO, this additionally showing a pumping engine house and boiler house to the west of Reade's Shaft and a whim engine house and boiler house to its south.

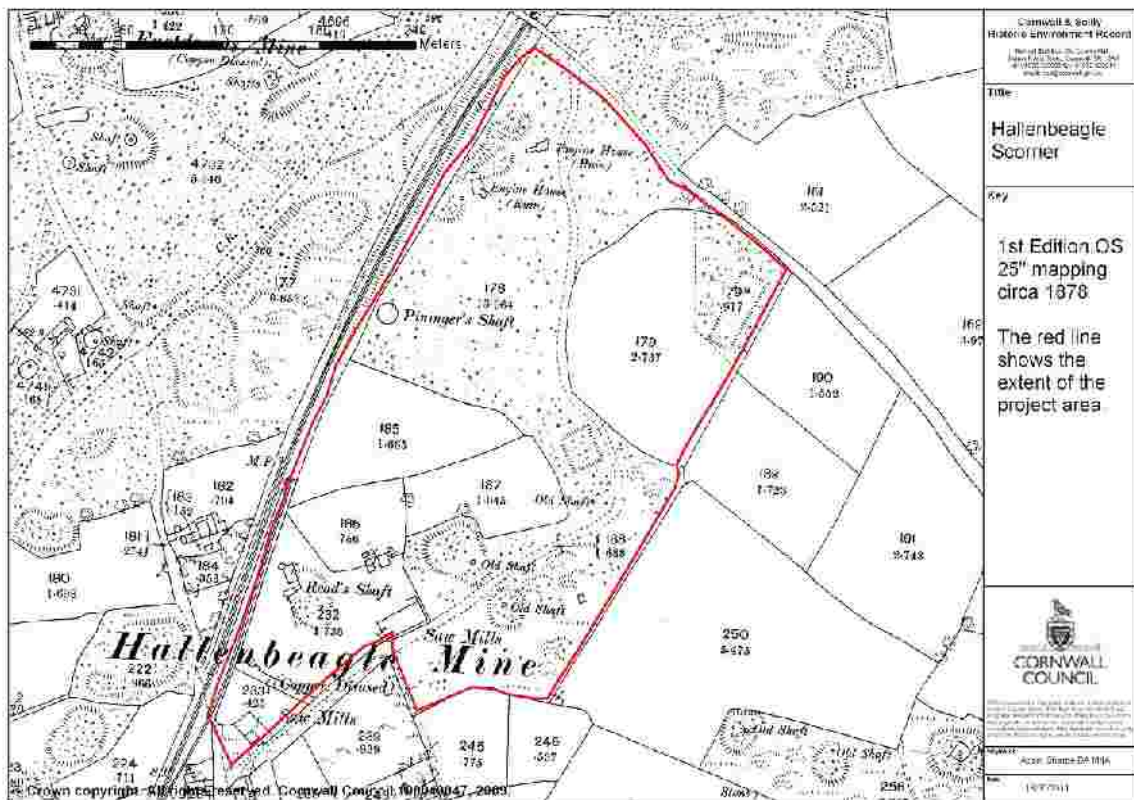


Fig 8. An extract from the circa 1877 OS 1st Edition 25 inch mapping. Pumping and whim engine houses are shown in the northern part of the site, together with a large reservoir. A smaller reservoir is in the central part of the site, whilst to the south are further pumping and winding engine houses and buildings associated with the saw mills.







Fig 11. A detail from the 1946 RAF photograph, showing the complex of buildings in the southern part of the site Reade's Shaft.



Fig 12. The Hallenbeagle site in 2005 as shown on the aerial photographs. By this date the travellers' site had been established whilst the sawmill and concrete plant buildings had substantially been demolished and the site had scrubbed in.

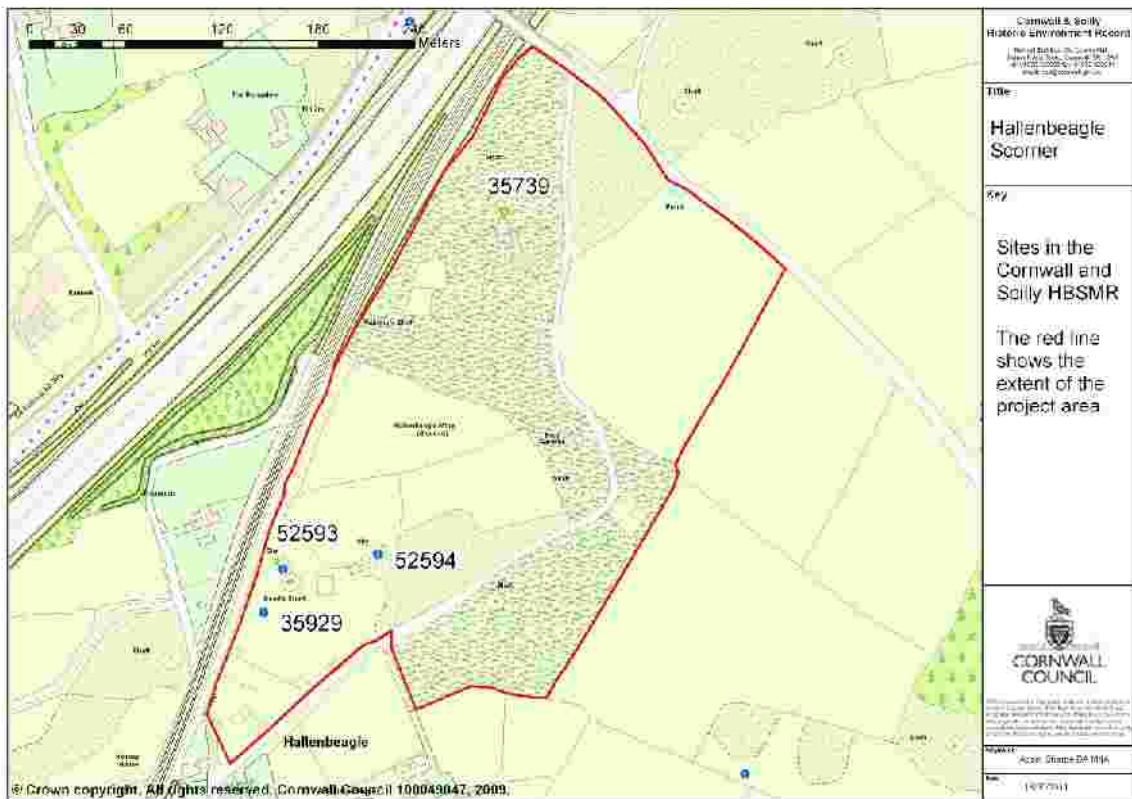


Fig 13. Sites at Hallenbeagle recorded in the Cornwall and Scilly HBSMR. MCO35929 – Hallenbeagle Mine; MCO52593- Reade’s pumping engine house; MCO52594 – Reade’s whim; MCO35739 – US Army camp.



Fig 14. HLC mapping for Hallenbeagle. Black = Communications, Green = Recently Enclosed Land (post-medieval), yellow = Upland Rough Ground.



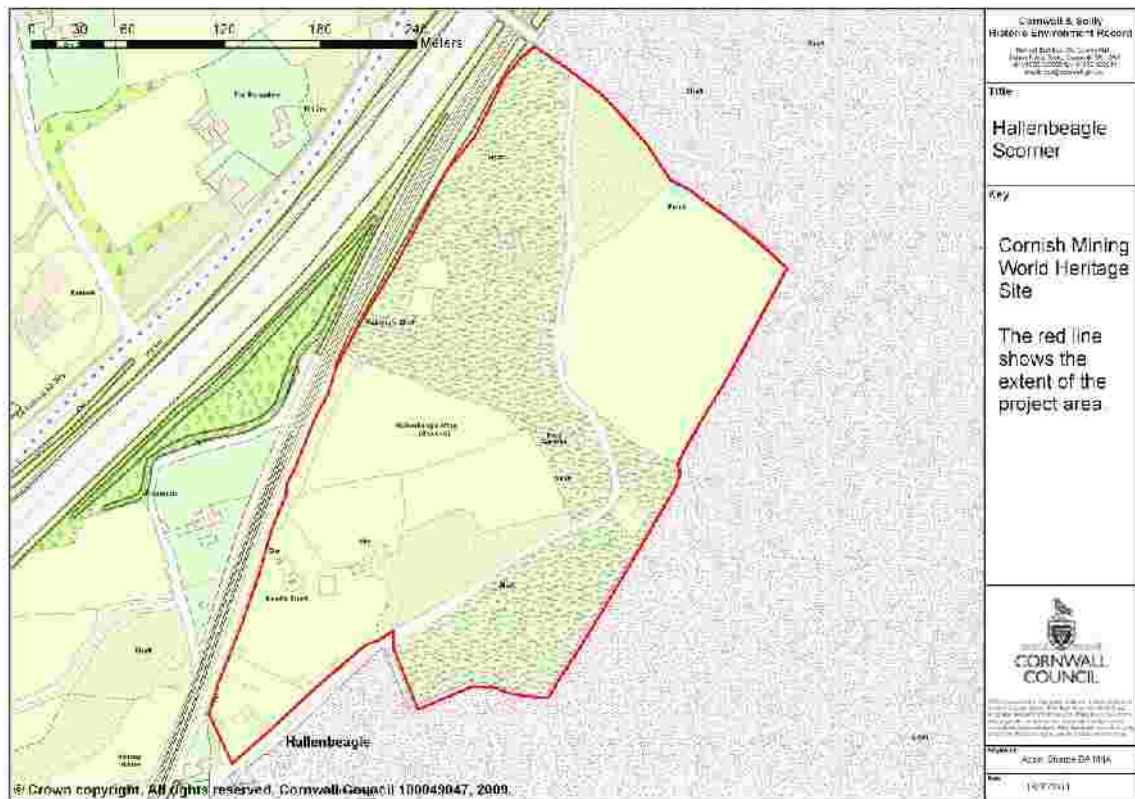


Fig 15. The Hallenbeagle project area in relation to the Cornish Mining World Heritage Site boundary to the north, east and west.

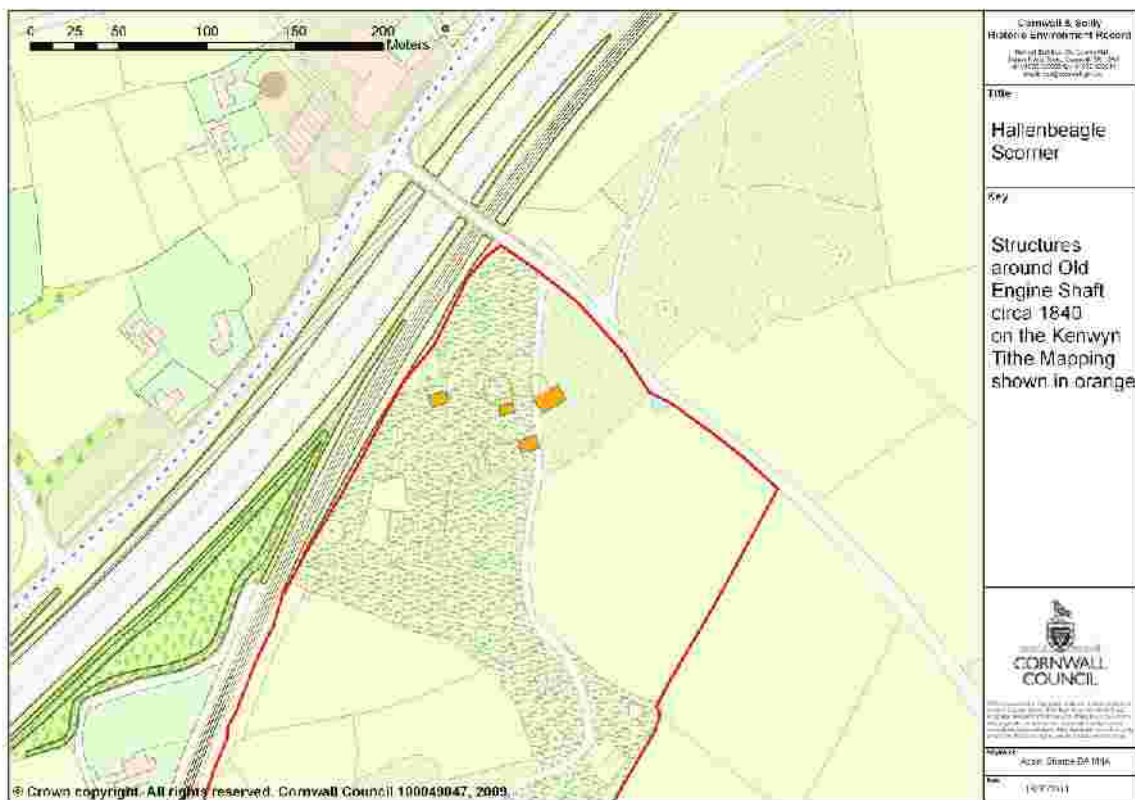


Fig 16. The locations of the mine buildings shown on the 1840 Kenwyn TA map projected onto the modern OS MasterMap base.

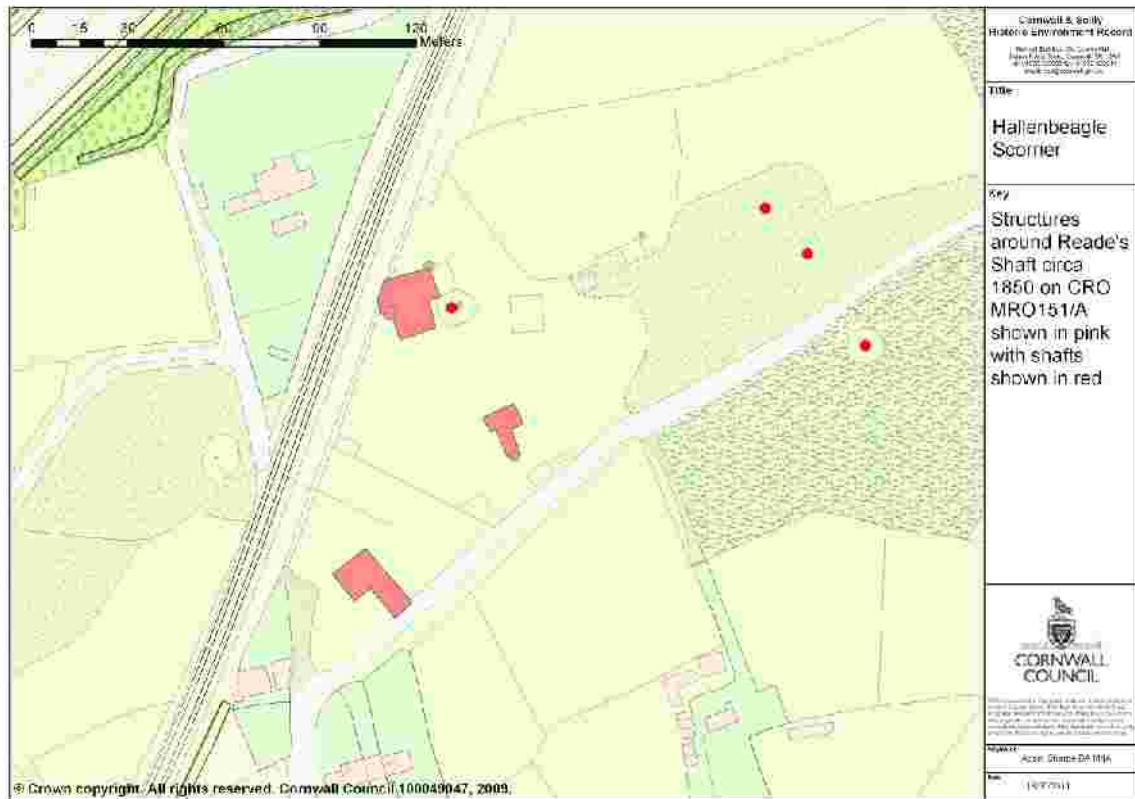


Fig 17. Mine buildings shown on 1859 plans in the CRO ojected onto the modern OS MasterMap base.

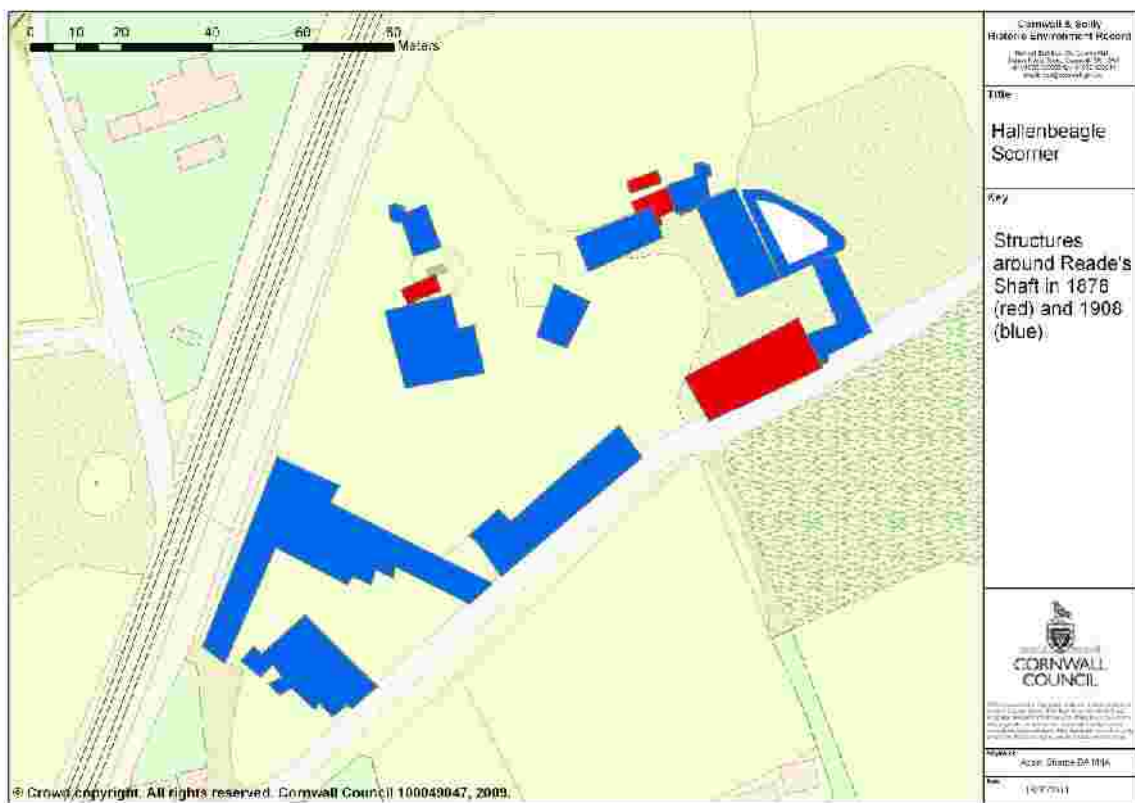


Fig 18. The locations of documented structures around Reade's Shaft on OS 25" mapping dating to 1878 and 1908 projected onto the modern OS MasterMap base.



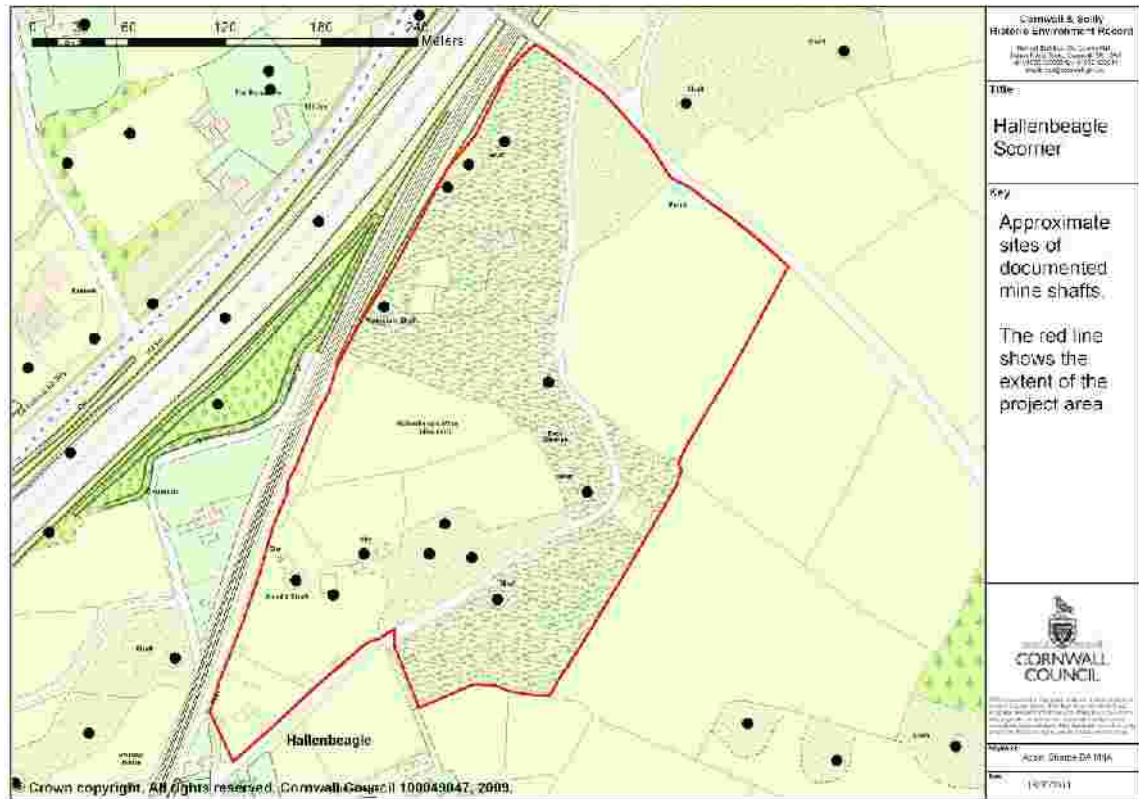


Fig 19. Documented mine shafts within and adjacent to the Hallenbeagle project area.



Fig 20. A view of the Hallenbeagle site from the north-east, looking across the northern part of the travellers' site towards the engine houses at Reade's Shaft.





*Fig 21. A view looking southwards across the central part of the travellers' site and the engine houses at Reade's Shaft towards the woods around Scorrier House.*



*Fig 22. The central part of the travellers' site. Note the stand of Japanese knotweed in the mid distance.*



*Fig 23. Looking west towards the Engine Shaft spoil dump. The pumping engines [3/4] serving this shaft were sited adjacent to the tree to the left.*



*Fig 24. The Clwyd Cap on Whim Engine Shaft [5] on the top of the spoil dump on the western part of the site at its northern end.*





*Fig 25. Large pieces of copper slag exposed on the ground surface in the northern part of the site (lens cap for scale).*



*Fig 26. The western boundary of the site, formed by the main line railway cutting, beyond which is the A30 trunk road.*





*Fig 27. The 18<sup>th</sup> century smallholders' fields [14] which occupy the central part of the Hallenbeagle site.*



*Fig 28. The tarpaulin-covered Clwyd Cap covering Piningers Shaft [10] set within a hollow at the centre of its spoil dump.*



*Fig 29. Looking towards the buildings at Reade's Shaft from the edge of the spoil dump associated with Jeffrey's [18] and Oat's [19] Shafts.*



*Fig 30. An abandoned concrete wagon mixer butt partly-buried within material dumped onto the southern edge of the Jeffrey's and Oat's Shaft spoil tips.*





*Fig 31. The remains of the spoil dump partly surrounding a shaft [21] in the south-eastern part of the site.*



*Fig 32. Looking north towards the travellers' site from the spoil dump associated with Jeffrey's and Oat's Shaft. The site of Jeffrey's Shaft [18] lies under the level ground at the centre of this view.*



*Fig 34. Reade's whim engine house seen from the north. Its boiler house was sited in [16] the field to the right of the remains of the building*



*Fig 33. The Cotoneaster-covered Clwyd Cap on Oat's Shaf. [19].*





*Fig 35. Reade's whim engine house [16] seen from the east. The forward part of this Listed Building, together with its boiler house and loadings have been demolished. A shallow trench runs across the nearby field to this building.*



*Fig 36. Two of the abandoned concrete plant buildings [30/31] to the south of Reade's Shaft.*





*Fig 37. The concrete plant vehicle maintenance building [28] adjacent to Reade's Shaft.*



*Fig 38. The masonry and concrete tank [38] in the south-eastern part of the site, almost certainly constructed as part of the sawmill complex.*



Fig 40. The rubbish-filled hollow marking the site of Reade's or Old Engine Shaft [34].



Fig 39. Reade's pumping engine house [33] as seen from the south-west.

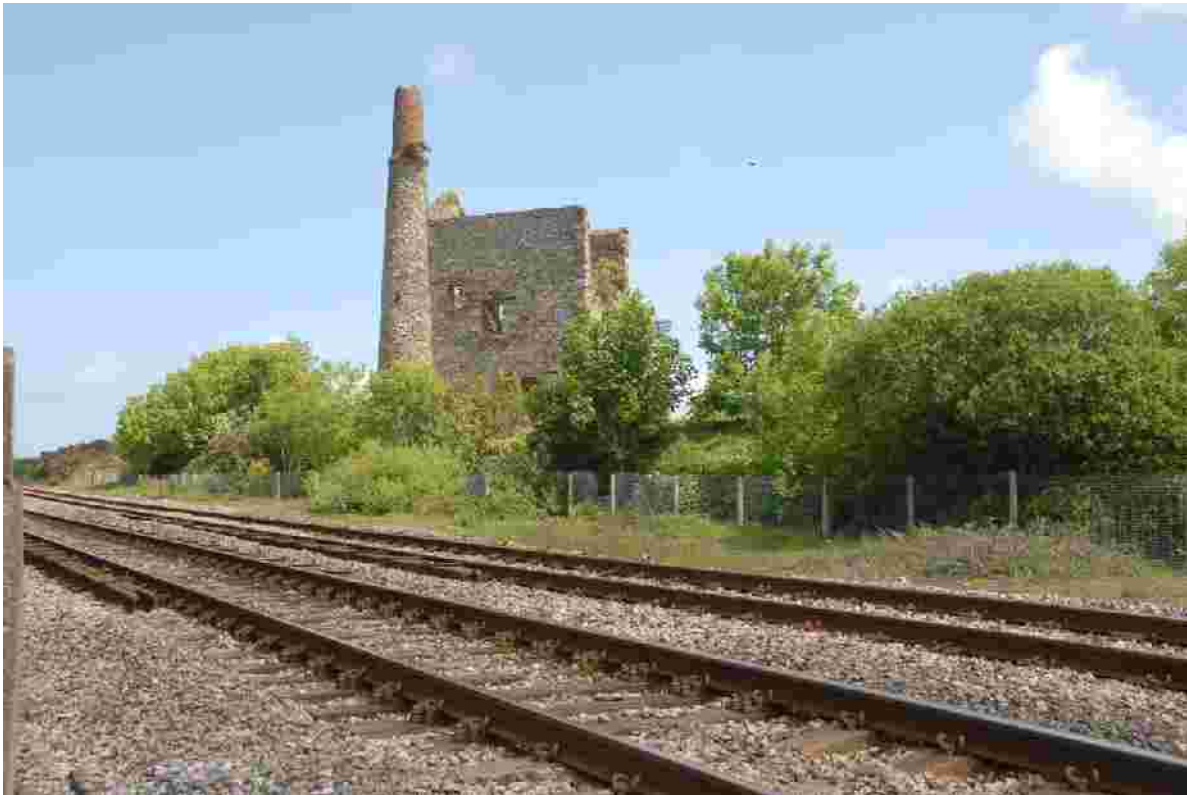




*Fig 41. The decay of timber lintels on the south-western elevation of Reade's pumping engine house has resulted in the loss of masonry in the walling above.*



*Fig 42. Failure cracking in the rear elevation of Read pumping engine house needs to be addressed soon if major parts of this wall are not to collapse.*



*Fig 43. The classic view of Reade's pumping engine house, as seen across the main line railway from the occupation crossing.*



*Fig 44. The sites of at least two buildings [32/36a] adjacent to Reade's Shaft, the most recently demolished of which is marked by lines of cut-off RSJs protruding from the ground surface.*





*Fig 45. The eastern boundary wall of the former sawmill, constructed from a mixture of masonry and brickwork. This area next to an adjacent land is particularly prone to fly tipping.*



*Fig 46. A view of the southern side of the western end of the elongated sawmill building [40]. Only foundations now remain of this building.*





*Fig 47. A substantial masonry plinth at the western end of the central sawmill building [40]. A large threaded metal fixing protrudes from the ground adjacent to this.*



*Fig 48. All that remains of the L-shaped mid-19<sup>th</sup> century mine building [41] at the southern end of the Hallenbeagle site.*



Fig 49. Inventory key map for sites in the northern part of the Hallenbeagle site.

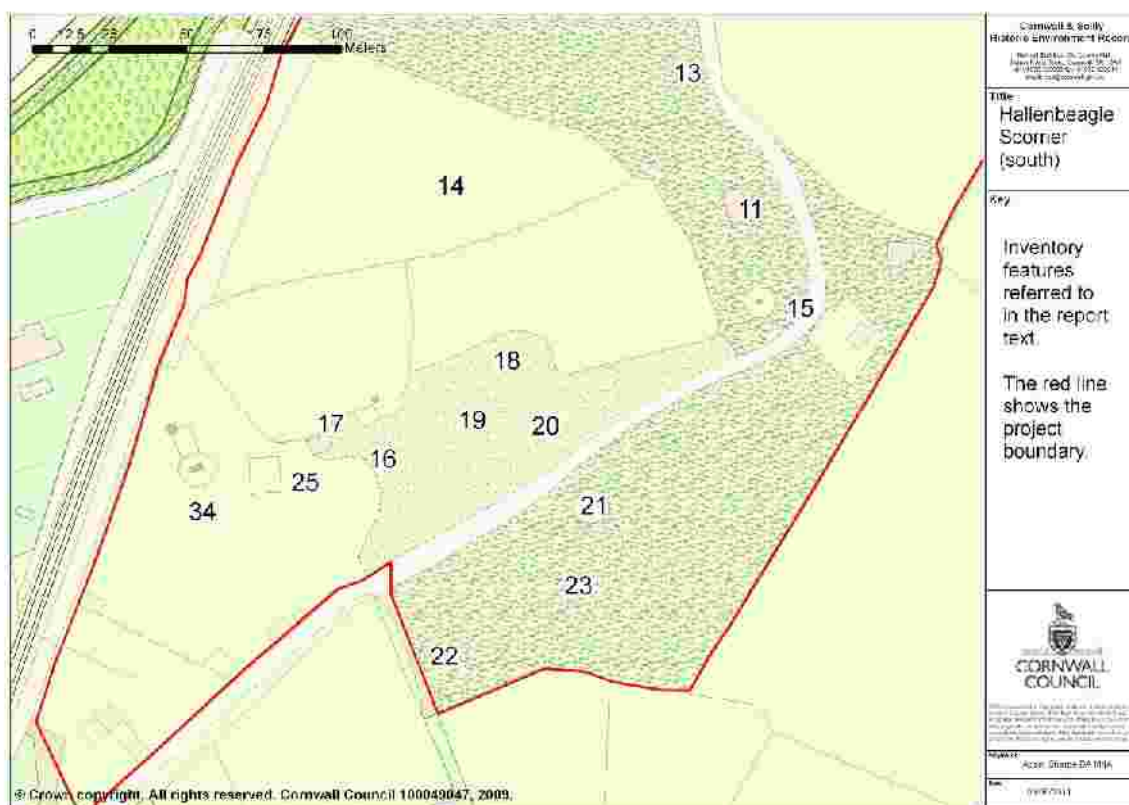


Fig 50. Inventory key map for shafts and other feature in the southern part of the Hallenbeagle site.



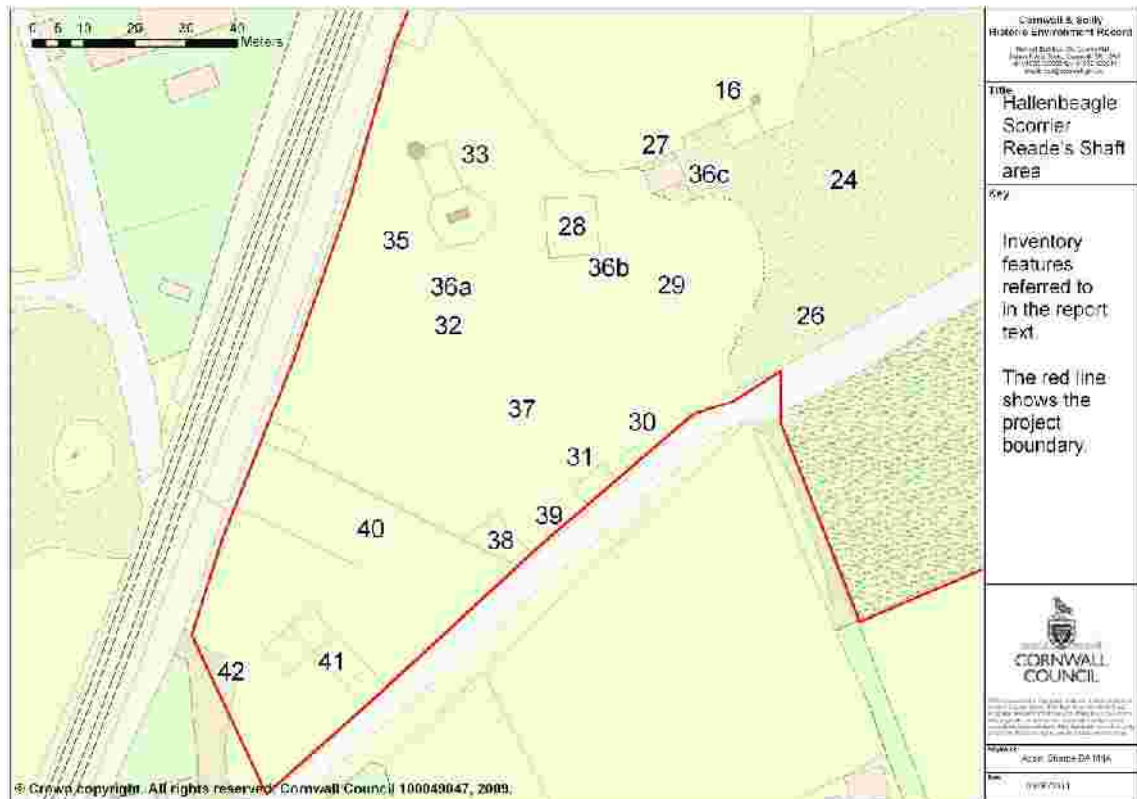


Fig 51. Inventory key map for structures around Reade's Shaft in the southern part of the Hallenbeagle site.

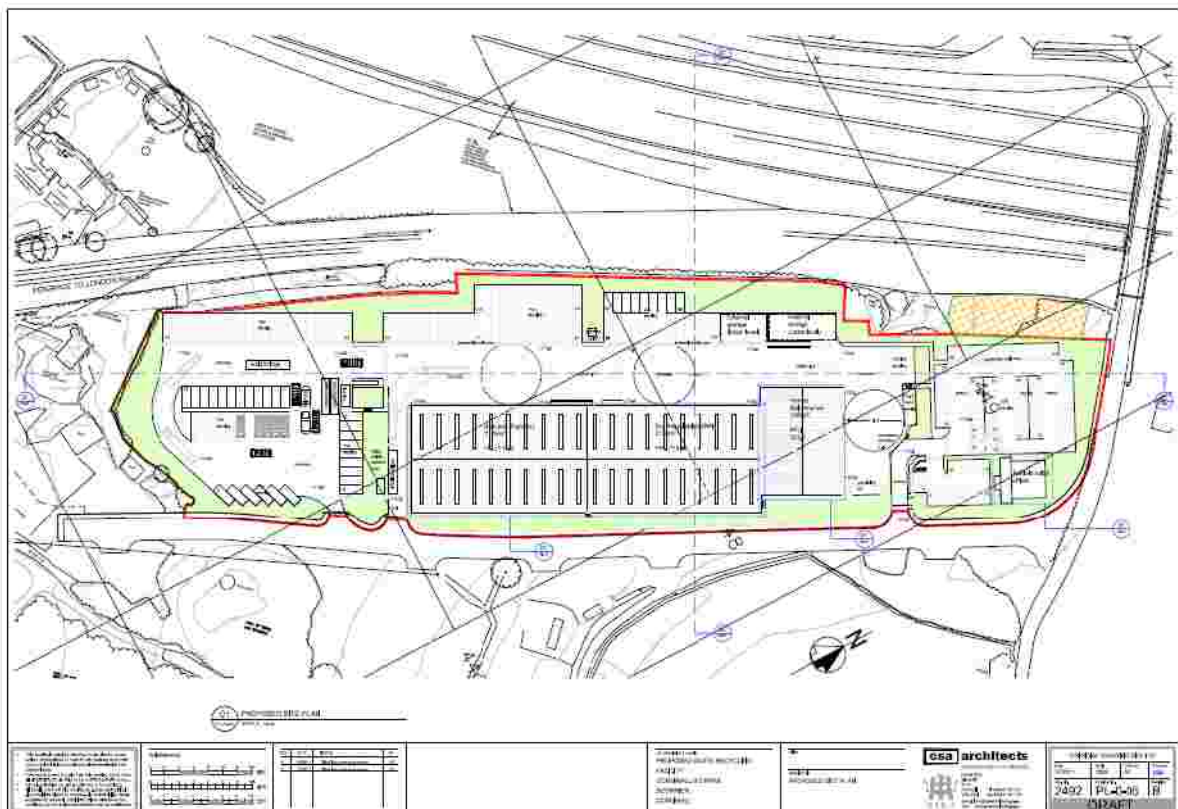


Fig 52. The site layout for the Cory Environmental waste transfer station proposed for the north-western part of the Hallenbeagle site.