

Herland Farm, Gwinear, Cornwall

Archaeological Assessment



Historic Environment Projects

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Archaeological Assessment

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Within Historic Environment, the Project Manager was Adam Sharpe.

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

Freedom of Information Act

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Cover illustration

Looking north-east across the development area

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Abbreviations

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

1 Summary

HE Projects was commissioned by Ireland Brothers Builders & Haulage Contractors to undertake an archaeological assessment of an area of land at Herland Farm to the west of the village of Gwinear and east of Hayle, Cornwall. The development area, (centred at NGR SW 59236 36908), although lying outside the Cornish Mining World Heritage Site, has been recorded on the Cornwall and Scilly Historic Environment Record (HER) as being part of the former Herland Mine in an area of very ancient mining.

Twenty sites have been identified by this assessment although some of these lie outside the study area. The extant site layout includes the partial remains of spoil heaps derived from mining activity which began at least as early as the beginning of the 18th century, although most of these have now been levelled. The southern boundary marks the enclosures first recorded on the Tithe Map of *circa* 1840, whilst the north-eastern edge of the site contains the significant remains of a WWII anti-aircraft battery and personnel base. Two shafts (one of which is open) and their associated waste dumps are visible at surface within the development area.

2 Introduction

2.1 Project background

Planning application 09-0680 was submitted on the 16th June 2009 and was for land reclamation to return an area of derelict mining land to agricultural use through topsoiling. This application has been approved subject to 16 conditions. Condition 14 states:

No development shall take place within the site until the applicant has secured and implemented a programme of archaeological work in accordance with a written scheme of investigation to be submitted by the applicant and approved in writing by the Local planning Authority in consultation with the County Archaeologist.

Reason: In the interests of the archaeological value of the site

A brief for an archaeological assessment of the site prior to works was prepared by Philip Markham (Historic Environment Planning Advice Officer), Cornwall Council, Historic Environment, Kennall Building, Old County Hall, Truro TR1 3AY (Tel. 01872 322546 E-mail. pmarkham@cornwall.gov.uk) in response to this condition and a written scheme of investigation (WSI) prepared by HE Projects (Sharpe 2009).

This report presents the results of the archaeological assessment.

2.2 Aims

The aim of the study was to understand the site and its potential for recording archaeological remains prior to re-development taking place.

The site-specific aims were:

- To determine the likely impact of the applicant's proposals on the application site
- To draw together the historical and archaeological information about the site
- To inform whether archaeological recording of any extant remains is required
- To inform whether an archaeological evaluation or further archaeological recording of any potential buried remains is required
- To inform whether palaeo-environmental or mine waste sampling would be required.

2.2.1 Research questions

The application site formed part of the Hayle Mining District, an important early copper mining area whose history and landscape remains have, to date, been little investigated. The proposed assessment provided an opportunity to sample the extent and quality of the mining remains in this area, and in particular to determine whether evidence survived for some of the pioneering beam engine installations recorded on this mine.

2.3 Methods

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

- Tithe Map and relevant apportionments for the parish of Gwinear (*circa* 1840)
- 1st and 2nd Editions of the Ordnance Survey 1:2500 mapping (*circa* 1878 and 1907 respectively)
- Plans and documents held in the County Record Office including the Lanhydrock Atlas (1695)
- Aerial photographs in Cornwall Council collections.
- Published histories

2.3.2 Fieldwork

A base map (using modern Ordnance Survey digital mapping) drawing together documented sites and features was drawn up for use during the fieldwork on which all surviving features were plotted (forming the basis of Fig 6). A walk over survey was undertaken to determine the survival or otherwise of documented and mapped features within the project area. Previously un-mapped features were recorded and described using the prepared base map, field notes and high resolution digital photography. Where the potential for significant buried archaeology could be inferred, or suspected, it was also noted, as was the potential for any requirement for subsequent recording work.

2.4 Previous archaeological work

No records of a previous field assessment of this area were located. Details of mining activity suggested by aerial photographs of the area dating from 1946 have been plotted by the National Mapping Programme team; the photograph shows extensive areas of scrub and spoil heaps covering the development area, in addition to the WWII anti-aircraft battery and personnel base (Fig 5).

3 Background

3.1 Location and setting

The site is centred at SW 59236 36908, 500m to the west of the settlement of Gwinear and approximately 3km to the east of Hayle (Fig 1). The site is located on the upper reaches of a west facing slope at an approximate height of 80m. Bedrock is recorded as being Mylor Slate Formation underlying Manod soils (loam over slate). The site, formerly mining land, is currently cleared scrub and rough ground and is surrounded by open fields to the north and south, and derelict mine land to the west, southwest and north-east. The site is defined as Upland Rough Ground by the HLC (Cornwall County Council 1996).

The proposed development covers an area of approximately 2.3 hectares.

3.2 Historical Background

3.2.1 Archaeological sites in the vicinity

The Cornwall and Scilly Historic Environment Record (HER) records a number of sites in the area. Two late prehistoric enclosures ('rounds') are recorded to the south with PRNs 31846 and 53621. To the north is the medieval church dedicated to St Winerus (PRN 31876) and to the south the medieval manor of Drannock, first recorded as '*Dranec*' in 1179 (PRN 31764). Post-medieval sites include Drannock Mill (PRN 31927) and Smithy (PRN 40380) to the south-west. The Herland group of mines is listed as PRN 40371, with Prince George mine to the south-west as PRN 163569. The personnel camp bordering the north-eastern extents of the development area is recorded as PRN 166467 and the anti-aircraft battery as PRN 53620.

3.2.2 Pre-industrial landscape context

The Lanhydrock Atlas of 1695 shows land covering the study area within Drinnick Veor, part of the manor of Drinnick. The map shows a landscape enclosed by small fields, the majority being arable with those at the western extents of the study area being used as rough grazing, tenements 36 marked as 'Croft' and 61 as 'High Croft'. The Tithe Map of 1840 for Gwinear shows that the study area was rough ground and mine workings at this time, described as 'waste at Herland Mine' on the tithe apportionment. Around the old mine land the pattern of enclosed fields remained largely unchanged under either arable or pasture use.

3.2.3 Mining history summary

Adapted from the Cornwall and Scilly Historic Environment Record (HER):

The development area has been recorded on the Cornwall and Scilly HER as being part of the former Herland Mine. The HER records the following: *Herland Mine was in operation from 1746 to 1807, producing silver. It resumed work in 1816 until 1843 for copper and later worked with Rosewarne.* The HER also records the following: *Mining in this area is doubtless very ancient, documentary references dating back to the very early eighteenth century. The Herland group of mines, known locally as Manor Mine (after the manor of Drannack) comprised a number of small concerns including Wheal Drannack, Wheal Royal at SW 597 370, Wheal Fancy and Pleasure at SW 589 370, and Wheal Prince George at SW 593 369.*

Documented mining began in this area in 1717 when the Coster family worked part of Herland Mine "*and did very well therein*" (Jenkin 1961, 16). When work continues in 1726 by a group including Henry, Earl of Radnor of Lanhydrock, there is a reference which suggests antiquity at the mine; the party are recorded driving an adit "*until they come to an old copper work called five acres at Herland*" (*ibid*, 17). The mine had seen considerable expansion by the 1750s when a 70 inch Newcomen engine was installed, reaching a depth of 120 fathoms from the surface. In 1756 Old Herland raised £7352 worth of ore and in 1760, 275 tons of ore from "Herland and Drannack" was sold for £2023. Following an idle period the mine was working again with North Herland, producing 80 tons of copper per month. At this time the water was being pumped solely by horse-whims, the adventurers not wanting to invest the £2000 - £3000 required to install an engine and increase productivity. Ultimately in 1761 this did happen, with a merger of Wheal Pleasure and Wheal Fancy to the North Herland Sett resulting in the erection of an engine to drain all three mines but not including Old Herland Mine working a lode on the south-east. A larger amalgamation to include Old Herland Mine took place in the same year with the erection of a 63" beam engine erected on Old Herland Mine and by the following year the mine was producing ore.

With the mine always prone to flooding and pressures put on shareholders due to escalating pumping costs a 60" Bull engine was erected at Wheal Fancy and throughout the early 1790s the fortunes of the mines improved. A side-cylinder of 40" was added to the Old Herland engine to allow the mine to be worked 40 fathoms deeper and by 1794 Old Herland was producing up to 677 tons of ore in two months (Jenkin 1961, 18).

Problems were encountered in the aftermath of the erection of the Bull engine as this was deemed to infringe the Boulton and Watt patent. By 1796 the Herland group was reported to have been employing around 700 men, women and children and in 1798 a rich deposit of silver was found at 100 fathoms deep, specimens of which were procured by Charles Rashleigh, mineral collector (Fig 18). The mine was paying its monthly cost and a fourth pumping engine and a second small fire engine were being erected. At this time the mine had attained a depth of almost 150 fathoms.

However, the following year the fortunes of the mine had taken a turn for the worse and by 1801 the bottom levels of both Herland and Prince George had been struck idle and the

machinery was being sold off; all but one pumping engine was kept at work to hold the water back to the 60 fathoms level. Between 1800 and 1804 the combined ore sales from Herland and Prince George amounted to 9,139 tons realising a profit of £12,000. Work had largely ceased by 1802 although work at surface and in the shallow levels continued for another five years (Jenkin 1961, 26).

Work at the mine commenced again in 1814-15 with two large steam engines on order and new buildings erected at surface including a count house. One of these was the first plunger pole engine, designed by Trevithick and working on steam at between 60 and 120 lbs per square inch. Unfortunately the engine failed due to the exposure of the piston to the atmosphere accelerating corrosion and also the fact that it wasted steam due to the lack of a cylinder. In 1816 a dispute arose with the London Adventurers and the whole enterprise collapsed (*ibid*, 28).

By 1824 the mine had been reopened again and continued in production until 1843, although machinery including a 80" pumping engine and two 16" steam whims were put up for sale. Between 1816 and 1864 the total output of the Herland Mines was 18,517 tons of 11% copper ore which realised a profit of £159,074. The mine was later worked in conjunction with Rosewarne as Rosewarne United and produced over 14,000 tons of 9.5% copper ore and 172 tons of black tin, in addition to some blende and mispickel. In 1854 Rosewarne and Herland also produced 106 oz of silver (Dines 1956, 151-152). The concern closed in 1874 at the height of the tin slump following strike action by its workforce campaigning against a cut in wages designed to lower working costs to save the mine from closure. At this time a 60" engine and 5 horse whims were advertised for sale from Rosewarne United (Barton 1967, 163).

3.2.4 Anti-aircraft battery and personnel base

The remains of an anti-aircraft battery and personnel base have been recorded in detail by Alwyn Harvey as part of the Defence of Britain Project (Sites AH367 – AH371), providing much of the information below. The Gwinear anti-aircraft base was built at Herland Farm in 1942 to protect Hayle Harbour, docks, power station and the ‘Associated Ethyl’ factory producing an important ingredient for aviation fuel. The battery itself, located to the north-east of the development area, comprised five heavy guns (4.5 inch), at least three of which can be clearly seen on the 1946 aerial photograph (Fig 5). The landowner Mr Richard Rowe, recalls the five guns firing out to sea during enemy air raids.

In the field to the south was a camp for approximately eighty ‘mixed’ ATS (Auxiliary Territorial Service) personnel (centred on SW 5941 3698, Fig 5). It is believed that some of the relict structures (Sites 2-14; Fig 6) recorded on the boundary of the development area are associated with the camp, two named by Alwyn Harvey as the foundations for the Ablutions Block (Site 2) and Officer’s Mess (Site 3). Mr Rowe also recalls that a water-tower stood in this area. The eastern end of the camp was given over to a grenade throwing range – it is possible that part of this falls within the development area. ATS personnel also manned a mobile radar vehicle at the site, located in a field to the south of their camp. In the field to the north of the gun battery was a camp for male personnel (centred on SW 5925 3700, Fig 5). After the army had vacated the site the camps were occupied by Italian prisoners of war (Harvey 1998).

3.2.5 Historical Mapping

The earliest map source consulted was the Lanhydrock Atlas of 1695/96 which held land in the manor of Drannock (‘Drinnick’) (CRO reference FS/2/32/1/59), and whilst this shows seventeenth century agricultural use (see above) it records no evidence of early mining within the development area. The Tithe Map for the parish of Gwinear, circa 1840, shows activity in areas adjacent to the study area that is related to mining (Fig 2). This includes rectangular

structures and a circular feature, probably representing an engine house and associated building and a shaft, immediately to the west of the development area. A structure just beyond the north-eastern extents of the study area has the faint outline of a circular feature immediately to its south-east. This is likely to be the 'Old Shaft' recorded on the 1st edition Ordnance Survey map of 1880 (Fig 3). A spoil dump is also indicated immediately to the south-west of the study area. Three field boundaries dividing the study area are shown on the tithe map, but there is no evidence of these today. The 1880 Ordnance Survey shows the landscape had changed little with the exception of additional dumps just beyond the south-western extents (part of which survives as Site 19) and an elongated spoil dump surrounding the now open shaft (Site 18) in the southern part of the study area. Interestingly this is not labelled as a shaft on either the 1880 or 1907 Ordnance Survey maps. The 1907 (2nd edition Ordnance Survey) map (Fig 4) shows the further spread of spoil dumps across the area and the modification of the southern boundary (Site 14) around a spoil dump, extending the field to the south. Areas of spoil dumping are shown extending to the west of the choked shaft visible today (Site 20) indicating waste that may have derived from this shaft.

3.2.6 National Mapping Programme

A programme of the reappraisal of archive aerial photographs has resulted in a number of surface features being plotted onto the HER GIS mapping. These include the two known shafts within the study area in addition to a number of circular features, and the edges of what are likely to be extensive dumps spread across the area. None of these circular features or dumps are evident today. Many of the WWII structures recorded just beyond the north-eastern extents have also been plotted. A 2005 aerial photograph shows another probable shaft to the south-west of the site just beyond Site 19.

4 Results

4.1 Summary

With the exception of the spoil dumps surrounding shafts Site 18 and Site 20 the study area is now generally flat and largely featureless. It is assumed that scrub has been cleared and old spoil dumps have at some time been levelled and re-profiled across the site, resulting in the barren ground surface seen today which is clearly comprised largely of mine waste. *In situ* spoil dumps survive along and beyond the extents of the development area to the north-east and south-west.

4.2 Identified sites

NB: Sites 1 – 14 are outside the area of development but are included as they are either on the boundary or relate to structures (no longer extant) and activity taking place within the study area. All sites are clearly indicated on Fig 6.

4.2.1 Site 1 Mine dump SW 59298 37008

Spoil dumps up to 2.0m high exposed in section to the east of a track, revealing several layered deposits comprised of mine waste and including slaggy material (probably boiler waste) and mined rock (Fig 7).

This spoil dump is outside the area of development.

Condition

Good

4.2.2 Site 2 WWII structure SW 59307 37020

Concrete slab protruding from vegetation on north side of track. Identified as the ablution block foundation, part of the anti-aircraft personnel camp (Fig 8).

Outside the area of development.

Condition

Good

4.2.3 Site 3 WWII structure SW 59321 37019

Concrete slab protruding from vegetation on north side of track, identified as the officers mess foundation for anti-aircraft personnel camp (Fig 8).

Outside the area of development.

Condition

Good

4.2.4 Site 4 Mine dumps and WWII structures centred on SW 59335 37000

Area of spoil dumps and WWII structures densely overgrown with gorse and not possible to assess with any accuracy.

Condition

Overgrown.

4.2.5 Site 5 Shaft SW 59362 37006

A densely overgrown area but with a noticeable dip in the ground, almost certainly the location of 'Old Shaft' indicated on the 1880 map and possibly on the 1840 Tithe Map for the parish of Gwinear.

Condition

Overgrown.

4.2.6 Site 6 Mine dumps and WWII structure centred on SW 59371 36990

Area of spoil dumps and WWII structures densely overgrown with gorse and not possible to assess with any accuracy.

Condition

Overgrown.

4.2.7 Site 7 Mine dumps and WWII structure SW 59293 36988

Spoil dumps up to 2.0m high exposed in section, revealing several layered deposits comprised of mine waste and including slaggy material (boiler waste) and mined rock (Fig 9).

The demolished remains of a concrete blockwork structure of probable WWII date are exposed in this section.

Condition

Poor

4.2.8 Site 8 Mine dumps and WWII structure SW 59306 36984

Spoil dumps up to 3.0m high exposed in section, revealing several layered deposits comprised of mine waste and including slaggy material (boiler waste) and mined rock (Fig 9).

The remains of a concrete slab-base structure of probable WWII date are exposed in this section.

Condition

Poor

4.2.9 Site 9 Mine dumps and WWII structure SW 59312 36997

Spoil dumps up to 3.0m high exposed in section, revealing several layered deposits comprised of mine waste and including slaggy material (boiler waste) and mined rock (Fig 10).

The remains of a concrete slab-base structure of probable WWII date are exposed in this section.

Condition

Poor

4.2.10 Site 10 Mine dumps and WWII structure SW 59338 36974

Demolished concrete block structure at the base of the 3.0m high spoil dumps (Fig 11).

Condition

Poor

4.2.11 Site 11 Mine dumps and WWII structure SW 59357 36973

The remains of a concrete slab-base structure of probable WWII date are exposed at the top of the section through the 3.0m high spoil dump.

Condition

Poor

4.2.12 Site 12 Mine dumps and WWII structure SW 59351 36971

The demolished and overgrown remains of a concrete block structure of probable WWII date are exposed at the base of this section.

Condition

Poor

4.2.13 Site 13 Mine dumps and WWII structure SW 59359 39969

The remains of a concrete slab-base structure of probable WWII date are exposed at the top of the section through the 3.0m high spoil dump.

Condition

Poor

4.2.14 Site 14 Mine dumps and WWII structure SW 59380 36962

The remains of a concrete slab-base structure of probable WWII date exposed in this section through the 3.0m high spoil dump (Fig 12).

Condition

Poor

4.2.15 Site 15 Ground surface/levelled mine dumps SW 59358 36943

The exposed ground surface (similar to that across the entire development area and the same as Site 21) comprising levelled mine waste consisting of angular stone and large lumps of slaggy material (boiler waste). Fig 13.

4.2.16 Site 16 Stone faced hedge SW 59380 36934 - 59213 36858

Stone faced Cornish hedge forming the southern boundary of the development area, running from SW59380 36934 – SW 59213 36858

The same boundary is shown on the 1840 tithe map but its western extent was modified between 1880 and 1907. The hedge survives to 1m high and is 0.5m wide at its top and 1.3m wide at its base.

Condition

Good

4.2.17 Site 17 Iron gate SW 59284 36859

An old and corroded wrought iron gate set into an opening in hedge boundary Site 16. The gate is hung on a granite post on its north-eastern side.

Condition

Poor

4.2.18 Site 18 Shaft SW 59262 36867

An open shaft choked with vegetation set within a 1.2m high spoil dump (Fig 14) measuring approximately 8.0m in diameter at the top of the cone. The remains of a timber post and wire mesh fence can be seen collapsing into the shaft cone (Fig 15). The shaft appears on both the 1880 and 1907 Ordnance Survey maps but not on the Tithe map of 1840.

Condition

Open to considerable depth. No evidence of recent movement/collapse.

4.2.19 Site 19 Mine dumps SW 59174 36866

An area of extensive spoil dumps at least 1.5m high outside the area of development. The dumps are very overgrown and there is the potential within this area for the existence of hitherto unrecorded shafts. Probably those dumps indicated on the 1st Edition Ordnance Survey 1880 (Fig 3), extended to the south on the 2nd Edition Ordnance Survey of 1907 (Fig 4).

Condition

Stable - overgrown

4.2.20 Site 20 Shaft SW 59210 36952

A blocked shaft within an extensive circular spoil dump (Fig 16), within which is a cone approximately 3.0m deep. At the base of the cone the shaft is choked with stone and iron sheeting (Fig 17). According to the landowner Mr Rowe this was an open shaft that has been covered with timbers. The shaft is not recorded on any of the historic mapping.

Condition

Stable. No evidence of recent movement/collapse.

4.2.21 Site 21 Ground surface/levelled mine dumps centred on SW 59221 36921

The exposed ground surface (similar to that across the entire development area and the same as Site 15) comprising levelled mine waste consisting of angular stone and large lumps of slaggy material (boiler waste).

5 Discussion

Historical mapping evidence gives an idea of the scale of mining activity that has taken place across the site and its immediate vicinity, although there is little extant evidence today within the development area itself. Unfortunately there is no surviving evidence for the pioneering beam engine installations recorded at the mine.

The spoil dumps marking the north-eastern extents of the development area and the two shafts (Sites 18 and 20) are all that survives of once extensive mining activity. Areas of apparently widespread spoil dumping as indicated by both historic mapping and aerial photographs have since been levelled out. These levelled areas exist across the entire development area and comprise a mix of mine waste such as angular stone and slaggy material approximately indicating the sites of beam engine boilers, similar to that which can be seen in section where the extant dumps have eroded; most noticeably Sites 1 and 9. There is no evidence for either the shaft or mine buildings indicated on the Tithe map just to the west of the extents of the area; heaps of stone within the development area have been recently imported and are not of historical significance (Mr Ireland, pers comm).

Site 18, the shaft close to the southern edge of the area is partially overgrown but is open and dangerous. This shaft is not shown on historic mapping but is indicated by an elongated spoil heap in this location; presumably by the time of the first edition Ordnance Survey in 1880 the shaft was already redundant. This is also likely of Site 20, the choked shaft to the north; unusually this is not indicated on the 1840, 1880 or 1907 mapping, suggesting that it could relate to some of the earlier mining on the site. The shaft lies on the same north-east to south-west trending lode indicated on the Tithe Map by a shaft (Site 5) and by a shaft and structures some 70m to the south-west, immediately outside the development area. The size of the shaft spoil mound has probably been emphasised by the re-profiling of surrounding spoil dumps in recent years. There is no surviving evidence for either a shaft or engine/boiler house to the south-west.

A circular feature is recorded on the 1840 Tithe Map in the same location as the Site 5 shaft recorded as 'Old Shaft' on both the first and second edition maps.

Just beyond the extents of the development area are the remains of a major anti-aircraft battery, a significant reminder of defensive military efforts on the home front during WWII. The Defence of Britain Project database records details of the site, although parts of the personnel camp within the development area have already collapsed or been destroyed. Future efforts should be taken to ensure the preservation of the surviving structures of the anti-aircraft battery.

6 Recommendations

No recommendations are made for further archaeological recording work at the site. Since the application is for the importation of material in order to return the land to agricultural use through topsoiling, this will protect any buried archaeological deposits not evident during the walk-over and mitigate the need for additional archaeological evaluation or recording.

No further development should take place in the area of surviving mine waste dumps or WWII features outside the study area without further archaeological assessment and recording.

7 References

7.1 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 Gwinear* (GIS raster at HE)

7.2 Publications

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Dines, H G, 1988. *The Metalliferous Mining Region of Southwest England: Vols. I and II with additional Addenda and Corrigenda* by K.E. Beer. London: HMSO

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Harvey, A H, 1998. Defence of Britain Project. AH368 and AH369 Herland Farm anti-aircraft battery and personnel base. Site report form.

Sharpe, A, 2009. *Herland Farm, Gwinear, Written Scheme of Investigation*.

7.3 Websites

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

8 Project archive

The HES project number is **2009088**

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

1. A project file containing site records and notes, project correspondence and administration.
2. Electronic drawings stored in the directory [R:\Historic Environment \(CAD\)\CAD Archive\Sites H\Herland Farm assessment Gwinear 2009088](#)
3. Digital photographs stored in the directory [R:\Historic Environment \(Images\)\SITES.E-H\Herland Farm assessment Gwinear 2009088](#)
4. This report text is held in digital form as: [G:\Historic Environment \(Documents\)\HE Projects\Sites\Sites H\Herland Farm Gwinear assessment 2009088](#)

9 Appendix 1: Site Inventory

Gazeteer	Cornwall HER ID	OS Prefix	Eastings	Northings	Importance	Period	Site Type	Description
1	40371/53620 /166467	SW	59298	37008	Local	18 th -19 th century	Mine/ Spoil Heap	Spoil dumps up to 2m high exposed in section to the east of a track, revealing several layered deposits comprised of mine waste and including slag (boiler waste) and mined rock. Outside the area of development.
2	53620/16646 7	SW	59307	37020	Local	WWII	anti-aircraft site	Concrete platform, foundations of ablutions block, anti-aircraft gun personnel Outside the area of development.
3	53620/16646 7	SW	59321	37019	Local	WWII	anti-aircraft site	Concrete platform, foundations of officers mess, anti-aircraft gun personnel Outside the area of development.
4	40371/53620 /166467	SW	Centred on 59335	37000	Local	18 th -19 th century/ WWII	Spoil Heap / anti-aircraft site	Area of spoil dumps and WWII structures densely overgrown with gorse and not possible to assess with any accuracy. Outside the area of development.
5	40371/53620 /166467	SW	59362	37006	Local		Shaft	A densely overgrown area but with a notable dip in the ground, almost certainly the location of 'Old Shaft' indicated on the 1880 map and possibly on the 1840 Tithe Map for the parish of Gwinear. Outside the area of development.
6	40371/53620 /166467	SW	Centred on 59371	36990	Local	18 th -19 th century/W WII	Spoil Heap / anti-aircraft site	Area of spoil dumps and WWII structures densely overgrown with gorse and not possible to assess with any accuracy. Forming the edge of the area of development.
7	40371/53620 /166467	SW	59293	36988	Local	18 th -19 th century/W WII	Spoil Heap / anti-aircraft site	Spoil dumps up to 3m high exposed in section, revealing several layered deposits comprised of mine waste and including slag (boiler waste) and mined rock. The remains of a concrete slab-base structure of WWII date

Gazeteer	Cornwall HER ID	OS Prefix	Eastings	Northings	Importance	Period	Site Type	Description
								are exposed in this section.
8	40371/53620 /166467	SW	59306	36984	Local	18 th -19 th century/W WII	Spoil Heap / anti-aircraft site	Spoil dumps up to 3m high exposed in section, revealing several layered deposits comprised of mine waste and including slag (boiler waste) and mined rock. The demolished remains of a concrete blockwork structure of WWII date are exposed in this section. Forming the edge of the area of development.
9	40371/53620 /166467	SW	59312	36997	Local	18 th -19 th century/W WII	Spoil Heap / anti-aircraft site	Spoil dumps up to 3m high exposed in section, revealing several layered deposits comprised of mine waste and including slag (boiler waste) and mined rock. Forming the edge of the area of development.
10	40371/53620 /166467	SW	59338	36974	Local	18 th -19 th century/W WII	Spoil Heap / Anti-aircraft defence site	Demolished concrete block structure of WWII date at the base of the 3m high spoil dumps. Forming the edge of the area of development.
11	40371/53620 /166467	SW	59357	36973	Local	18 th -19 th century/W WII	Spoil Heap / anti-aircraft site	The remains of a concrete slab-base structure of WWII date are exposed at the top of the section through the 3m high spoil dump. Forming the edge of the area of development.
12	40371/53620 /166467	SW	59351	36971	Local	18 th -19 th century/W WII	Spoil Heap/ anti-aircraft site	The demolished and overgrown remains of a concrete blockwork structure of WWII date are exposed at the base of this section through the spoil dump. Forming the edge of the area of development.
13	40371/53620 /166467	SW	59359	39969	Local	18 th -19 th century/W WII	Spoil Heap / anti-aircraft site	The remains of a concrete slab-base structure of WWII date are exposed at the top of the section through the 3m high spoil dump. Forming the edge of the area of development.
14	40371/53620 /166467	SW	59380	36962	Local	18 th -19 th century/W	Spoil Heap / anti-aircraft	The remains of a concrete slab-base structure of WWII date exposed in this section at the top of the 3m high spoil

Gazeteer	Cornwall HER ID	OS Prefix	Eastings	Northings	Importance	Period	Site Type	Description
						WII	site	dump. Forming the edge of the area of development.
15	40371	SW	59358	36943	Local	18 th -19 th century	/	The exposed ground surface (similar to that across the entire development area and the same as Site 21) comprising levelled mine waste consisting of angular stone and large lumps of slag (boiler waste).
16	40371	SW	59380 – 59213	36934 – 36858	Local	18 th -19 th century/	Cornish Hedge	Stone faced Cornish hedge forming the southern boundary of the development area. Likely to be the same boundary shown on the 1840 tithe map but with its western extent modified between 1880 and 1907. The hedge survives to 1m high and is 0.5m wide at its top and 1.3m wide at its base.
17	/	SW	59284	36859	Local	19 th – 20 th century	Gate	Old and corroded wrought iron gate of local style set into an opening in hedge boundary Site 16. Hung on a granite post on its north-eastern side.
18	40371	SW	59262	36867	Local	18 th -19 th century	Shaft and Shaft Mound	An open shaft choked with vegetation set within a 1.2m high spoil dump. The remains of a timber post and wire mesh fence were seen collapsing into the shaft cone.
19	40371	SW	59174	36866	Local	18 th -19 th century	Spoil Heap	An area of extensive spoil dumps at least 1.5m high outside the area of development. The dumps are very overgrown and there is the potential within this area for the existence of hitherto unrecorded shafts.
20	40371	SW	59210	36952	Local	18 th -19 th century	Shaft and Shaft Mound	Blocked shaft within an extensive circular spoil dump within which the shaft cone is open to a depth of approximately 3m. Choked with stone, iron sheeting and according to the landowner.
21	/	SW	Centred on 59221	36921	Local	/	/	Recently modified exposed ground surface (similar to that across the entire development area and the same as Site 15) comprising levelled mine waste consisting of angular stone and large lumps of slag (boiler waste).

10 Appendix II: Project Design for archaeological assessment

Adam Sharpe

Client: Ireland Brothers Builders & Haulage Contractors, 1 Penhale Road, Carnhell Green, Camborne TR14 0LT

Client contact: Christopher Montagu, Stephen Payne Planning Ltd. 43 Lemon Street, Truro TR1 2NS. E-mail. chrismontagu@btconnect.com

10.1 Site description

The site is centred at SW 59236 36908, 500m to the west of the settlement of Gwinear and approximately 3km to the east of Hayle. The site is located on the upper reaches of a west facing slope at an approximate height of 80m. Bedrock is recorded as being Mylor Slate Formation underlying Manod soils (loam over slate). The site, formerly mining land, is currently scrub and rough ground.

10.2 Project Background

Planning application 09-0680 was submitted on the 16th June 2009 and was for land reclamation to return an area of derelict mining land to agricultural use through topsoiling. This application has been approved subject to 16 conditions. Condition 14 states:

No development shall take place within the site until the applicant has secured and implemented a programme of archaeological work in accordance with a written scheme of investigation to be submitted by the applicant and approved in writing by the Local planning Authority in consultation with the County Archaeologist.

Reason: In the interests of the archaeological value of the site

A brief for an archaeological assessment of the site prior to works was prepared by Philip Markham, Cornwall Council, Historic Environment, Kennall Building, Old County Hall, Truro TR1 3AY (Tel. 01872 322546 E-mail. pmarkham@cornwall.gov.uk) in response to this condition and a request for a fee quotation and written scheme of investigation (WSI) received by HE (Projects) on 24/08/09.

10.3 Project area historical summary

The development area has been recorded on the Cornwall and Scilly Historic Environment Record (HER) as being part of the former Herland Mine. The HER records the following: *Herland Mine was in operation from 1746 to 1807, producing silver. It resumed work in 1816 until 1843 for copper and later worked with Rosewarne.* The HER also records the following: *Mining in this area is doubtless very ancient, documentary references dating back to the very early eighteenth century. The Herland group of mines, known locally as Manor Mine (after the manor of Drannack) comprised a number of small concerns including Wheal Drannack, Wheal Royal at SW 597 370, Wheal Fancy and Pleasure at SW 589 370, and Wheal Prince George at SW 593 369.* Although not in the Mining World Heritage Site, mining is a very important aspect of the cultural heritage of Cornwall.

The development area is centred on the area of Old Wheal Herland, Herland Mine lying immediately to its east, Prince George being sited to its south and Drannack to its west.

At least two mine shafts survive as features within the development area, though archive maps and aerial photographs of the area suggest that this figure may be an underestimate, other closely set and probably relatively early shafts having being sunk on at least three roughly east-west trending parallel lodes. Mining activity on these lodes appears to date back to at least

1717, when the Coster family had worked part of Herland Mine. A further phase of work began in 1726 and continued until 1762, a rare Newcomen engine being in operation here in the 1750s.

The mine was at work again in 1790 and in 1791, following amalgamation with neighbouring mines a beam engine was erected on Old Herland Mine, a second engine (a Bull engine) being erected on Wheal Fancy. A third engine was proposed in 1795 by which time the mine was employing 700 people. Following the discovery of a rich lode of silver ore, a fourth engine was erected in 1798. Work largely ceased in 1802. The mines were restarted in or about 1815 with two new steam engines (including one designed by Richard Trevithick) and a range of new buildings were erected. However, the whole concern stopped work the following year due to mismanagement. The mine was restarted on a more sound footing in 1824 and continued at work until 1843, although its machinery had been disposed of in 1838.

Wheal Herland is significant in part for the silver ores it produced, but also as one of the small number of Cornwall's copper mines which was worked intermittently from the early 18th century through to the mid 19th century, sited a number of pioneering steam engines including a Newcomen engine, a Bull engine, an adapted twin cylinder engine and early variants of what was to become the standard Cornish engine, including one designed by Richard Trevithick.

10.4 Previous archaeological work

None identified.

10.5 Requirement for Work

The proposed ground works may disturb extant and buried archaeological remains. In order to understand the site and its potential for the recording of significant archaeological remains prior to development activities, the planning condition requires that an archaeological assessment is undertaken. This will involve a desk based assessment including a map regression plus a survey of the extant remains of the site. The assessment would provide evidence for any recommendations requiring further archaeological recording.

10.6 Project aims and objectives

The site specific aims are to:

- To determine the likely impact of the applicant's proposals on the application site.
- To draw together the historical and archaeological information about the site.
- To inform whether archaeological recording of any extant remains is required.
- To inform whether an archaeological evaluation or further archaeological recording of any potential buried remains is required.
- To inform whether palaeo-environmental or mine waste sampling would be required.

10.7 Research questions

The application site formed part of the Hayle Mining District, an important early copper mining area whose history and landscape remains have, to date, been little investigated. The proposed assessment provides an opportunity to sample the extent and quality of the mining remains in this area, and in particular to determine whether evidence survives for some of the pioneering beam engine installations recorded on this mine.

10.8 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

Desk-based assessment will be undertaken to assemble a site history and to bring together information from published sources, archive maps and plans and information held in the Cornwall and Isles of Scilly Historic Environment record. Map searches will include the 1st and 2nd Editions of the Ordnance Survey 1:2500 mapping (1878 and 1907 respectively) and the Tithe Mapping for Gwinear (*circa* 1840). Plans held in the County Record Office will also be consulted as well as aerial photographs in Cornwall Council collections.

Fieldwork

A walk-over survey will be undertaken where vegetation conditions permit and all surviving features will be plotted onto a copy of the modern Ordnance Survey digital mapping.

Report

An illustrated report will be produced summarising the results of the documentary research and from the walkover survey. This will be provided to the Client.

10.9 Product

The study will result in the following outputs:

1. Annotated plan of the site.
2. Survey field notes and descriptions
3. Digital photographs (archived according to Historic Environment, Cornwall Council guidelines) and supplied to the client on CD.
4. A written report to include;
 - Summary
 - Introduction/background/terms of reference
 - Site description including landscape character
 - A record of any past archaeological interventions, surveys or historical studies, with the location of any resulting archives.
 - Assessment methodology
 - A short statement of archaeological significance, in terms of importance, rarity, local character, educational and academic value.
 - Inventory of identified and potential sites
 - Assessment of impacts.
 - Relevant planning and other policies and guidance.
 - Relevant historic maps, plans and illustrations, and other supporting material.
 - A full and properly referenced bibliography.

A digital copy of the report, illustrations and any other files will be held in the Cornwall HER.

- Copies of the report will be distributed to the client, to Cornwall Council Historic Environment, local archives (either the Cornwall Record Office or the Royal Cornwall Museum) and to the National Monuments Record (NMR) Swindon. A further digital copy shall be supplied to the Client on CD-ROM in 'Adobe Acrobat' PDF format.

10.10 General notes

- The archaeological contractor will follow the code of the Institute for Archaeologists (IfA).
- All of the latest Health and Safety guidelines shall be followed on site.
- Terminology used in the report will be consistent with the English Heritage Thesaurus.
- The archaeological contractor will undertake the English Heritage/ads online access to the index of archaeological investigations (OASIS).
- The report will be held by the Cornwall and Scilly Historic Environment Record (HER) and made available for public consultation.
- 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 the Royal Cornwall Museum or the Cornwall Record Office.
- The archive including a copy of the written report shall be deposited with the Royal Cornwall Museum within two months of the completion of the full report and confirmed in writing with the HEPAO.
- Where there is only a documentary archive this will be deposited with the Cornwall Record Office or 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 on completion of the deposition of the archive and report a recommendation will be made for the discharge of the archaeological recording condition.

10.11 Monitoring

- The HEPAO will monitor the work and will be kept regularly informed of progress.
- Notification of the start of work will be given 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 in writing, prior to them being carried out.

10.12 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.

10.13 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.

10.14 Timetable

The study is anticipated to be commenced during the Autumn of 2009. HE (Projects) normally require at least three weeks notice before commencement of work, in order to allow the allocation of field staff time and to arrange other logistics.

10.15 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

10.16 Project staff

The project will be carried out by HE field staff and will be managed by a nominated Senior Archaeologist (Adam Sharpe BA MiFA) 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.

10.17 Contract

The HE projects team 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 the Historic Environment projects team and will be presented in good faith on the basis of professional judgement and on information currently available.

10.18 Standards

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

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

10.19 Health and safety statement

Historic Environment, Cornwall Council follows the Council's *Statement of Safety Policy*. For more specific policy and guidelines the Unit uses the manual *Health and Safety in Field Archaeology* (2002) endorsed by the Standing Conference of Archaeological Unit Managers and also the Council for British Archaeology's Handbook No. 6 *Safety in Archaeological Field Work* (1989).

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

10.20 Insurance

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

Adam Sharpe BA MiFA

Senior Archaeologist

26/08/09

11 BRIEF FOR ARCHAEOLOGICAL ASSESSMENT

Philip Markham

Date: 19th August 2009

Planning Application: 09-0680

Address: Herland Farm, Gwinear, Hayle

Site: Land reclamation site at the above address

Applicant: Ireland Brothers Builders & Haulage Contractors, 1 Penhale Road, Carnhell Green, Camborne TR14 0LT

Agent: Christopher Montagu, Stephen Payne Planning Ltd. 43 Lemon Street, Truro TR1 2NS E-mail. chrismontagu@btconnect.com

Historic Environment Planning Advice Officer: Philip Markham, Cornwall Council, Historic Environment, Kennall Building, Old County Hall, Truro TR1 3AY.

Tel. 01872 322546 E-mail. pmarkham@cornwall.gov.uk

Local Planning Authority Officer: Not known, Cornwall Council. Planning West 1, St Clare, Penzance, TR18 3QW Tel. 01736 331166 E-mail. planning.west1@cornwall.gov.uk

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.

11.1 Introduction

This brief has been written by the HEPAO and sets out the minimum requirements for an archaeological assessment, which may lead to archaeological recording, at the above site.

11.2 Site Location and Description

The site is located at OS Grid Reference SW 59236 36908 which is approximately 3km east of Hayle and approximately 500m south-west of Gwinear. The site is on the upper reaches of a west facing slope at an approximate height of 80m. The bedrock is recorded as being Mylor Slate Formation underlying Manod soils (loam over slate). The site is currently scrub and rough ground.

11.3 Planning Background

Planning application 09-0680 was submitted on the 16th June 2009 and was for land reclamation. This application has been approved subject to 16 conditions. Condition 14 states:

No development shall take place within the site until the applicant has secured and implemented a programme of archaeological work in accordance with a written scheme of investigation to be submitted by the applicant and approved in writing by the Local planning Authority in consultation with the County Archaeologist.

Reason: In the interests of the archaeological value of the site

11.4 Archaeological Background

The development area has been recorded on the Cornwall and Scilly Historic Environment Record (HER) as being part of the former Herland Mine. The HER records the following: *Herland Mine was in operation from 1746 to 1807, producing silver. It resumed work in 1816 until 1843 for copper and later worked with Rosewarne. The HER also records the following: Mining in this area is doubtless very ancient, documentary references dating back to the very early eighteenth century. The Herland group of mines, known locally as Manor Mine (after the manor of Drannack) comprised a number of small concerns including Wheal Drannack, Wheal Royal at SW 597 370, Wheal Fancy and Pleasure at SW 589*

370, and Wheal Prince George at SW 593 369 ... Although not in the Mining World Heritage Site, mining is a very important aspect of the cultural heritage of Cornwall.

11.5 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.
- Inform whether archaeological recording of any extant remains is required.
- Inform whether an archaeological evaluation or further archaeological recording of any potential buried remains is required.
- Inform whether palaeo-environmental or mine waste sampling would be required.

11.6 General Guidance

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

11.7 Results

11.7.1

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 and the Cornwall Record Office or Royal Cornwall Museum. A further digital copy shall be supplied on CD-ROM preferably in 'Adobe Acrobat' PDF format.

11.7.2

The archaeological contractor will undertake the English Heritage/ads online access to the index of archaeological investigations (OASIS).

11.7.3

This report will be held by the Cornwall and Scilly Historic Environment Record (HER) and made available for public consultation.

11.7.4

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 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 context register with brief descriptions shall be included as an appendix.
- A copy of the brief and the approved WSI will be included as an appendix.

11.8 Archive Deposition

11.8.1

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 the Royal Cornwall Museum or the Cornwall Record Office.

11.8.2

If the finds are to remain with the landowner a full copy of the documentary archive shall be housed with the Cornwall County Record Office and with the Courtenay Library of the Royal Institution of Cornwall.

11.8.3

The archive including a copy of the written report shall be deposited with the Royal Cornwall Museum within two months of the completion of the full report and confirmed in writing with the HEPAO.

11.8.4

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.

11.8.5

A copy of the report will be supplied to the National Monuments Record (NMR) Swindon.

11.8.6

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

11.8.7

Only on completion of 8.1 to 8.5 (inclusive) will there be a recommendation for the discharge of any archaeological recording condition.

11.9 Monitoring

11.9.1

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

11.9.2

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

11.9.3

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



Fig 1 Location map, scale 1:20000. Development area outlined in red.

Reproduced from the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Cornwall County Council 100049047, 2009



Fig 2 Tithe Map for the parish of Gwinear, 1840. Development area outlined in red.

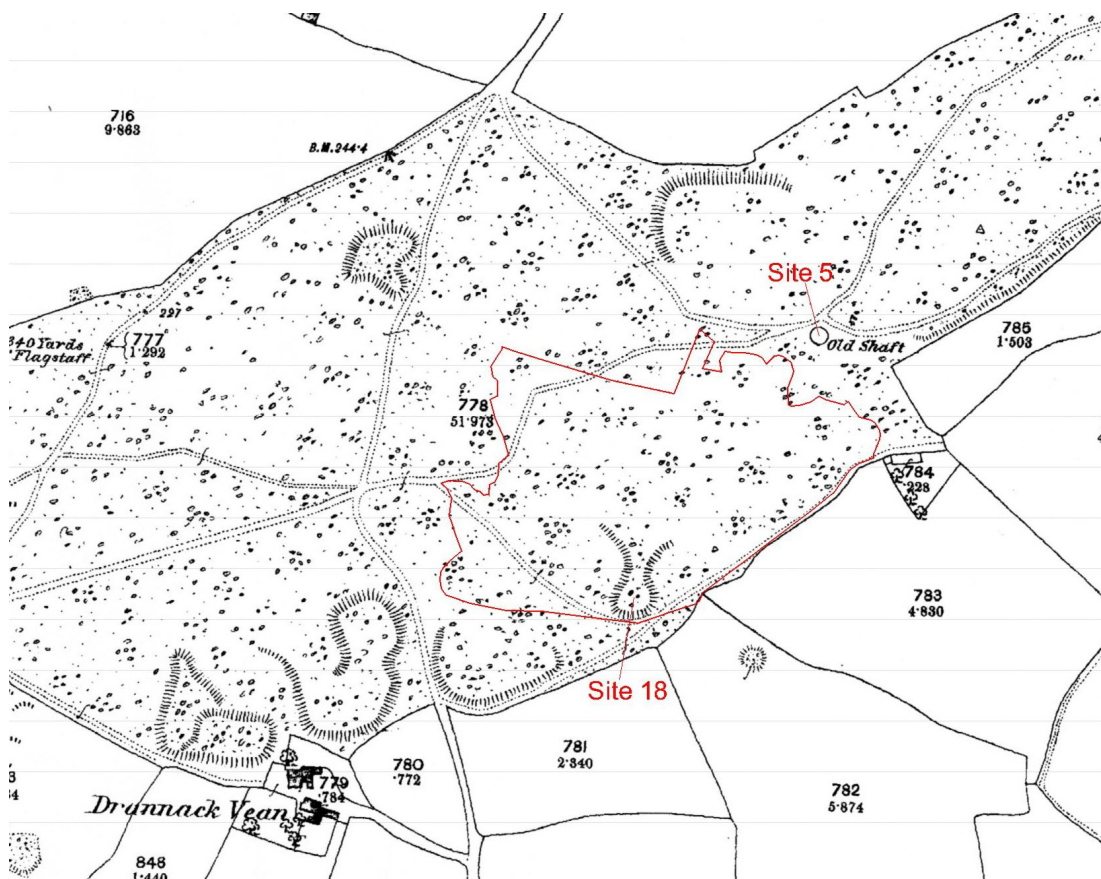


Fig 3 First Edition of the Ordnance Survey 25 Inch Map, 1880, development area outlined in red.

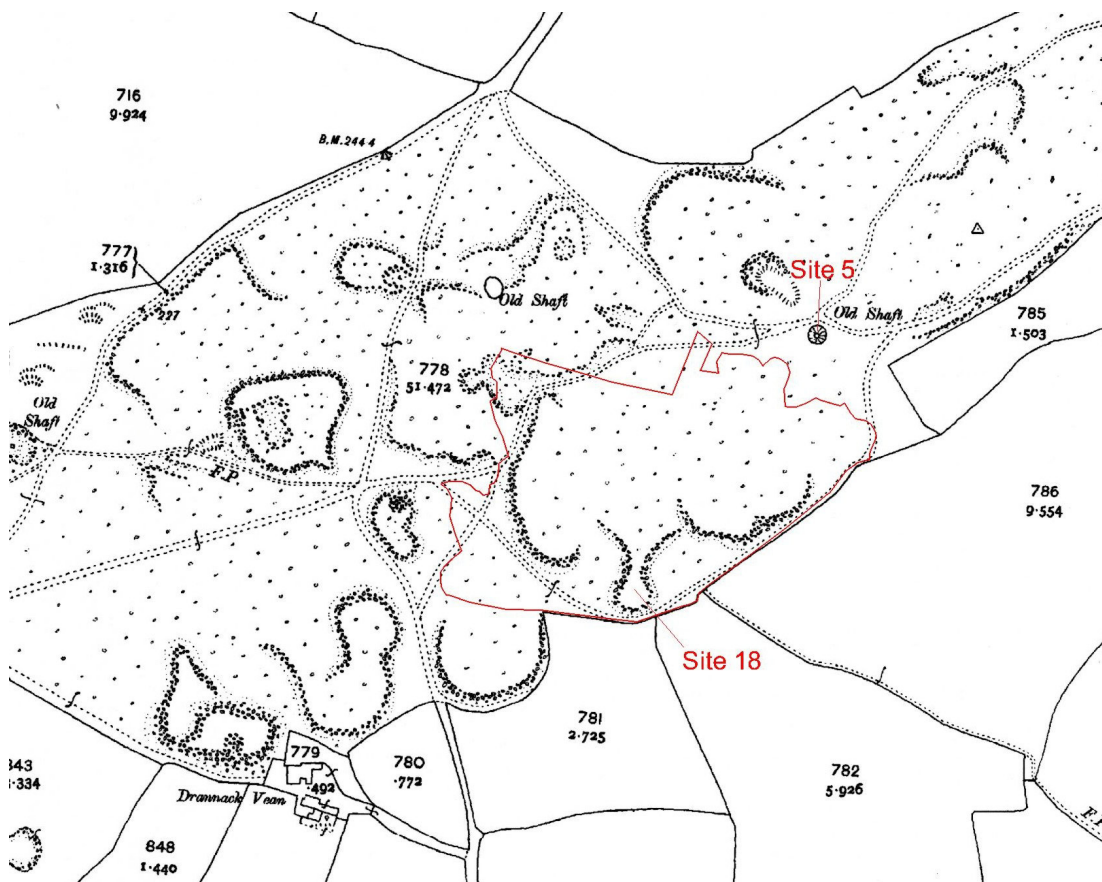


Fig 4 Second Edition of the Ordnance Survey 25 Inch Map, 1907, development area outlined in red.



Fig 5 RAF aerial photograph of 1946 showing the development area outlined in red and identifiable sites mentioned in the text. Potential shafts are shown in blue (RAF.1946.3G/TUD/209/5066.ABP).

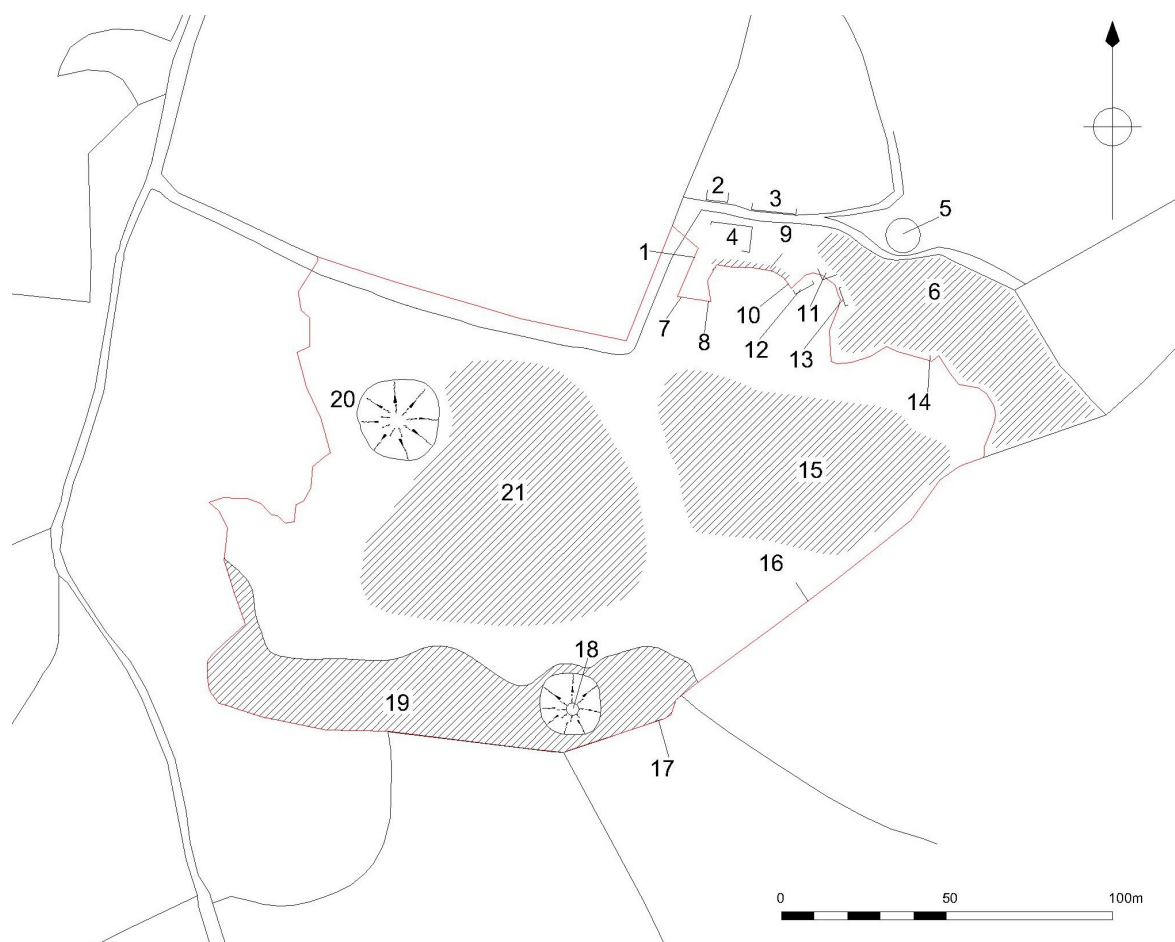


Fig 6 The development area and its environs including all sites listed in the text. Reproduced from the Ordnance Survey mapping with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Cornwall County Council 100049047, 2009.



Fig 7 Site 1: exposed section through spoil dumps, facing north-east.



Fig 8: Sites 2 and 3, part of the WWII anti-aircraft personnel camp, facing north-west.



Fig 9: Sites 7 and 8, demolished WWII structures at the base of spoil dumps, facing north.



Fig 10: Site 9, Spoil dumps up to 3m high, facing north.



Fig 11: Site 10, demolished concrete block structure of WWII date at the base of the 3m high spoil dumps, facing north.



Fig 12: Site 14, the remains of a concrete slab-base structure of WWII date exposed in this section at the top of the 3m high spoil dump, facing north.



Fig 13: The exposed ground surface comprising levelled mine waste consisting of angular stone and large lumps of slag (boiler waste), facing west.



Fig 14: Site 18, spoil around the open shaft, facing south.



Fig 15: Site 18, the open shaft choked with vegetation, facing south.



Fig 16: Site 20, spoil dump surrounding the blocked shaft, facing north.



Fig 17, Site 20, the blocked shaft cone.



Fig 18: Sample of Wheal Herland silver. Detail from <http://www.mindat.org/loc-950.html>:

The silver was discovered in 1798 at a depth of 115 fathoms at the intersection of the main east-west lode (Manor Lode), and a north-south cross-course (Convocation), which faults the main lode 46 cm south. The silver ore, up to 20 cm wide, was found on the east side of the cross-course 61cm wide, continuing for about 10m south, and 3.5m north of the intersection. The silver ore was composed of galena, native bismuth, skutterudite, acanthite, arsenopyrite, cobaltite, chlorargyrite, pyrrargyrite and native silver in capillary form. Specimens at the time were given to Philip Rashleigh, a leading mineral collector in the late 18th century and examples were also sent to Rev. William Gregor, the discoverer of titanium.