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Dudnance Lane, Pool, Camborne

Archaeological Watching Brief



Historic Environment Projects

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Archaeological Watching Brief

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Report author	Carl Thorpe
Checked by	Adam Sharpe BA MIfA
Approved by	Andrew Young

Historic Environment Projects Environment Directorate, Cornwall Council Fal Building, County Hall, Treyew Road, Truro, Cornwall, TR1 3AY Tel: (01872) 323603 Email: hes@cornwall.gov.uk Web: www.cornwall.gov.uk

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The Project Manager was Adam Sharpe. Fieldwork was undertaken by the author.

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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Contents

1	Sum	nmary	1
2 Introduction			1
	2.1	Project background	1
	2.2	Aims	1
	2.3 2.3. 2.3.	Methods 1 Desk-based assessment 2 Fieldwork: watching brief	2 2 2
3	Loca	ation and setting	3
4	Desk Based Assessment		4
5 Archaeological fieldwork results		4	
	5.1	Mining investigation trenches	5
6	5 Conclusions/discussion		9
7	7 Recommendations		10
8 References		erences	10
	8.1	Primary sources	10
	8.2	Publications	10
	8.3	Websites	10
9	9 Project archive 11		

10 Appendix 1. Dudnance Lane HWRC assessment and watching brief: Written Scheme of Investigation for archaeological assessment and watching brief 12

List of Figures

Figure 1. Location map

Figure 2. The 1880 OS 25" map showing site area outlined in red, and lodes in blue \odot and database right "Crown Copyright and Landmark Information Group Ltd" (All rights reserved 2011).

Figure 3. The 1908 OS 25" map showing site area outlined in red and lodes in blue \bigcirc and database right "Crown Copyright and Landmark Information Group Ltd" (All rights reserved 2011).

Figure 4. Geo-referenced Doidge Map. 1737 showing position of Brea Audit A Tin Work and known lodes. $\ensuremath{\mathbb{C}}$ Copyright CRO.

Figure 5. Site plan showing Trench locations, Test Pits, and features located.

Abbreviations

CRO	Cornwall County Record Office
EH	English Heritage
HER	Cornwall and the Isles of Scilly Historic Environment Record
HE	Historic Environment, Cornwall Council
мсо	Monument number in Cornwall HER

- NGR National Grid Reference
- OD Ordnance Datum height above mean sea level at Newlyn
- OS Ordnance Survey
- RIC Royal Institution of Cornwall

1 Summary

HE Projects was commissioned by Matt Yates, Principal Engineer, Geotechnics Limited to undertake an assessment and programme of archaeological recording at Dudnance Lane, Pool, Cornwall. This took place during the ground works for the investigation of mine workings, together with other geotechnical site investigations. This was undertaken to provide information relating to mine workings within the site in advance of its utilisation as a Household Waste Recycling Centre (HWRC).

The site is centred on a part of the former New Cooks Kitchen sett which rapidly developed into one of the most significant mines in the Camborne-Redruth Mining District. The 1877 OS map shows it to have been occupied by New Cooks Kitchen Mine.

Evidence for at least two phases of mining was identified within the course of the work.

The earliest features encountered were in the southern part of the site and consisted of a trench-form linear mine working that was in places over 3m deep and over 12m wide. This followed the trend of the local lodes with two small shafts or lode back pits and a stope dipping to the northeast exploiting the lode at depths greater than 4m. These works appear to be 18th century in date (if not earlier), appearing on the 1737 map of Tehidy Manor drawn up by Doidge. This map shows what appears to be a line of lode back workings running through this area, these being named on the map as 'Brea Audit A Tin Work', following the same orientation as the linear working recorded during the project.

A second phase of mining seems to be represented by the shaft at the north western end of Trench 3 which lay beyond the northern edge of the openwork. This appears to be on the line of a run of documented shafts lying roughly mid way between Cooks Kitchen Mine, East shaft (MCO54884) and the unnamed shaft at SW 66511 40770. These shafts seem to have been sunk to work the lode at depth by intercepting its strike, which lies to the north-west. These shafts appear to be disused on the 1880 OS map, suggesting a probable late 18th or early 19th century date for this activity.

No evidence for the buildings or reservoir associated with New Cook's Kitchen Mine was identified, though a possible leat that may have fed the reservoir was recorded. It is assumed that the buildings and reservoir were removed during a phase of site clearance during the 20th century.

2 Introduction

2.1 Project background

Historic Environment Projects was commissioned by Matt Yates, Principal Engineer, Geotechnics Limited to undertake an assessment prior to and a programme of archaeological recording during the ground works for the investigation of mine workings and other geotechnical site investigations at Dudnance Lane, Pool, Cornwall. This was carried out in order to inform the geotechnical site investigation programme in advance of utilisation of the site for a Household Waste Recycling Centre (HWRC).

A written scheme of investigation, outlining the methodology for archaeological recording was produced (30/01/13) by Adam Sharpe, Senior Archaeologist, HE Projects (Appendix 1). This was approved by Phil Markham, Historic Environment Planning Advice Officer and HE (Projects) was commissioned to undertake the work on 5th March 2013.

2.2 Aims

The principal aim of the desk-based assessment of the area proposed for the HWRC was to help to inform the geotechnical site investigation programme.

The aims of the watching brief were:

- To establish the absence/presence of buried archaeological remains.
- To record archaeological features, layers and finds affected by the works.
- To establish the extent, condition, significance and character of the archaeological resource.
- To identify any artefacts relating to the occupation of the site.
- To gain further information about the archaeological potential of the area, through the recording of buried archaeological remains.
- The dissemination and publication of the results.
- The long-term conservation of the project archive in appropriate conditions.

2.3 Methods

2.3.1 Desk-based assessment

The desk-based assessment involved consultation of the following resources

- Published sources and relevant grey literature
- Historic maps and plans, including
 - Joel Gascoyne's map of Cornwall (1699)
 - Doidge MS Map of the Manor of Tehidy, (1737)
 - Thomas Martyn's map of Cornwall (1748),
 - OS 1 inch survey (c1810)
 - Illogan Tithe Map (c1840),
 - 1st and 2nd Editions of the OS 25 inch maps (c1880 and c1907)
 - Relevant mining maps and plans
- Modern maps
- GIS map layers

2.3.2 Fieldwork: watching brief

Recording was through a combination of site notes, photography and sketch and measured recording of features exposed within trenches and soil strip areas opened up by the geotechnical investigation team. This recording was targeted at mining features including shafts, adits, outcrop workings, near-surface stoping and areas of potential contamination by mine waste deposits. The extent and detail of such work was guided by Health and Safety considerations, particularly in relation to areas containing potentially unstable mine workings and especially adjacent to choked or open mine shafts.

The location of the investigation trenches and test pits were plotted onto a site plan at a scale of 1:1000 based on an Ordnance Survey map of the same scale, being measured in from fixed locatable points on the ground marked on the map, together with compass bearings. Features identified were recorded in sketch section at a scale of 1:50. Sample sections (nature of soil depth, layers present, etc) were also noted across the site (Fig 5).

3 Location and setting

This description is based on Sharpe 1993 and the WSI (Appendix 1). The current project is centred on a part of the former New Cooks Kitchen sett at SW 66509 40797 and covers an area of circa 0.45 Hectares. Although shown as fields on the Illogan Tithe Map (1840), this area rapidly developed into one of the most significant mines in the Camborne-Redruth Mining District, the 1877 OS map showing it to have been occupied by New Cooks Kitchen Mine (Figs 1-4).

The mining sett of New Cook's Kitchen lay immediately to the east of the Red River Valley to the south of Tuckingmill, its lodes being essentially continuations of those worked in Dolcoath to the west and Tincroft to the east, though the lodes are dislocated along a north-south line by the Great Cross Course on the western side of the sett.

The adjacent Cook's Kitchen had been, worked very successfully for copper ores, and was described in 1796 as 'one of the most remarkable mines for copper perhaps in the world.' It was initially worked by waterwheels, but by 1794 it had already acquired a Boulton and Watt pumping engine. By the 1820s, the richer deposits of copper available from the Cook's Kitchen lodes were already becoming substantially worked out and exploitation of its tin resources had begun. In 1849, emboldened by discoveries of rich tin resources below the copper deposits in Dolcoath, Tincroft and Carn Brea, Cook's Kitchen was taken up again, though found to be in a poor state. New steampowered dressing floors were constructed, and Chapple's Engine Shaft deepened – virtually the only deep shaft on the sett. By 1865 the mine was employing 370 people and working to a depth of 500m below adit.

In 1872, the mine was divided in two, New Cook's Kitchen taking over the northern part of the sett. However, declining tin prices and poor management over many decades had inevitable results, the last dividend for Cook's Kitchen being paid to the shareholders in the following year. Critically, the mine essentially continued to be worked from a single shaft, there had been expensive equipment failures, extensive areas of weak ground had been encountered which required heavy timbering, the eastern and southern parts of the mine had been found to be not worth working in depth and the ground to the west bordering Dolcoath could not be worked because of an agreement between the two mines. The only option was to work the core area of the mine ever downwards, at increasing expense. The mine was amalgamated with neighbouring Tincroft in 1875, though this was found to be a worse state than Cook's Kitchen. In 1893, a further fall in world tin prices looked as if it would prove the final straw. By this time, the mine was in a poor state. Its engines were ancient, working a single, cramped and very deep shaft. Its dressing floors had not been remodelled for nearly four decades; the man engine reached only half way to the lower levels of the mine, where the heat was so intense that the working conditions were described as stupefying. In 1896 Tincroft and Cook's Kitchen were amalgamated with the Carn Brea Mines, though the Cook's Kitchen workings had effectively been abandoned by this date. Carn Brea was abandoned in 1913/14 and Tincroft (with Cook's Kitchen) in 1921.

New Cook's Kitchen, created in 1872, also proved unsuccessful and was closed in 1893, parts of the sett being acquired by South Crofty in 1899, a new shaft (New Cook's) being sunk within the northern part of the enlarged sett.

South Crofty has a long and complex history, from small beginnings during the 18th century, gradually absorbing all of its neighbours to become the last working mine in Cornwall during the second half of the 20th century. Its story began with a plethora of small, shallow but often rich copper mines developed in the area around Pool and Tuckingmill during the 18th century, one of these being Wheal Crofty. The nearby East Wheal Crofty, which came into being in 1823, worked the former Longclose, Dudnance, Penhellick, Trevenson and Pool setts. After a short-lived closure, the mine was restarted in 1831, becoming one of the most important copper mines in Cornwall and in 1854 its sett was subdivided into North Wheal Crofty and South Wheal Crofty along the line of the Pool to Tuckingmill road. South Wheal Crofty thus worked the setts of the

former Wheal Susan, Copper Tankard, Longclose, Dudnance and Penhellick, though Longclose was sold off to become Wheal Crofty. Contrary to expectations, South Wheal Crofty did not prove particularly successful, and closed in 1896.

In 1899, combined with the former Cook's Kitchen sett, the mine was re-started and was completely refurbished. Over the following decades this new amalgamation weathered the economic conditions which saw almost every other Cornish mine go to the wall. Adjacent adjoining setts were acquired and the mine eventually became the deepest ever to work in Cornwall. In 1985, however, the effects of the International Tin Crisis made even South Crofty uneconomic to work closing in 1999, though there are current proposals for its imminent reopening.

Over the 20th century, the surface land take for the mine has shrunk to the current core site around New Cooks Kitchen Shaft off Dudnance Lane, and all of the rest of the sites which formed its 19th century satellite components were abandoned, their buildings demolished and their shafts capped and, in many cases, overbuilt. The majority of these sites now lie under the industrial estates which have developed in the last four decades to the north of Carn Brea, though some survive as pockets of waste or undeveloped land, as in the instance of that proposed for the Dudnance Lane Household Waste Recycling Centre (HWRC).

4 Desk Based Assessment

Within the current project area, the desk based assessment utilising available historic map sources and consulting various reports on work done previously in the area identified the locations of various features that may be affected by the work. These included one of the outlying shafts of New Cooks Kitchen mine on the southwest side of the site (SW 66511 40770), a mine building of unidentified function immediately to the northwest of it (SW 66493 40781), a mine reservoir on the north east side of the site (SW 66536 40815) and a winding engine house with probable arsenic flue to the northwest (SW 66479 40839). All of these belonged to New Cooks Kitchen Mine.

Previous archaeological work had indicated that at least one lode outcrop was known to cross the site towards its southern end, (Buck 1997, Sharpe 1993, 2003, 2004) and geotechnical investigation along Dudnance Lane near the entrance to the Tesco Extra site showed extensive near-surface stoping trending in this direction towards the site, this very likely significantly pre-dating the development of the documented elements of New Cooks Kitchen mine and probably elements of the 18th century and earlier Dudnance Mine.

Doidge's map of 1737 showed a line of lode back pits or workings running through the southern part of the site. These are named as the 'Brea Audit A Tin Work'.

Examination of more recent maps and aerial photographs has shown that following the centralisation of operations at New Cooks Shaft during the later 20th century, this area was used for mine waste disposal, then for materials storage and latterly as a store for recycling skips. It is currently waste land awaiting redevelopment.

5 Archaeological fieldwork results

Seven geotechnical test pits were dug at various locations to investigate the nature of the ground and to conduct soil sampling, while four ground investigation trenches were excavated across the site in a roughly NW to SE direction to determine the presence of and nature of any mining activity within the study area (Figure 5). These geotechnical pits and investigation trenches were opened up using a wheeled excavator utilising a toothless bucket.

No archaeology was found within the geotechnical test pits, though they did show that made ground occurred across the site, most likely as levelling layers when the area became a storage area and yard.

5.1 Mining investigation trenches

Trench 1.

This trench was dug on the western side of the study area (Figure 5). It was *circa* 47m long and averaged 0.70m in width though in places where the sides were unstable it became substantially wider due to collapse. The trench was dug down to a depth where solid bedrock was encountered (where present) so this was variable.

The trench commenced some 8.8m from the road (at the southern end) due to the presence of a bund that had been contaminated with Japanese knotweed.

For the first 3.3m the profile recorded consisted of topsoil overlying 1.0m of made ground consisting of dumps of mixed clays and processing waste; that overlaid 0.20m of dark red, black-brown compacted clay that had the appearance of an old land surface. This in turn overlaid *circa* 0.9m of soft yellow-brown clay and decayed rock fragments (the decayed natural bedrock) before solid unweathered bedrock was encountered at a depth of *circa* 2.1m.

At a distance of *circa* 3.3m a mining feature was encountered. This was marked by a near vertical cut on the southern side while a convex cut was seen some 2.2m to the north. Infilled with loose debris of mixed clays and stony rubble, this began to collapse into the trench almost as soon as it was disturbed. The plan at surface of the collapsing material was sub circular in shape, perhaps indicative of a small shaft (of circa 2.2m diameter), however though it could not be investigated fully due to the unstable nature of the ground, there was a hint (seen in the angled way the possible old land surface layer had been cut) that the feature dipped to the east, suggesting perhaps that this may have been a stope. This feature was followed down to a depth of *circa* 3.5m before trench collapse made further investigation impractical, while the fill suggested that it had been worked from not far below the current ground surface. The bedrock observed at the point through which the feature had been cut appeared to be a very weathered felsitic elvan, one of numerous dykes running through this area. No obvious dating evidence was recorded for this feature.

Disturbed and backfilled ground continued to be seen along the length of the trench for another *circa* 12.5m, with the trench averaging a depth of 3.5m with solid bedrock being glimpsed intermittently along its base. No clear pattern was observed, the impression being given that this represented the remnants of a backfilled surface working. This observation was reinforced at a point approximately 18m from the start of the trench where a *circa* 45 degree angled cut (sloping southwards) was seen in the bedrock that appeared to mark the edge of the openwork. From this cut northwards the top of the bedrock was seen to rise to a depth of 1.65m from surface; the dark, redbrown compacted clay interpreted as a buried old land surface reappeared at this point. No dating evidence was obtained for this surface working.

For the next *circa* 27m (including Test Pit 4 recorded between 32m and 34m along the length of the trench) the profile observed was fairly uniform in nature and consisted of 0.05m of grass, roots and topsoil, overlying 0.10m of grey-brown clay loam, and 0.30m of mixed clay (mostly dumped processing waste). This made ground overlaid up to 0.20m of compacted dark red, black-brown clay (most probably the old land surface), and up to 1.0m of yellow-brown clay with numerous shillet fragments (decayed natural weathering zone), solid shillet bedrock being encountered at the base of the trench. It was noted that the bedrock gradually came closer to the surface towards the northern end of the trench; at its termination at the northern end the solid shillet was encountered at a depth of 0.65m.

Lying directly above the old land surface between 35m from its southern end and the northern end of the trench (47m) a deposit of black-brown cinder was recorded as a layer up to 0.10m thick. This may have come from the operation of one of the range of buildings depicted immediately to the west of this area on the 1880 OS map (Figure 2), or from the engine house of New Cooks Kitchen Mine *circa* 50m to the northwest.

Trench 2.

This trench lay some 12m to the northeast of Trench 1, and was dug to run roughly parallel to it (Figure 5). It was *circa* 37m long and averaged 0.70m in width though as in Trench 1 in places it became substantially wider due to collapse. Again the trench was dug down to a depth where solid bedrock was encountered (where present at the maximum depth excavated) so this was variable.

The trench commenced alongside the road, and was orientated roughly NW to SE. For the first 12m the profile recorded was similar to that at the southeastern end of Trench 1. Solid unweathered bedrock was found at a depth of *circa* 2.0m. The bedrock within the first 5.0m of the trench proved to be very decayed, and seemed to be a soft felsitic elvan (probably the same dyke recorded within Trench 1); here the trench reached a depth of 3.0m before unweathered rock was encountered.

Mining features were encountered at a distance of *circa* 12.6m from the start of the trench. These took the form of a near vertical cut in the bedrock removing the layer forming the old land surface, with loose material and stony blocks infilling the trench to the north of this line. The loose unstable nature of this material made observation and recording of features difficult due to section collapse of the trench sides. Despite this a possible tunnel or voided stope approximately 1.0m wide was revealed at *circa* 12.8m from the start of the trench. The roof seemed to be arched, (the top occurring at a depth of about 3.0m from surface, the sides being near vertical, with a floor (of solid shillet bedrock) at *circa* 4.8m from surface. This tunnel or working appeared to dip steeply towards the east and was most likely the crown of a shallow stope. This description is only tentative given that the dimensions had to be estimated due to the feature being rapidly obscured by the collapse of the trench sides. No obvious dating evidence was recorded.

Disturbed and backfilled ground continued to be seen along the length of the trench for another *circa* 6.9m, the trench averaging a depth of 3.10m with solid bedrock seen at its base. The infill consisted of loose blocks of stone, and very friable dumped clays, often voided. No clear pattern was observed; the few tip lines that could be seen indicated tipping from varying directions and the overall impression was that this feature represented the remnants of a backfilled surface working.

At a point *circa* 19.5m along the trench the nature of the disturbed ground changed dramatically, a 3.5m wide feature being encountered, this being marked by near vertical cuts on either side. This feature was infilled with very loose modern fill including concrete blocks, plastic sheeting, stone fragments, a motorbike tyre, and builder's rubble. This feature was followed to a depth of approximately 4.0m from surface and was not bottomed. It was suspected that this was probably backfill on top of modern remediation (capping work) done on parts of the site during the 1990s. The feature was not investigated further given the instability of the ground, and the reach limits of the machine.

For 2.0m to the north of this feature further disturbed and backfilled ground was seen along the length of the trench, solid shillet bedrock being recorded at a depth of 3.0m. No pattern was seen within the nature of the tipping, the whole giving the impression of infill within an openwork.

The edge of the open work was recorded at a point *circa* 25m along the trench where a vertical cut was seen in the bedrock. From this cut northwards the top of the bedrock was seen to rise to a depth of 1.0m from surface, and the dark, red-brown compacted

clay interpreted as a buried old land surface reappeared. No dating evidence was obtained for this surface working.

For the remaining 12m of the length of the trench the profile recorded was fairly uniform in nature consisting of 0.05m of grass, roots and topsoil, overlying 0.10m of grey-brown stony clay, and 0.10m of mixed clay (mostly dumped processing waste). This made ground overlaid up to 0.10m of compacted dark red, black-brown clay (most probably the old land surface), and up to 0.65m of yellow-brown clay mixed with numerous shillet fragments (the decayed natural weathering zone). Solid shillet bedrock was encountered at the base of the trench which was seen to rise closer to the surface towards the north; at the northern end of the trench the solid shillet was at a depth of *circa* 0.80m from surface.

Trench 3.

This trench lay some 20m to the northeast of Trench 2, and was dug to run roughly parallel to it (Figure 5). It was *circa* 36m long and averaged 0.70m in width, though again this varied due to collapse of the trench sides. The trench was dug down to a depth where solid bedrock was encountered (where located) so this was variable.

The trench commenced alongside the road, and was orientated roughly NW to SE. For the first *circa* 8m of the trench a layer of 'Perma-soil' was encountered immediately below the turf. As this material is often laid by utility companies to protect the fill over services, and that it was known that a major gas main lay in the close vicinity it was decided not to excavate this section of the trench any further.

For the next 5.0m the profile recorded within the trench consisted of topsoil overlying 0.10m of grey-brown clay loam subsoil, and 0.20m of red-brown clay. This in turn overlaid 1.55m depth of made ground consisting of dumps of mixed clays and processing waste. A depth of 0.30m of soft orange, yellow-brown clay and decayed rock fragments (the decayed natural bedrock) lay below this, with a very decayed and soft felsitic elvan (probably the same dyke recorded previously) occurring at the base of the trench at a depth of *circa* 2.3m. This had the appearance of an infilled openwork.

Some 13.5m from the start of the trench, a distinct mining feature was recorded. This feature proved to be cone shaped in profile, *circa* 3.5m in diameter, being cut from close to surface. The southern edge was initially nearly vertical in nature down to solid bedrock at a depth of *circa* 2.5m; thereafter it became steeply angled, until at a depth of *circa* 3.m it changed direction again to become vertical. The northern edge was a steeply convex profile until becoming near vertical at a depth of 3.0m. At the base of the cone the feature seemed to become a vertical shaft approximately 2.0m across. The feature was infilled with loose material and stony blocks, which were excavated to a depth of 3.0m but it was not bottomed due to the unstable nature of the fill preventing further examination. It is uncertain exactly what this feature is; it could possibly be a small outcrop shaft.

The cut that formed the northern edge of this feature (at a point some 17m along the length of the trench) actually marks the end of the worked zone, as to its north the top of the shillet bedrock was seen at a depth of 1.5m and the dark, red-brown compacted clay interpreted as a buried old land surface reappeared. No dating evidence was obtained for this surface working.

For the next 9.0m northwards the profile recorded was fairly consistent, comprising 0.05m of grass, roots and topsoil, overlying 0.20m of red-brown stony clay gravel. This material overlaid up to 0.25m of compacted dark red, black-brown clay (most probably the old land surface), and up to 1.0m of yellow-brown clay with numerous shillet fragments (the decayed natural weathering zone). Solid shillet bedrock was encountered at the base of the trench and seen to rise towards the surface until at a distance of *circa* 24m along the trench, bedrock was encountered at a depth of 1.3m.

At a point 26m along the length of the trench another mining feature was encountered. Two vertical cuts set approximately 4.0m apart were recorded. Cut from close to the surface, this feature was found to be infilled with loose grey-brown stony clay and rubble, the fill being voided in places and very unstable. The feature was excavated to a depth of 3.0m but not bottomed as the instability of the trench sides prevented further investigation. As backfilling commenced the ground fell away to reveal a sub-circular depression in the ground *circa* 4.0m diameter. The features exposed indicated that this was most likely a shaft. This is further supported in that it lies roughly mid way between the two known recorded shafts belonging to Cooks Kitchen Mine: East Shaft (MCO54884) at SW 66574 40812 and an unnamed shaft at SW 66511 40770. These are roughly aligned with the South Crofty shaft at SW 66435 40748, and all appear to have been sunk on the same NE - SW aligned lode. No dating evidence was obtained for this shaft, though it is likely to post-date the small shafts, openworks and trench form work found close by.

For the remaining 5.0m of the of the trench it was seen that the profile was again fairly consistent comprising 0.05m of grass, roots and topsoil, overlying 0.20m of red-brown stony clay gravel. This material overlaid up to 0.15m of compacted dark red, black-brown clay (most probably the old land surface), and up to 1.0m of yellow-brown clay incorporating numerous shillet fragments (the decayed natural weathering zone). Solid shillet bedrock was encountered at the base of the trench.

Trench 4.

This trench was the easternmost (Figure 5) of those excavated and ran parallel with the fence marking the site boundary. It was *circa* 30m long and averaged 0.70m in width though in places where the sides were unstable it became substantially wider due to collapse. The trench was dug down to a depth where solid bedrock was encountered (where located) so this depth was variable.

For the first *circa* 16m of the trench the profile recorded consisted of topsoil overlying 0.40m of grey-brown clay containing modern ironwork, and builder's rubble including concrete blocks. This in turn overlaid up to 0.10m of compacted dark red, black-brown clay (most probably the old land surface), and up to 1.0m of yellow-brown clay with numerous shillet fragments (the decayed natural weathering zone). Solid shillet bedrock was encountered at the base of the trench.

A pit was recorded at a point roughly 5.5m from the start of the trench. This had a flat bottomed U-shaped profile with convex sides; it was approximately 2.5m long, and *circa* 1.2m deep. The pit was infilled with friable loose grey-brown clays, shillet fragments and stony blocks that were generally unstable in nature. Sealed by the modern dump layer above, and with solid bedrock forming the floor this had all the appearance of an infilled prospecting pit.

Some 16.2m along the length of the trench a ditch circa 1.8m wide was recorded. Sealed under 0.80m of modern dumped material, this ditch had a U-shaped profile and was 0.9m deep. It appeared to be orientated NE - SW and was infilled with red-brown processing fines and silt. The function of this ditch remains uncertain, though the fills do appear to be of a water-borne nature, suggesting that it might have been a leat. Though no dating evidence was observed, it is possible that this may have fed (or been fed by) the north eastern end of the reservoir shown at this location on the 1880 OS map (Figure 2), though the leat itself is not depicted on this mapping.

At a distance of 22.2m from the start of the trench a further small pit was encountered. This had a U-shaped profile and appeared to have a diameter of *circa* 1.0m and a depth of 0.40m. It was infilled with dark black-brown clays and wood fragments.

For the remaining 7.5m of the of the trench it was seen that the profile was again fairly consistent comprising 0.05m of grass, roots and topsoil, overlying 0.50m of modern dumped material (mixed clays and concrete blocks). This in turn overlaid up to 0.20m

of compacted dark red, black-brown clay (the old land surface), and up to 0.8m of orange, yellow-brown clay incorporating numerous shillet fragments (the decayed natural weathering zone). Solid shillet bedrock was encountered at the base of the trench.

6 Conclusions/discussion

No archaeological structures were recorded within any of the test pits, they did though demonstrate that made ground consisting of layers of mine and processing waste existed over most of the site, probably laid down during a phase of site levelling to make it usable as a yard and storage area.

The earliest features encountered in the course of this project appear to be those at on the south eastern ends of trenches T1, T2 and T3 (Figure 5). Within these it was noted that a linear mine working which was in places over 3.0m deep and over 12m wide followed the trend of the local lodes in a northeast to southwest direction. At its extreme south eastern end it was seen that part of this work exploited a very rotten felsitic dyke, though most had been cut through shillet bedrock. The nature of the lode which had been followed by this trenching was not observed. Two small outcrop shafts within trenches T1 and T3 and a stope steeply dipping to the northeast within trench T2 were recorded, these evidently sunk to exploit the lode to depths in excess of 4.0m.

The 1737 map of Tehidy Manor by Doidge (Figure 4) held by the Cornwall County Record Office (CRO) shows a line of what appear to be outcrop shafts running through this area along the same orientation as the openwork. The mapping names these 'the Brea Audit - A Tin Work'. By the time of the 1840 Illogan Tithe Map, nothing but open fields were indicated in this area, suggesting that these early investigative works had already been abandoned, their dumps levelled and their openings infilled. Certainly the more detailed 1880 1st Edition Ordnance Survey 25" to a mile mapping (Figure 2) shows no evidence for these works, though the spoil heaps and buildings of New Cooks Kitchen Mine were clearly depicted. The evidence suggests an 18th century or earlier date for the openwork and early shafts. Unfortunately no direct dating evidence for these features was recovered in the course of the work.

The probable shaft that was found at the north western end of Trench 3 beyond the northern edge of the openwork is more difficult to date. Though it was not depicted on the 1880 OS map, it does lie roughly mid point between Cooks Kitchen Mine's East shaft (MCO54884) and the unnamed shaft at SW 66511 40770. The position of the latter is shown as a small mound of spoil on the 1880 OS map, and as surrounded by a wall and marked 'Old Shaft' on the 1909 OS 2nd Edition 25" map (Figure 3). This suggests that this shaft had probably only just been abandoned *circa* 1880, and it is probable that the shaft uncovered in the course of the work is of similar date. Again no direct dating evidence for this shaft was recorded.

No evidence for the reservoir shown on the north eastern side of the site on the 1880 OS map (Figure 2) was recorded (such as layers in section providing evidence for clay lining or silting, or walling), however the 1.8m wide ditch running NE to SW recorded near the mid point of Trench 4 was seen to be infilled with silt and processing fines, and may have been either be a feeder leat associated with it, or a water course leading from it.

Finally, no evidence for any buildings was encountered within the trenches, though the layer of cinders seen at the northwestern end of Trench 1 may indicate the close proximity of buildings, particularly those recorded on the 1880 OS map *circa* 20m to the southwest of the trench line.

No other features of archaeological interest were seen over the area of the site apart from those noted above and no artefacts were recovered.

7 Recommendations

As this current project has demonstrated that early and potentially significant mining features still survive below ground, and occur close to the present day ground surface, it is recommended that an archaeological watching brief be carried out during ground works for the HWRC, as this is likely to expose the mine workings and possibly elements of the documented structures during their remediation. There is also a possibility that other undocumented features will be exposed during these works, and that dating evidence for the early workings might be obtained.

This is only a recommendation, and any decision about any further archaeological recording which might be required would be made by Phil Markham, HEPAO.

8 References

8.1 Primary sources

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8.2 Publications

- Buck, C. 1997. South Crofty and Cooks Kitchen (Phases 1 and 2). An archaeological watching brief during Derelict Land Grant works. Cornwall Archaeological Unit report to Kerrier District Council. CAU report 1997R036
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- Sharpe A. 2004, An archaeological assessment of the proposed development area at South Crofty, Pool, Redruth, Report for Crofty Developments Ltd.

8.3 Websites

http://www.heritagegateway.org.uk/gateway/ English Heritage's online database of Sites and Monuments Records, and Listed Buildings

9 Project archive

The HE project number is **HEXQPR146237**

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

- 1. A project and information file containing site records and notes, project correspondence and administration (file no HEXQPR146237).
- 2. Field plans and copies of historic maps stored in an A2-size plastic envelope (GRE790/1).
- 3. Digital photographs stored in the directory: R:\Historic Environment (Images)\SITES.A-D\Dudnance Lane HWRC, Pool WB May 2013
- 4. English Heritage/ADS OASIS online reference: cornwall2-151673
- This report text is held in digital form as: G:\TWE\Waste & Env\Strat Waste & Land\Historic Environment\Projects\Sites\Sites D\Dudnance Lane HWRC WB 2013\Report

10 Appendix **1.** Dudnance Lane HWRC assessment and watching brief: Written Scheme of Investigation for archaeological assessment and watching brief

Client:Geotechnics LimitedClient contact:Matt YatesClient tel:01392 463114Client email:myates@geotechnics.co.uk

Site history and project background

The mining sett of New Cook's Kitchen lay immediately to the east of the Red River Valley to the south of Tuckingmill, its lodes being essentially continuations of those worked in Dolcoath to the west and Tincroft to the east, though the lodes are dislocated along a north-south line by the Great Cross Course on the western side of the sett. As such, very great things were expected of undertakings in this area of the Camborne-Redruth Mining District.

The adjacent Cook's Kitchen had been, during its heyday, the second deepest mine in Cornwall. Like Dolcoath, it was at first worked very successfully for copper ores, and was described in 1796 as 'one of the most remarkable mines for copper perhaps in the world.' Its revenues were used by the Bassett family to fund a major rebuild of Tehidy House, and although it was initially worked by waterwheels, by 1794 it had already acquired a Boulton and Watt pumping engine.

However, by the 1820s, the richer deposits of copper available from the Cook's Kitchen lodes were already becoming substantially worked out and the adventurers' attention had begun to turn the exploitation of its tin resources. In 1849, emboldened by discoveries of rich tin resources below the copper deposits in Dolcoath, Tincroft and Carn Brea, Cook's Kitchen was taken up again, though found to be in a poor state. New steam-powered dressing floors were constructed, but most of the adventurers' attention was given to the deepening of Chapple's Engine Shaft – virtually the only deep shaft on the sett. By 1865 the mine was employing 370 people and working to a depth of 500m below adit.

In 1872, the mine was divided in two, New Cook's Kitchen taking over the northern part of the sett. However, declining tin prices and poor management over many decades had inevitable results, the last dividend for Cook's Kitchen being paid to the shareholders in the following year. Critically, the mine essentially continued to be worked from a single shaft, there had been expensive equipment failures, extensive areas of weak ground had been encountered which required heavy timbering, the eastern and southern parts of the mine had been found to be not worth working in depth and the ground to the west bordering Dolcoath could not be worked because of an agreement between the two mines. The only option was to work the core area of the mine ever downwards, at increasing expense. The mine was amalgamated with neighbouring Tincroft in 1875, though this was found to be a worse state than Cook's Kitchen.

In 1893, a further fall in world tin prices looked as if it would prove the final straw. By this time, the mine was in a poor state. Its engines were ancient, working a single, cramped and very deep shaft. Its dressing floors had not been remodelled for nearly four decades, the man engine reached only half way to the lower levels of the mine, where the heat was so intense that the working conditions were described as stupefying. In 1896 Tincroft and Cook's Kitchen were amalgamated with the Carn Brea

Mines, though the Cook's Kitchen workings had effectively been abandoned by this date. Carn Brea was abandoned in 1913/14 and Tincroft (with Cook's Kitchen) in 1921.

New Cook's Kitchen, created in 1872, also proved unsuccessful and was closed in 1893, parts of the sett being acquired by South Crofty in 1899, a new shaft (New Cook's) being sunk within the northern part of the enlarged sett.

South Crofty has a long and complex history, from small beginnings during the 18th century, gradually absorbing all of its neighbours to become the last working mine in Cornwall during the second half of the 20th century. Its story began with a plethora of small, shallow but often rich copper mines developed in the area around Pool and Tuckingmill during the 18th century, one of these being Wheal Crofty. The nearby East Wheal Crofty, which came into being in 1823, worked the former Longclose, Dudnance, Penhellick, Trevenson and Pool setts. After a short-lived closure, the mine was restarted in 1831, becoming one of the most important copper mines in Cornwall and in 1854, its sett was subdivided into North Wheal Crofty and South Wheal Crofty along the line of the Pool to Tuckingmill road. South Wheal Crofty thus worked the setts of the former Wheal Susan, Copper Tankard, Longclose, Dudnance and Penhellick, though Longclose was sold off to become Wheal Crofty. Contrary to expectations, South Wheal Crofty did not prove particularly successful, and closed in 1896.

However, in 1899, combined with the former Cook's Kitchen sett, the mine was restarted and was completely refurbished. Over the following decades this new amalgamation weathered the economic conditions which saw almost every other Cornish mine go to the wall. Adjacent adjoining setts were acquired and the mine eventually became the deepest ever to work in Cornwall. In 1985, however, the effects of the International Tin Crisis made even South Crofty uneconomic to work. Despite heroic efforts to keep the mine operational, it closed in 1999, though there are current proposals for its imminent reopening.

Over the 20th century, the surface land take for the mine has shrunk to the current core site around New Cooks Kitchen Shaft off Dudnance Lane, and all of the rest of the sites which formed its 19th century satellite components were abandoned, their buildings demolished and their shafts capped and, in many cases, overbuilt. The majority of these sites now lie under the industrial estates which have developed in the last four decades to the north of Carn Brea, though some survive as pockets of waste or undeveloped land, as in the instance of that proposed for the Dudnance Lane Household Waste Recycling Centre (HWRC).

Project extent

The current project is centred on a part of the former New Cooks Kitchen sett at SW 66509 40797 and extends to approximately 5,725m². Although shown as fields on the Illogan Tithe Map, this was an area rapidly developing into one of the most significant mines in the Camborne-Redruth Mining District. The 1877 OS mapping shows it to have been occupied by New Cooks Kitchen Mine, the project area including one of its outlying shafts, a mine reservoir, a mine building of unidentified function to the south and its winding engine house to the north west. At least one lode outcrop is known to cross the site towards its southern end, though geotechnical investigation along Dudnance Lane near the entrance to the Tesco Extra site shows extensive near-surface stoping trending in this direction, this very likely significantly pre-dating the development of the documented elements of New Cooks Kitchen mine and probably elements of the 18th century and earlier Dudnance Mine. The OS mapping showed that the whim engine had been demolished by 1907, though the pond and the building to the south remained. Following the centralisation of operations at New Cooks Shaft during the later 20th century, this area was used for mine waste disposal and latterly for materials storage. It is currently waste land awaiting redevelopment.

Aims and objectives

The principal aims of the study are to undertake a desk based assessment and walkover survey of the area proposed for the HWRC to help to inform the geotechnical site investigation programme and to undertake a watching brief during the investigation of mine workings and other geotechnical site investigations.

The principal objective of the project is to produce an interim and a final report detailing the results of the desktop/walkover survey and of the watching brief.

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 assessments will be undertaken to inform the fieldwork. This will include:

- Published sources and relevant grey literature
- Historic maps and plans, including
 - Joel Gascoyne's map of Cornwall (1699)
 - Thomas Martyn's map of Cornwall (1748),
 - OS 1 inch survey (c1810)
 - Illogan Tithe Map (c1840),
 - 1st and 2nd Editions of the OS 25 inch maps (c1880 and c1907)
 - relevant mining maps and plans
- Modern maps
- GIS map layers

Fieldwork: walkover survey

A walkover survey will be undertaken to determine the potential for the survival of features identified from the desktop survey. Any surviving features will be surveyed in using a handheld gps unit and marked up onto a base map derived from the dba survey; this record will be augmented with site notes and digital photographs.

Fieldwork: watching brief

An archaeological watching brief will be undertaken during the programme of geotechnical investigation of the site – this being targeted at mining features including shafts, adits, outcrop workings, near-surface stoping and areas of potential contamination by mine waste deposits.

Recording will be through a combination of site notes, photography and sketch and measured recording of features exposed within trenches and soil strip areas opened up by the geotechnical investigation team. The extent and detail of such work will be guided by Health and Safety considerations, particularly in relation to areas containing potentially unstable mine workings and especially adjacent to choked or open mine shafts. Potentially significant artefacts will be recovered for further study where possible.

Fieldwork: photographic recording

In order to provide a pre-works record of the features exposed during the investigative works, a photographic record will be created. This will include colour photographs taken

with a digital camera (with a resolution of 10MP or higher), to be used to illustrate the report and for possible presentation purposes.

The photo record will comprise:

- general views
- examples of structural and stratigraphic detail

Methodology for the photography is set out as follows:

- Photographs of details will be taken with lenses of appropriate focal length
- A tripod will be used to take advantage of natural light and slower exposures
- Difficulties of back-lighting will be dealt with where necessary by balancing the lighting by the use of flash
- A metric scale will be included in all views, except where health and safety considerations make this impractical

Creation of site archive

To include:

- Digital colour photographs will be stored according to HER guidelines and copies of images will be made available to the client if required.
- Preparation of finished drawings.
- All finds in significant stratified contexts predating 1800 AD will be collected. Post-medieval or modern finds may be disposed of at the cataloguing stage. This process will be reviewed ahead of its implementation.
- Completion of the English Heritage/ADS OASIS online archive index for the project

Archive report

An interim report will be prepared for the client on completion of the desk based assessment summarising its principal findings to assist in the targeting of areas of the site which might contain below-ground archaeological features for subsequent investigation.

A written report will be produced on completion of the project. This will include:

- Summary
- Project background
- Aims and objectives
- Methodologies
- Location and setting
- Designations
- Site history
- Results of desk based assessment
- Watching brief results
- Significance
- Conclusions
- References
- Project archive index

• Supporting illustrations: location map, historic maps, plans and elevations, photographs

A paper copy and a digital (PDF) copy of the report, illustrations and any other files will be deposited in the Cornwall HER. Paper copies of the report will be distributed to the client, to local archives and national archaeological record centres.

Archive deposition

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

The archiving will comprise 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. Drawn archive storage (plastic wallets for the annotated record drawings).
- 3. All finds, etc will be stored in a proper manner (being clearly labelled and marked and stored according to HE guidelines).
- 4. The project archive will be deposited initially at ReStore PLC, Liskeard and in due course (when space permits) at Cornwall Record Office.

Timetable

The study is anticipated to be commenced during 2012. HE will require at least three weeks notice before commencement of work, in order to allow the allocation of field staff time and the arrangement of other logistics.

The archive report will be completed within 3 months of the end of the fieldwork. The deposition of the archive will be completed within 3 months of the completion of the archive report.

Monitoring and Signing Off Condition

Monitoring of the project will be carried out by Phil Markham, Historic Environment Planning Advice Officer (West).

Monitoring points during the study will include:

- Approval of the WSI. Note that no works can take place on site until this WSI has been formally approved by Mr. Markham.
- Completion of fieldwork
- Completion of archive report
- Deposition of the archive

Historic Environment Projects

Historic Environment Projects is the contracting arm of Historic Environment, Cornwall Council (HE). HE employs some 20 project staff with a broad range of expertise, undertaking around 100 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

Standards



HE is a Registered Organisation with the Institute for Archaeologists and follows their Standards and Code of Conduct.

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

Terms and conditions

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

Project staff

The project 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 client and the field officers, including arrangements for health and safety.
- Monitor progress and results for each stage.
- Edit the project report.
- Liaise with the client regarding the budget and related issues.

Work will be carried out by HE field staff, with assistance from qualified specialists where appropriate.

Report distribution

Paper copies of the report will be distributed to the client, to local archives and national archaeological record centres.

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

Copyright

Copyright of all material gathered as a result of the project will be reserved to the 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.

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 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.

Insurance

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

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Buckley, J.A. 1982, South Crofty Mine, Dyllansow Truran

The Cahill Partnership and Cornwall Archaeological Unit 2002, *Cornwall Industrial Settlements Initiative: Pool*, Cornwall Archaeological Unit report

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Adam Sharpe BA MIfA

Senior Archaeologist

30 January 2013

Historic Environment Projects, Cornwall Council

Kennall Building, Old County Hall, Station Road, Truro, Cornwall. TR1 3AY

Tel: 01872 323603; Fax: 01872 323811

Email: asharpe@cornwall.gov.uk



Figure 1. Location map



Figure 2. The 1880 OS 25" map showing site area outlined in red, and lodes in blue © and database right "Crown Copyright and Landmark Information Group Ltd" (All rights reserved 2011).



Figure 3. The 1908 OS 25" map showing site area outlined in red and lodes in blue \bigcirc and database right "Crown Copyright and Landmark Information Group Ltd" (All rights reserved 2011).



Figure 4. Geo-referenced Doidge Map. 1737 showing position of Brea Audit A Tin Work and known lodes. © *Copyright CRO.*



Figure 5. Site plan showing Trench locations, Test Pits, and features located.