



CPR Road Scheme, Cornwall

Archaeological Watching Brief



Cornwall Archaeological Unit

CPR Road Scheme, Cornwall

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Client	Cornwall Council (Strategic Planning and Transportation)
Report Number	2014R090
Date	January 2015
Status	Final
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Acknowledgements

This study was commissioned by Mark Allott (Cornwall Council, Strategic Planning and Transportation) and carried out by Cornwall Archaeological Unit, Cornwall Council.

Emma Blakesley, Geo-environmental Engineer, CORMAC Engineering Services, provided information about the mining investigations and what they had revealed about shafts, stopes and lodes along the route of the road corridor and the results of mitigation work done previously, or when the archaeologist could not be present.

The Project Manager was Andy Jones.

The views and recommendations expressed in this report are those of Cornwall Archaeological Unit and are presented in good faith on the basis of professional judgement and on information currently available.

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Cover illustration

The Red River Valley looking north-east, showing site of the new bridge, as well as the construction of the road causeway, the footings for the bridge, and the new channel for the Red River. The recently conserved head frame on New Cooks Shaft now forms one of the few surviving surface remnants of South Crofty Mine.

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Abbreviations

CAU	Cornwall Archaeological Unit
HER	Cornwall and the Isles of Scilly Historic Environment Record
MCO	Monument number in the Cornwall HER
OS	Ordnance Survey

1 Summary

In 2013 Cornwall Archaeological Unit was commissioned by Cornwall Council to undertake archaeological recording along the route of the Camborne to Pool (CPR) Link Road.

The corridor of this road was created through some of the most important former mining areas in Cornwall, including through the setts of Dolcoath (once Cornwall's premier mine) and the Tincroft mines, both being at their height of operation during the 18th and 19th centuries, extracting both tin and copper from the rich mineral lodes in this locality. This area, and especially the Red River Valley, was at one time part of the most heavily and intensively industrialised area of Cornwall; today following the re-processing of tailing dumps for their mineral content and more recent land reclamation and landscaping projects, very little evidence remains visible at surface.

The archaeological monitoring of the CPR road scheme provided a window into some of this earlier history, and has provided important insights into some of the mining history of the area, though the evidence proved patchy, preservation being better in some areas than in others.

In particular, at the west end of the road corridor within the western fields, it was possible to identify and record mining activity on two major lodes that had included initial prospection, exploitation via outcrop shafts, the digging of deep shafts, and finally the working of the lode at depth utilising extensive stopes. These features are likely to date from the late 17th or early 18th century through to the late 19th century, and possibly into the early 20th century, and were associated with Dolcoath Mine. Evidence for parts of a major underground leat system, developed to power machines and pumps utilising underground waterwheels within Dolcoath Mine was also recorded, this being likely to date to the 17th and 18th centuries. Those within the Bullen Garden section of Dolcoath are shown in William Pryce's *Mineralogia Cornubiensis* published in 1778, Fig 4, p 177.

Evidence for mining activity in the area to the east of the Red River was less well preserved, and although a few features were recorded, much evidence had been lost due to modern activity within this section of the road corridor. No evidence for any pre-industrial activity was recorded along the length of the road corridor.

The opportunity to investigate the extent and quality of the archaeological evidence for mining activity on a large scale across parts of the corridor was unusual and this project has allowed the evolution of aspects of Cornwall's central mining district to be documented and interpreted.

2 Introduction

2.1 Project background

In May 2013 HE Projects (now Cornwall Archaeological Unit, CAU) was commissioned by Mark Allott (Cornwall Council, Strategic Planning and Transportation) to undertake an archaeological watching brief during groundworks involved with the construction of a new 2.6 Km road linking the settlements of Camborne, Pool, and Redruth, this being known as the CPR Link Road (Fig 1). The route was subject to two planning applications: NR/08/00355/CC ENV (23/07/2008) and PA09/01295/F (02/10/2009), which required archaeological recording taking place ahead of and during construction. Archaeological assessments of the road corridor were undertaken (Parkes 2007, and 2009) that helped to determine the scope of the archaeological recording that would be required.

Phil Markham, former Historic Environment Planning Advice Officer (West), Cornwall Council, produced a series of briefs for the archaeological recording, as well as an overall brief for the project (27/11/12, Appendix 2), and was consulted over the requirements for the work.

An overarching project design (Appendix 3) for the recording of archaeological features along the entire length of the road corridor was produced (06/03/13) by Dr Andy Jones (Archaeologist Team Leader, CAU), in response to Phil Markham's brief, along with separate Written Schemes of Investigation (WSIs) for individual stretches of the road, these being: Dudnance Lane to Wilson Way (Jones 5/3/13), South Crofty (Jones 6/3/13), Basset/Bartle's Foundry (Sturgess 6/3/13), the western fields (Jones 30/4/13) and the Red River Valley and mine spoil area (Jones 1/5/13).

2.2 Aims

The purpose of the archaeological recording was:

- To ensure that the site works associated with the development were carried out in such a way as to allow adequate recording.
- To record upstanding buildings and structures as outlined in the Phase 1 project designs for Bartle's Foundry, Wilson Way and South Crofty.
- To record archaeological features and deposits affected by the scheme, as described in the Phase 2 project designs for Dudnance Lane to Wilson Way, Bartle's Foundry, the Red River Valley mine spoil area, and the fields to the west of the Red River.
- To recover and record artefacts uncovered by the works, as appropriate.
- To undertake palaeoenvironmental sampling and analysis, as appropriate.
- To disseminate the results of discoveries from all stages of the project appropriately.
- The long-term conservation of the project archive in appropriate conditions.

2.1 Key objectives were:

- To locate and record prehistoric, medieval industrial activity and evidence associated with post-medieval mining/industrial activity within the area affected by the road scheme.

2.3 Methods

The project included the following stages.

Prior to the commencement of the archaeological recording a geophysical survey was undertaken within the area of the Western Fields by ArchaeoPhysica Ltd (Roseveare, 2013).

2.3.1 Fieldwork

Most of the archaeological recording consisted of a watching brief with controlled soil stripping being undertaken in more archaeologically sensitive areas (see below).

2.3.1.1 Controlled topsoil stripping

Controlled soil stripping was carried out along those parts of the road corridor where a larger area of undeveloped open ground was to be affected by the scheme. These areas included the western fields and Dolcoath Road, Lower Pengegon (see section 6.1 below), and a small stretch within the Dudnance Lane to Wilson Way corridor to the northeast of the sports ground (Carn Brea Leisure Centre), see section 6.5 below.

The soil stripping was carried out under archaeological supervision using a machine fitted with a toothless grading bucket. The soil was stripped cleanly to a level at which archaeological features or layers were expected to be revealed, in this case the top of the natural geology. The area was then inspected by the archaeologist. On some occasions, it did not prove possible for the archaeologist to be on site when groundworks were being undertaken, and features had to be recorded subsequent to their mitigation, or their forms recorded from the observations of others.

Archaeological features in the investigated area were plotted onto a site plan based on the Ordnance Survey mapping at a scale of 1:1000. Features were located by taking compass bearings and measurements from fixed locations. Identified features were planned at scales of 1:500 and 1:100. Sections through features were recorded at scales of 1:10 and 1:20. Sample sections (recording the nature of soil depth, layers present, etc.) were also drawn up at relevant locations along the length of the stripped area. A digital photographic record was kept of the trenches and features encountered.

Where significant remains were encountered, the site archaeologist was given the opportunity to make an appropriate record before work proceeded. This was achieved in agreement with the resident engineer.

2.3.1.2 Watching Brief

For the majority of the road corridor, the recording was undertaken in the form of a watching brief. This involved an archaeologist being in attendance during groundworks or making visits to record any features which were exposed during the road construction process. Where significant remains were encountered the site archaeologist was given the opportunity to make an appropriate record before work proceeded.

2.3.2 Post-fieldwork

An archive level report has been produced which contains the results from the project (this report) and the project archive has been collated.

In the course of writing this report historical databases and archives were consulted in order to obtain information about the history of the site and the structures and features that survived. The main sources consulted were as follows:

- Cornwall HER.
- Early maps and photographs.
- Published histories.

- Previous archaeological reports including the archaeological assessments of the road scheme (Parkes 2007; 2009).

A felt miners' 'tull' or hat most likely dating from the 19th century though possibly dating to the early 20th century was found in Tunnel [68] within the western fields, field 10. Discussions are still ongoing as to where this is to be deposited, Geevor Tin Mine Museum being the most popular suggestion. No final decision had been made at the conclusion of the watching brief, the hat being held, albeit temporarily, at the CAU Finds Store.

3 Location and setting

3.1 Geology and soils

The underlying geology of the project area consists of Upper Devonian slates and mudstones of the Mylor series, its metamorphosed edge abutting the Carn Brea mass, a smaller area of granite to the north of a major outcrop (the Carnmenellis intrusion), the contact between the sedimentary and igneous rocks occurring immediately to the south of the main railway line.

An elvan dyke running roughly northeast to southwest lies to the south of, but approximately following the line of Pendarves Street, East Hill, and Trevenson Road, and occurs on the northern edge of the area examined, from SW 65846 40786 to SW 66616 4156. Another major elvan dyke lying just to the north of the railway line runs from SW 66206 40342 to SW 66445 40533 on the southern edge of the study area.

The whole area is criss-crossed with mineral lodes, most following the same trend as the dykes, this being characteristically northeast to southwest; however, a few lodes run perpendicular to this orientation (caunter lodes). The lodes within this district predominantly contain copper, with tin at depth (Dines 1956, 276). These northern flanks of the Carnmenellis granite have been characterised as '*the most intense zone of tin and copper mineralization*' in Cornwall (Bristow 1996, 102).

The soils are of the type known as Denbigh 2, these typically being brown earths (Soil Survey of England and Wales 1974).

3.2 Landscape

The road corridor crosses the inner, southern edge of a broad plateau or peneplain which is cut by several deep valleys that run towards the north coast of west Cornwall. Within the project area, the ground is predominantly level or gently sloping, and is bisected by the north-south aligned valley of the Red River, which in this area is fairly narrow and deep, but which broadens northwards towards the coast. The southern edge of this plateau is marked by rising ground that forms the hill of Carn Brea, a relatively isolated, long, tor-crowned ridge, and a prominent regional landmark. At its south-western end, two lesser hills, Carn Arthen and Carn Entral, continue its line (Figs 1 and 2). In total the road corridor affected an area of some 10 Hectares.

Along the north side of the study area is the conurbation formed by the towns of Camborne (to the west) and Redruth (to the east), the smaller linear settlements of Tuckingmill, Pool, Illogan Highway, Barncoose and Blowinghouse lying between them. The area studied lies within the parish of Illogan. To the south, the main line Paddington to Penzance railway borders the area, its straight course here following the edge of the coastal plateau at the foot of the hills.

4 Designations

4.1 National

World Heritage Site

Area 5(i) (the Camborne and Redruth Mining District) of the Cornwall and West Devon Mining Landscapes World Heritage Site (WHS) inscribed in 2006 includes a large area, Carn Brea and Camborne lying within this on the south and west of the road corridor (Cornwall County Council 2004). Various sections of the road come close to or intersect land within the WHS, including areas to the west of Dolcoath, to the east of the road to Lower Pengegon, within the Red River valley, on either side of Chapel Road, Tuckingmill, to the south of Dudnance Lane, to the north of the railway, and to the west of Tolvaddon Road and Dudnance Lane on the north-western and south-western sides of East Hill junction.

5 Site history

The history of the area has been fully covered in the archaeological assessments of the road scheme (Parkes 2007; 2009). A summary which is largely taken from these reports is presented below.

Although the area has undergone many of landscape changes within the last couple of centuries due to intensive industrial activity, there is some evidence for earlier human influence on the local landscape.

Evidence for occupation during the Neolithic period (*circa* 4,000 to 2,500 BC) has been found at Carn Brea which lies at a distance of approximately 1,300m to the south-east of the current project area (MCO357, MCO13791). Partial excavation of some of the earthworks found on this hill have demonstrated that Carn Brea sited a tor enclosure of Early Neolithic date (Mercer 1981). A potentially very important discovery made in the Red River valley at Tuckingmill in the 19th century during groundworks for gasometers, consisted of the uncovering of the buried remains of a 'boat' containing a stone adze head, the latter dateable to the Neolithic period (MCO 1794). The identification of the 'boat' is, however, tentative; it is possible that it may have been the remnants of an early timber tin streaming launder (Childe 1951).

During the Bronze Age (*circa* 2,500 to 600 BC) there is some evidence for activity on Carn Brea, indicated by the occasional find of barbed and tanged flint arrowheads (MCO 56594) and a hoard of Late Bronze Age socketed axes found there during the 18th century (MCO 24890). A Map of the Manor of Tehidy, drawn up in 1737 by William Doidge records a cluster of three mounds not far from the lower slopes of Carn Brea at Highburrow, Tregajorran (MCO 54965). These could possibly be Bronze Age barrows but are more likely to be early mine workings (Parkes 2007). A possible barrow containing 'bones in a pot', perhaps a cremation in an urn, was found in 1876 at Carn Entral (MCO 2354). This lies around 500m to the south of the western end of the road corridor.

During the Iron Age (*circa* 600 BC to AD 43) Carn Brea was reoccupied as a fortified settlement (MCO 38) its double ramparts enclosing at least 12 hut circles (Sharpe 1985).

It may have functioned as a focal point or administrative centre for the whole area (Mercer 1997). The sites of several 'rounds' or enclosed farming hamlets characteristic of settlements of Iron Age and Roman period Cornwall occur in the wider vicinity of the road corridor. These have been identified from historic maps, and place name evidence. West of Dudnance Lane, at SW 66417 40617 (within part of South Crofty Mine) is the probable site of a round (MCO 54943) indicated by the field name 'Whealangare' that includes the Cornish element *ker*, meaning fort or round (Padel 1985, 50-52). Another possible enclosure site lies on the south of the Barncoose industrial estate (*circa* SW

67868 41246) indicated by evidence from William Doidge's map of 1737, and the OS map of 1809 (Parkes 2007). Iron Age pottery was found (Sharpe 1998) near Tregajorran during groundworks for the Boscarn Parc travellers' site at Carn Brea Stamps some 10m to the north of the site of Polkinghorne's Shaft (SW 67435 40915).

South-east of South Crofty at SW 6661 4093, Tuckingmill round (MCO 54901) is depicted on the Lanhydrock Atlas (Gascoyne 1696) and curvilinear field walls are recorded on the 1880 OS map. Another possible round (MCO 8319) has been identified at Pengegon at SW 6600 3995 which lies some 330m south of the western end of the project. A map of Tehidy in 1806 drawn up by J. Mill names a couple of fields here as 'Park Round' and 'Round Field'.

Evidence for activity in the area during the Roman period (AD 43 to AD 410) is indicated by stray finds of coins including one of Nero (dated to AD 66) from East Charles Street, Camborne (MCO 331), one of Constantine I (AD 307-337) from Edward Street, Tuckingmill (MCO 577), and a couple of coin hoards from Carn Brea. The hoard found in 1744 (MCO 248893) contained coins that have been dated to the 2nd to 4th centuries AD; the second found in 1749 (MCO24892) contained coins of unknown Roman date. A gold coin of Valentinian I (AD 364 to AD 375) was also found in a brook at the bottom of Carn Brea *circa* 1828 (MCO24892). No Roman structures are known in the area, though the rounds are likely to have continued in use throughout this period.

During the medieval period (*circa* AD 410 to AD 1600) many settlements developed near or along the route of the road to the north of Carn Brea, the largest being Redruth (MCO16541) which was first recorded *circa* 1250 (Gover 1948), with market and fair charters dating from 1333 (Parkes 2007). The settlement of Camborne (MCO13708) is first recorded as "Cambron" *circa* 1100 (Gover 1948) but was at this time no more than a small hamlet with a church. Other recorded medieval settlements in the area included Penhellick (MCO16148), first recorded in 1314, Tregajorran (MCO17202), first recorded in 1241, Entrall in 1380 and Southern Entrall in 1595 (MCO14400). A fulling or tucking mill was recorded as being sited at Tuckingmill in 1250 (Pevsner and Radcliffe 1970).

It is at this time that mining began in earnest in this area, tin being produced on a substantial scale across the district. This may well have initially involved exploiting the Red River valley's alluvial tin deposits, these already having been separated from the parent lodes by erosional forces, utilising streamworks. The place-name of Redruth is derived from the Cornish for 'red ford', thought to reflect the staining of its river through the disposal of the waste from such streaming operations into it (Parkes 2007). In subsequent periods, the miners began to excavate openworks on the backs of the lodes and, by the 16th century, 'adits' were being driven from nearby valleys to access the lodes at depth. The place name Dolcoath, whose Cornish name means 'old ground' (Padel 1985), may refer to medieval tinworks.

The exploitation of the mineral resources of the area was subsequently greatly expanded, developing from near surface workings *circa* 1700 through the sinking of shafts equipped with horse-powered pumping systems and linked to drainage adits, enabling the lodes to be developed to far greater depths; after *circa* 1750 the mines could be pursued to significant depths following the introduction of the steam technology necessary for de-watering deeper levels. This produced an extensive and long-lived, east-west group of mining and related sites in the area which sited Dolcoath, Cook's Kitchen, Tincroft, the Carn Brea Mines, South Crofty and North Crofty.

Cook's Kitchen is recorded *circa* 1690, while Longclose Mine to the south west of the East Hill junction is known to have been at work by 1743 (Sharpe 2005); there is also some evidence for 17th century workings at Dolcoath (Cahill and CAU 2002). Dudnace Mine, to the east of Long Close on the south east side of the East Hill junction, is recorded as working before 1778 (Dines and Phemister 1956, 317-18) whilst Thomas Martyn's map of 1748 depicts Dolcoath, marked with a symbol for copper, and Cook's Kitchen and possibly also Tincroft with the symbol for tin. Dolcoath, Cook's Kitchen,

Tincroft, together with Wheal Fanny and Highburrow Mine were all depicted on the 1809 OS 1st Edition 1" to a mile map.

Throughout the 18th century and much of the 19th century these mines suffered periods of depression, and some were closed, re-opened, or amalgamated, but in general, they increased in scale, and complexity. By the 1770s, the Camborne mines were the major producers in the county, and Dolcoath became established as the most important of them all (Parkes 2007).

During this period stamping mills would have been operating around the area, using water power to process the tin ore produced by these mines. Many of these were sited within the Red River valley. Other, mine-related industries were also established, including foundries, smithies and small engineering workshops, creating a heavily industrialised landscape. The mines and other industries continued at work, with many closures, re-workings, expansions, and amalgamations through the 19th and 20th centuries until the last of them, South Crofty, was closed in the late 1990s.

The growth in mining and other industries, together with a need for significant improvements in communication in turn stimulated and facilitated the expansion of existing settlements to accommodate workers' families, and the formation of new settlements strung out along the road linking Redruth and Camborne. During the nineteenth century Camborne expanded greatly, becoming a rival to the earlier established Redruth, and in both towns, expansion of existing housing, the creation of extensive new residential districts, and numerous impressive civic, religious and commercial buildings marked the success of this period (Herring *et al* 2000).

Following the virtual cessation of mining in the later 20th century, the re-development of abandoned mining sites and former farmland for light industry and retail was encouraged, particularly at the east end of the current road scheme. Pool and Barncoose Industrial Estates have filled in much of the strip of land between the railway and the former A30 (now the A3047) to the east of Dudnance Lane, whilst a sport and leisure centre was established near the railway, its outdoor track levelled into the waste dumps left by Tincroft Mine. Recent residential development in the development area has been limited, though some housing has been laid out around Dolcoath and at Lower Tregajorran. The greater part of the area to the west of Dudnance Lane remains as open rough ground, much used by local people for leisure pursuits, and is rich in industrial remains (Parkes 2007).

6 Archaeological results

The course of the road was divided by the contractors into different areas to make the management of the project and the undertaking of the construction work more manageable. The results of the archaeological watching brief are presented here by area working from the west to east along the line of the road corridor.

Detailed descriptions of archaeological features are given in the inventory of sites (Appendix 1). In most cases the features revealed were excavated mechanically, however a few such as the timber launders [85], [87] and rag frame bases [84] within the Red River Valley (section 6.2) were partly excavated by hand.

6.1 Western Fields and Dolcoath Road, Lower Pengegon

This section of the road line extended from the western edge of the Red River Valley at SW 66199 407728, passing through a series of nine fields to join Dolcoath Road at SW 65853 40392 (Fig 11). The fields were each given a number (fields 1 – 9) from east to west, reflecting the order in which they were soil-stripped. The road corridor varied from 25m to 30m in width, though Field 8 was stripped in its entirety to provide a site compound. Prior to the work commencing a geophysical survey of the western fields

had been undertaken by ArchaeoPhysica Ltd along the road. This had suggested the presence of below-ground features including shafts, disturbed ground (possible outcrop shafts) and the lines of removed field boundaries (Roseveare 2013).

6.1.1 Field 1

The profile of the soils recorded across this field (Fig 11) consisted of 0.05m of grass, roots and topsoil overlying 0.10m of light grey-brown clay loam, and 0.05m of red-brown clay. Yellow brown clay and shillet – the decayed natural bedrock - lay at the base of the stripped material, although in places the ground had the appearance of pockets of mine waste pressed into its surface. The basal layer was, in places, heavily manganese and iron stained, indicating some panning due to waterlogging.

No archaeological features or finds were recorded.

6.1.2 Field 2

The profile of the soils recorded across this field consisted of 0.05m of grass, roots and topsoil overlying 0.12m of light grey-brown clay loam, and 0.06m of red-brown clay. Yellow brown clay and shillet – the decayed natural bedrock - lay at the base of the stripped material. The top of the natural subsoil was, in places, heavily stained with manganese and iron panning.

The remnants of a heavily truncated feature [78] were recorded close to the northern edge of the road corridor (Fig 11). This consisted of a steep-sided linear cut measuring 1m wide by 0.5m deep which was oriented in a roughly north-east to south-west direction. In places the cut appeared to be clay lined and it had become infilled with red brown silts. The cut was associated with very ephemeral traces of walling running both parallel with it on its south-eastern side and perpendicular to it at its southern end (heading westwards). This cut appeared to be a leat.

At the southern end of the linear cut was a roughly rectangular shaped structure comprised of a granite slab, and a pit that incorporated a timber construction. Unfortunately this had been dug away before it could be recorded archaeologically. When examined, it was found that one of the timbers incorporated a mortise.

The whole area had been greatly disturbed by the excavation machinery and the remains were in places heavily truncated, and consequently it is uncertain as to what this feature represented. The 1909 OS map (Fig 5) shows the line of a leat and a sluice in this location feeding settling tanks that formed part of the Dolcoath dressing floors on the western side of the Red River valley (SW 66119 40724), so it is possible that these remains are part of that leat system, a continuation of that described in the assessment (site 74 in Parkes 2009).

Where the northern part of the field (Fig 11) formed a triangular area (centred at SW 66040 40702) it was found that the bedrock had been covered by a layer of clay, and silts, feature [79]. The level nature of the field at this location and the presence of the water-born deposits suggest the site of a reservoir or pond. This seems to be confirmed by the 1909 OS map (Fig 5) which indicates such a feature at this location (for further information see Buck and Sharpe 1994, feature 2 and Parkes 2009, site 27 and site 87).

No other archaeological features were recorded in this field.

6.1.3 Field 3

The profile of the soils recorded across this field consisted of 0.05m of grass, roots and topsoil overlying 0.15m of light grey-brown clay loam, and 0.2m of red-brown clay. Yellow, orange-brown clay - the decayed natural bedrock - lay at the base of the

stripped material. The top of the natural subsoil was in places heavily stained with manganese and iron panning. The soil profile was fairly uniform across the whole field, only varying in depth slightly between 0.3m and 0.4m.

No archaeological features were recorded within this field (Figs 7 and 11).

6.1.4 Field 4

The profile of the soils recorded within this field consisted of 0.05m of grass, roots and topsoil overlying 0.1m of light grey-brown clay loam, 0.15m of dark grey-brown clay and 0.1m of red-brown clay. Orange, red-brown clay - the decayed natural bedrock - lay at the base of the stripped material. The top of the natural was in places heavily stained with manganese and iron panning. The soil profile was fairly uniform across the whole field, only varying in depth slightly between 0.4m and 0.45m.

No archaeological features were recorded within this field (Fig 11).

6.1.5 Field 5

The profile of the soils recorded within this field consisted of 0.05m of grass, roots and topsoil overlying 0.2m of light grey-brown clay loam, 0.2m of red, grey-brown clay and 0.05m of dark red, grey-brown clay. Orange or red-brown clay with stone fragments - the decayed natural bedrock - lay at the base of the stripped material. The soil profile was fairly uniform across the whole field, only varying in depth between 0.3m and 0.45m.

Pit [1] was recorded in the northern part of the field (Fig 11). This feature had an elongated oval cut with straight, roughly parallel sides (see inventory, appendix 1 for details). This feature is likely to represent a prospecting pit.

At the south-western end of the field (Fig 11) a shaft [40] was located (for full details see appendix 1). There was no indication of this shaft at surface, although it was indicated on the geophysical survey of the area (Roseveare 2013). It appeared after topsoil stripping as a circular area of dark clay 4m in diameter that subsided to a depth of roughly 0.25m within a couple of days of being uncovered. On excavation this proved to be a completely choked shaft with a depth in excess of the 6m which was excavated from it. This feature was mitigated by creating a cone-shaped plug of concrete with its top at a level below that required for the road.

About 18m to the west of shaft [40] centred on SW 65874 40575 (Fig 3) several further features were revealed (for full details see appendix 1) that appeared to be of mining origin. None were apparent at surface, although the geophysical survey indicated a concentration of heavily disturbed ground in this vicinity (Roseveare 2013).

The first feature recorded lay some 10m to the north-west of Shaft [40]. This was a sub-rectangular pit [41] which had rounded corners. This had roughly parallel sides, its long axis being orientated north-west to south-east. The feature is likely to have been a prospecting pit.

Approximately 10m to the south-west of pit [41] was a large oval shaped area [42] of disturbed ground (for full details see Appendix 1). The area was mechanically excavated to a depth of 3m but the feature was not bottomed (Fig 11). This feature was probably a shaft. It had been excavated through a possible outcrop shaft or openwork [43]. The shaft was mitigated by having an inverted concrete conical plug inserted at a depth required for the road. Unfortunately this work was not recorded archaeologically, but apparently no further mining features were encountered (Emma Blakesley, pers. comm.).

Leading off from this shaft in a roughly northerly direction and disappearing into the edge of the side of the road corridor was a zone of disturbed material filling outcrop

shaft/openwork [43]. Its edges were quite well-defined, suggesting that this was a cut feature (full details are in appendix 1) and had the appearance of being an outcrop shaft or small openwork. It was cut at its southern end by shaft [42]. This feature was not investigated further.

At the northern end of the openwork [43] and cutting it, was a pit [44] which appeared to be sub-circular in shape. Its full extent was not fully determined as it was located at and beyond the edge of the road corridor. This proved to be a modern rubbish pit, and it was not investigated further.

Lying about 1m to the west of shaft [42] was a sub-rectangular shaped pit [45] which had rounded corners (see Appendix 1). This again had the appearance of a prospecting pit.

6.1.6 Field 6

Within this field, the stripped corridor was around 30m wide and the soil profile consisted of 0.05m of grass, roots and topsoil overlying 0.1m of light grey-brown clay loam, and 0.15m of red, grey-brown clay. Orange, red-brown clay with stone fragments - the decayed natural bedrock - lay at the base of the stripped material. The depth of the profile was fairly uniform across the whole field, varying from 0.3m to 0.4m.

Evidence for early mining was encountered across the entire length of this section of the road corridor (around 60m). The recorded archaeological features included a rough grid pattern of prospecting pits (Fig 16), a network of underlying prospecting tunnels, a number of outcrop shafts and open stopes working the sections of lodes close to surface (see site inventory). The greatest concentration of features was located adjacent to the outcrops of two major lodes which crossing the field from north-east to south-west, and which were centred at SW 65857 40517 (Figs 11 and 15).

These two major lodes - Entral Lode and Silver Lode - were known to cross the field from the north-east to the south-west, Entral lode being the more northerly. Cut into the bedrock immediately below the topsoil (Fig 15) was a group (Fig 16) of 32 pits (Pits [4] to [39], these being centred at SW 65862 40515). These were set out in lines perpendicular to the projected strikes of the lodes in order to locate their outcrops at surface. Interestingly a greater concentration of prospecting pits (Pits [12] to [21]) were found where Silver Lode appeared to change direction slightly, kinking towards the north; this clearly reflects the miners' attempts to relocate the lode (Fig 15).

In general the pits were very similar to one another, averaging 2m in length, 0.8m in width, and being roughly 1.5m deep with flat bases (Fig 16). Twenty eight of the 32 pits were orientated roughly north-west to south-east. Four pits were set out at right angles to this alignment. No reason for the change in alignment could be determined. No direct dating evidence for any of the pits was recovered.

The prospecting pits utilised to locate the outcrop of Silver Lode appear not to have provided enough information to the miners, as a network of tunnels was recorded below the bases of the prospecting pits. These seemed to correspond with the pattern of pits overlying them, as if trying to confirm or refine the findings of the prospecting pits (Fig 15 and site inventory).

This underground system (Fig 15) was revealed during the site works when part of the roof of tunnel [3] collapsed due to the weight of the dumper trucks running over the top of it. Cut through very rotten bedrock, it was seen to follow the line of the lode in a north-east to south-west direction and was traced for roughly 18m. From the point where the roof of the tunnel was breached it dipped steeply to the south-west, so when the edge of the road corridor (approximately 10m away) was reached the roof was approximately 2m below the surface. From the point of the breach the tunnel was found to run roughly horizontally in a north-easterly direction, its depth averaging between 1.5m and 1.6m below the surface. In general throughout the 18m length

recorded the tunnel had an arched roof with near vertical sides, having an average height of about 1.5m and a width of 1m.

After 18m tunnel [3] was seen to change direction (Fig 15) swinging more sharply and becoming aligned north-north-east to south-south-west. From this point the tunnel was numbered [50] and was traced for a further distance of about 15m. This latter section was given a different number due to its changed orientation, as it was thought initially to be a separate tunnel. The shape and dimensions of this stretch of the tunnel were similar to tunnel [3] and it was subsequently concluded that they were the same feature.

Along the course of tunnel [3]/[50] several cross cutting branch tunnels were recorded. All of these followed a north-west to south-east trend and had roughly similar dimensions and shapes, being on average 1.5m high, and 1m wide with arched roofs (see Fig 27 for the layout of some of these features).

The most southerly of these, tunnel [60] was located at the south-western end of tunnel [3] immediately at the edge of the road corridor. It was found to run in a south-easterly direction and was traced for about 1.5m before it became choked. The top of the roof of the tunnel was about 2m below the ground surface.

Roughly 8m from the edge of the road corridor was tunnel [59]. This branched in a north-westerly direction from tunnel [3] and was traced for about 2m before it became choked and was lost. Its roof was about 1.8m below the ground surface.

The next branch tunnel [54] lay 2m from the north-eastern end of tunnel [3]. It struck off in a south-eastern direction and was traced for a distance of about 4m before it came to an abrupt end in solid rock. The top of the roof was about 1.5m below the ground surface.

Three side tunnels were also recorded along the length of tunnel [50]. All were orientated north-west to south-east (Fig 15).

The most southerly was tunnel [52]/[55]. Tunnel [55], which ran to the south-east, was only traced for about 1.2m before it became totally choked. Tunnel [52] ran towards the north-west and was traced for a length of about 6m, at which point it connected with tunnel [58] which was aligned north-east to south-west, and was roughly parallel to the course of tunnel [50]. Tunnel [52] dipped slightly to the north-west; its roof was 1.5m below the ground at its eastern end, increasing to 1.8m by the junction with tunnel [58].

The next cross-cutting tunnel [56] was recorded a further 7m along tunnel [50]. This tunnel [56] was only traced for a distance of 1m either side of tunnel [50] before becoming completely blocked. Again this tunnel lay at a depth of about 1.5m below the ground.

At the north-eastern end of tunnel [50] was tunnel [57]. This tunnel was only traced for a distance of about 1.5m on either side of tunnel [50] before becoming choked and blocked. There seems to have been a major collapse at this point as it also marks the furthest point that tunnel [50] was traced before it was also lost. Tunnel [57] had similar dimensions to the others recorded, and again lay about 1.5m below the ground surface.

The final part of this tunnel system that was recorded was tunnel [58]. This was located at the north-western end of branch tunnel [52]. It ran north-east to south-west, and was therefore parallel with tunnel [50]. It was, however, only traced for a distance of about 2.5m before it became blocked at both ends and its full course proved untraceable. The roof of this tunnel was 1.8m below the surface.

No direct dating evidence was obtained for any parts of this tunnel system, though it can be surmised that they are likely to be early in date, since they relate to the early phases of prospection of lodes which were subsequently known to have been worked to considerable depths. A 17th century date is therefore possible.

Having been located at surface, Entral Lode was then exploited by at least four outcrop shafts: shafts [24], [25], [37] and [38] (Figs 15 and 17). These shafts clearly worked the lode to depths greater than the 4m excavated within them, none of the shafts being bottomed during the site works. Outcrop shafts [24] and [25] were connected by a linear trench running east-north-east to west-south-west that was up to 1.5m deep. It could not be determined whether this trench represented a deliberate attempt to connect the two outcrop shafts to aid communication between them, or if it was the remnants of earlier investigative features which had been developed in depth by the outcrop shafts. Another possibility was that this represented remnants of a small openwork that predated the shafts. Though no direct dating evidence was obtained for these outcrop shafts, workings described as 'Tin Works' are shown at this location on the William Doidge's map of 1737 (Fig 3).

As a result of this concentration of early mining features it was decided that instead of dealing with individual features, the entire road corridor within this field (an area roughly 30m wide x 55m long) would be excavated to a depth of roughly 5m, as it was hoped that this approach would remove most mining features, or at least reduce the number required for full-scale mitigation. This work commenced at the southern end of the corridor and proceeded northwards.

At a point roughly 10m from the southern hedge boundary, the crown of an open stope [49] was breached. This stope ran roughly north-east to south-west along the same alignment as tunnel [3]/[50], and for most of its length underlaid the tunnel, the floor of which was in places only separated from the roof of the stope by less than 0.3m of rock. This stope is likely to be associated with the working of Silver Lode by Dolcoath Mine, most probably in the early 18th century due to its shallow nature (Sharpe pers. comm.). The stope was traced right across the width of the road corridor. Interestingly, miners pick marks were recorded on the north western face of the stope at its south-western end, a general indication of a relatively early date (Fig 27).

It was decided to mitigate this feature by chamfering the edges of the cut on either side of the stope so that a wedge shape was created; this averaged 3m deep, the excavated material being used to infill the deeper, open sections of the stope. Concrete was then poured into the stope creating a plug, the shape of which would prevent its subsequent collapse into the lower sections. The full depth of the stope was not recorded, as it was found to be infilled with mine waste and rubble.

The chamfering of the sides of stope [49] revealed a tunnel cut within its north-western side, the roof of which was at the same level as the crown of the stope (Figs 15 and 27). This tunnel [51] was found to run in a north-westerly direction and to dip steeply. When initially opened up it was found to be choked after a distance of about 2m. The tunnel could be seen to be heading towards the edge of the road corridor, but was not traced further. This tunnel appeared to be more substantial than the others recorded, and at a greater depth. It did not seem to be following a lode (no lode material could be seen in its roof or floor) but trended towards Entral Lode which suggests this may have been a cross cutting prospecting tunnel.

At about 22m from the southern hedge boundary (SW 65859 40518) the crown of a small stope [53] was breached at a depth of 1.8m. This proved to be a very ephemeral small-scale working that proved difficult to trace.

Crossing the line of the road corridor in a north-easterly to south-westerly direction at a distance of about 38m from the southern field boundary, the crown of another large stope [48] was breached. This stope was associated with the exploitation of Entral Lode near surface, again probably in the 18th century as part of workings of Dolcoath Mine (Fig 15). Varying in width between 2m – 3m, this stope was not investigated closely due to material collapsing within it. Previous mining investigations by drilling had apparently shown it to be open at a depth of '300ft' or roughly 90m (Emma Blakesley, Geo-environmental Engineer, CORMAC pers. comm.). This stope was mitigated in a similar fashion to that for stope [49].

Finally, three sub-circular pits were recorded. All were of similar dimensions, with diameters of roughly 0.8m and depths of up to 1m. They were infilled with material similar to that found in the prospecting pits, and they may have been contemporary with them and fulfilled a similar function. Pit [28] was located at the north-eastern end of this complex of mining works, whilst the others: pits [46] and [47] were located in positions straddling the south-western end of tunnel [3]. As with all the other features recorded within this field, no direct dating evidence was obtained, though they are clearly primary features, and therefore likely to be early (Fig 15).

6.1.7 Field 7

Within this field (Fig 11) the stripped soil profile consisted of 0.05m of grass, roots and topsoil overlying 0.1m of light grey-brown clay loam, and 0.1m of red, grey-brown clay. Orange or red-brown clay with stone fragments - the decayed natural bedrock - lay at the base of the stripped material. The depth of the soil profile was fairly uniform across the whole field, varying from 0.25m to 0.3m.

No features of archaeological interest were recorded within this field. This is of interest in itself, as it suggests that no lodes crossed the field. The field boundary between Field 6 and Field 7 is depicted on the 1737 Tehidy Estate map (Fig 3) and as such must predate this, indeed the curvilinear nature of the field may indicate a medieval date (Parkes 2007).

6.1.8 Field 8

This field, centred at SW 65909 40431 (Fig 11), was completely stripped for a site compound and car park. The profile of the soils recorded consisted of 0.05m of grass, roots and topsoil overlying 0.10m of light grey-brown clay loam, and 0.15m of dark grey-brown clay. Orange or red-brown clay with stone fragments - the decayed natural bedrock - lay at the base of the stripped material. The depth of the soil profile was fairly uniform across the whole field, varying between 0.25m and 0.3m.

The only archaeological feature in this field was ditch [61]. This ran parallel with the roadside hedge boundary (Fig 11) and was aligned roughly east-north-east to west-south-west. It appeared to have been machine cut and is therefore likely to be a modern service trench. As it lay below the level required for the compound car park it was not further investigated.

6.1.9 Field 9

This field was recorded in small sections (Fig 11) as in places it was infested with Japanese knotweed, and some areas were contaminated with asbestos which had to be removed by specialist contractors. This meant that no overall view of the stripped field could be obtained.

The soil profile in the stripped area consisted of 0.05m of grass, roots and topsoil overlying 0.15m of light grey-brown clay loam, and 0.2m of dark grey-brown clay. Orange or red-brown clay with stone fragments - the decayed natural bedrock - lay at the base of the profile. The profile here varied greatly in depth from 0.25m to 0.5m though the horizons remained the same. The impression was given that the soil had been deposited here deliberately as an act of land reclamation. Local people from Church View Road (pers. comm. to author) reported that spoil heaps from this location had been removed in the 1970s or early 1980s, possibly for re-processing. The re-soiling of the field is likely to have taken place subsequent to this.

A shaft [62] was located towards the northern end of the field (Fig 11) (Parkes 2009, site 78). Its presence was initially indicated by a slight, sub-circular shaped depression situated on rising ground. Excavation revealed that it was open and was timber-lined

to a depth of about 2m, with a piece of boiler plate acting as a cap (see site inventory). The shaft was found to be choked below a depth of about 20m (Fig 28).

Immediately alongside, and to the west of the shaft at a depth of 2.3m below the surface was tunnel [63]. This was aligned north-east to south-west. This tunnel seemed to run horizontally, and, with a width of 1.5m, appeared to be larger than those seen in Field 6. The full height of this arch-roofed tunnel could not be determined as its floor was obscured by debris, and due to collapse and choking it could only be traced for about 10m. The function of this tunnel is uncertain. Its alignment is the same as that of the major lodes in the area, so there is the probability that this was the crown of a stope; however, the lack of lode material in the surrounding rock or roof seems to preclude this.

It is probable that this is an underground leat, part of a complex which is a feature of this area of Dolcoath and which have been previously reported on in the Journal of the Trevithick Society (Buckley and Sharpe 1993, 38). Though the current tunnel lies just outside of the area covered by that report it is very likely to have been an element of this system. Further elements of this leat system were also encountered further south within Field 10 centred at SW 65862 40296. Without any further evidence the possibility remains that this tunnel could possibly be a communications tunnel or an adit.

Due to the depth of the excavation, it could not be determined what, if any, relationship there was between shaft [62] and tunnel [63]. It is uncertain whether or not they were contemporary features, or if the tunnel pre-dated the shaft, or vice versa. No direct dating evidence was obtained for either feature, although the nature and construction of the timbering found on shaft [62] suggests that it had been sunk during the 19th century or at least re-opened and re-collared during this period (Adam Sharpe, pers comm). The shaft does not appear on the 1880 or 1909 OS maps (Figs 4 and 5) which possibly suggests that it predates these (though the converse may also be possible in that it may post date these maps). However, it does lie on an alignment with two shafts seen at SW 65944 40492 and SW 66013 40513 which are believed to be on Martin's Lode, part of the workings of Dolcoath Mine. These shafts first appear on the 1909 map (when one is described as 'Old Shaft', perhaps suggesting a short working period along this lode between 1880 and 1909). On the other hand, early capped shafts were generally not mapped until they were re-revealed, so the absence of evidence is not evidence for absence. Small-scale shafts tend to be early, particularly where they are on outcrops, whilst later shafts tend to be off the outcrops and significantly larger in scale and more regular in plan. This one might have opened up and been roughly capped with the boiler plate during the 19th century, but excavated much earlier (Adam Sharpe, pers comm).

6.1.10 Field 10 (Dolcoath Road)

A roughly 30m wide corridor was stripped running diagonally (roughly north-north-east, to south-south-west) across the western side of the playing field centred at SW 65877 40352 to the east of Lower Pengegon Road, and to the south of Dolcoath Road. This soil strip was undertaken to connect the main road corridor with new housing developments between Wheel Harriet and Dolcoath Avenue (Fig 11). The soil profile in the stripped area typically consisted of 0.05m of grass, roots and topsoil overlying 0.1m of light grey-brown clay loam, and 0.1m of dark grey-brown clay. This soil profile overlaid a deposit of mixed clays, stony rubble and modern waste material (including plastic sheeting). Nowhere in this area was the depth recorded greater than 0.3m. The flat featureless nature of the field, the uniform soil profile and the inclusion of plastic material indicated that this area had already undergone large-scale reclamation and landscaping.

Examination of the 1880 and 1909 OS maps (Figs 4 and 5) show that this area was the location of extensive spoil heaps from Dolcoath mine. These had been subjected to

various phases of reworking, large amounts of material having been removed for reprocessing to reclaim their mineral content, mainly during the late 1980s (Smith 1992).

At the south-western end of the corridor (Figs 10 and 11) an interesting group of mining-related features was uncovered (see site inventory) at a depth roughly 2.5m below the current ground surface. This consisted of a line of three adjacent co-joined small rectangular shafts [64], [65], and [66] set roughly 1m apart on an alignment running roughly north-west to south-east. These gave access to a pair of adjacent tunnels running north-east to south-west (tunnels [67]/[69] and [68]/[70]). The northernmost (Fig 10) of these tunnels [67]/[69] had large deposits of water born silts on its floor which suggested the flow and movement of water (indeed when breached there was a rapid egress of water from this tunnel). The southernmost tunnel which was provided with floorboards may have acted as a walkway or access tunnel (possibly for servicing the leat) though it is also possible that this boarding was the last remnants of a timber leat as shallow communications tunnels/walkways do not occur elsewhere in Cornwall (Adam Sharpe, pers comm).

Within this tunnel a felt miners' 'tull' or hat most likely dating from the 19th century was found (Fig 30). The shafts gave access to the surface, and allowed for maintenance of the tunnel system. A further tunnel [71]/[72] ran from north-west to south-east, passing through and connecting all three shafts (Fig 11).

This group of features appears to be part of a complex of tunnels associated with the extensive use of water power within Dolcoath mine to drive pumps and other machinery via waterwheels that was utilised from the late 17th century and throughout the 18th century, sections of which were documented by Pryce in a section of Bullen Garden published in 1778. Other elements of the system were exposed during land reclamation works at Dolcoath, and were reported on by Buckley and Sharpe in 1993. These paired tunnels/leats are very unusual if not unique in Cornwall (Adam Sharpe, pers comm).

6.2 The Red River Valley

This section of the road (centred at SW 66171 40812) covered the western flanks and the floor of the Red River Valley (Fig 12). Works within this area included landscaping for and the construction of an embankment leading onto a new bridge to be built over Chapel Road, the footings for the new bridge, the construction of a new channel to allow the redirection of the Red River under the new bridge, the excavation of a new drainage pond and the landscaping of part of the valley to provide recreational amenities, including ponds adjacent to the river.

The whole of this valley has a history of being heavily industrialised, the 1880 and 1909 OS maps and photographs in Bullen 1999 showing densely packed ranges of buildings and other structures related to the dressing of tin ores (Figs 4 and 5). Bullen 1999 provides some very good images of the complexity of the dressing floors in the valley bottom, see for example the photos on pages 9, 36, 50, 52.

The construction of the embankment entailed the demolition of part of a walled structure on the crest of the valley side at SW 66121 40735 (Figs 12 and 26). This was part of the tailings works identified (in Parkes 2009, Feature 88) as being situated on the flanks of the valley (Buck and Sharpe 1994) and depicted on both the 1880 and 1909 OS maps. The surviving walls [83] were the remnants of two banks of rectangular settling tanks fed by the reservoir and leat (Field 2 features [78] and [79]) described above (Buck and Sharpe 1994, feature 11) (Fig 26).

Immediately alongside the old course of the Red River, a concrete floor and a bank of rag frame bases or less likely settling tanks with a V shaped profile were recorded [84]. Various structures are shown at this location on both the 1880 and 1909 OS maps (Figs 4 and 5), so it is difficult to date these features; their concrete construction suggests a

late date, probably in the early 20th century (Figs 12, 18, 19 and 20). Bullen 1999 p50 shows rag frames being constructed in this part of the valley in 1910. These have a similar profile and appearance to the features recorded (though not exactly the same) so it is possible that rag frame bases are what were noted rather than settling tanks.

On the eastern bank of the Red River within the new channel which was dug to divert the river a stretch of timber launder [85] was uncovered which was traced for a distance of roughly 7m, running north-west to south-east before disappearing into the baulk. Unfortunately its northern end had been truncated by a concrete structure that was possibly a manhole. The launder was associated with various wooden structures which had survived as truncated wooden posts and supports running in a line to the south-east for a distance of about 10m; unfortunately the width of the new channel was too narrow to obtain a full plan of the pattern of features exposed. Again it is uncertain as to which phase of the dressing floors this feature belonged, though what looks like a launder with this alignment was shown at roughly this location on the 1909 OS map (Fig 5). Having been truncated by a concrete structure it is more than likely that this launder cannot be more recent than that in date (Figs 12, 21 and 23).

The levelling of ground to create a nature reserve and public amenity including ponds at SW 66209 40809 uncovered the lines of two more launders [86]. Unfortunately these were destroyed by the machine before they could be recorded in detail. Although their courses were slightly divergent they both ran towards the river in a roughly north-west to south-east direction. Various structures, all being elements of the former tailing works, were recorded at this location on both the 1880 and 1909 editions of the OS mapping (Figs 4 and 5); all would have required a water supply. However, it was not possible assign a date to these launders (Fig 12).

A timber lined shaft [88] was uncovered near to launders [86] (Fig 12). This had been buried under 1.8m of tailing sands and clay. No shafts are shown at this location on either the 1880 or 1909 OS maps (Figs 4 and 5), so its date remains uncertain. It was, however, open and contained a modern metal ladder which suggests that it had remained accessible until at least the 1950s and was probably buried when either the sand works were in operation or during subsequent landscaping during land reclamation works. The shaft reputedly gives access to an adit running roughly north-west to south-east across the floor of the valley (Bill Murray of Carillion, pers. comm.), however, test drilling along the presumed route failed to locate this feature though a few voids were encountered, these subsequently being backfilled with concrete (Emma Blakesley, pers. comm.).

Within the drainage pond at the northern end of the site (SW 66145 40921) another launder and what appeared to be the base for a round frame [87] were uncovered. Buddles were shown at this location on both the 1880 and 1909 OS maps, and a photograph in Bullen 1998 (on page 127) shows round frames being dismantled near this location. The concrete used to construct this feature suggests that it is most likely to be of 20th century date (Fig 12, 22, 24 and 25).

The whole of the floor of the valley had been utilised by the sites of dressing floors and tin tailings works over an extended period of time. The long period of occupation and the very substantial amounts of waste material produced by these operations has resulted in most features being buried under deep deposits of waste sand, depths of over 2m being noted across large parts of the site.

An aerial photograph taken by the RAF in 1946 (Fig 6) shows many ruinous buildings and earthworks surviving at this date, unfortunately most of these features were removed by later landscaping and land reclamation operations. A sand works cleaning up and selling some of the tailing sands was known to have operated here up until the late 1970s (Bill Murray of Carillion, pers. comm.). This operation probably also acted to remove or to blanket the remaining archaeological features.

6.3 South Crofty

This area covered the eastern slope of the Red River Valley and the stretch of land running eastwards to Dudnance Lane upon which buildings forming part of South Crofty Mine had formerly been sited (Figs 12 and 13). These structures which had survived until 2014 had been the subject of a historic building survey prior to their demolition (Berry, Sharpe and Thomas forthcoming).

Both the 1880 and 1909 OS maps depict earlier mining structures on this site (Figs 4 and 5) these being parts of earlier phases of dressing floors, including the stamping engine house and stamps, the arsenic calciners, labyrinths and stack, and the mine reservoirs. The line of the North Crofty branch line was also traversed by the line of the road corridor in this area. Unfortunately no traces of them were found during the groundworks for the road in this section. Though some of these features may have remained obscured by dumps of demolition debris from the removal of the South Crofty buildings (this rubble being crushed and stockpiled for use on building up the causeway leading up to the new bridge over the Red River) where ground levels were cleared or reduced only mixed layers of mine waste was observed. This lack of features in this area suggests that there may have been some very large-scale site clearance and the reduction of ground levels when the new South Crofty mill was constructed (Adam Sharpe, pers. comm.).

The only feature recorded was an infilled quarry [82] (Figs 8 and 12). This is known as 'The Arsenic Quarry' by miners from South Crofty (Bill Murray of Carillion, pers. comm.) and was apparently used for the disposal of contaminated waste produced during the dressing process. It is also possible that contaminated material from the demolition of the arsenic calciners and labyrinths were also disposed of here (Adam Sharpe, pers. comm.).

No evidence was found to explain the reason for this quarry having been dug. It is possible that it was a backfilled openwork as its alignment is similar to that for the lodes within the area however, no lode material within the cut was observed. As an alternative, it might have been created as a source of local building stone, possibly for the construction of the earlier buildings on the South Crofty site. The quarry was depicted on the 1880 OS 25" to a mile map (Fig 4).

No other archaeological features were recorded within this area.

6.4 Dudnance Lane (Bartles section)

This section of the road corridor (Fig 13) ran along the existing section of the road between Dudnance Lane and Station Road, from SW 66485 41073 to SW 67025 40827. Within this area the scheme mostly consisted of the widening of the existing road and the construction of a new junction to connect the new Red River Valley bridge with Dudnance Lane (at SW 66485 41073). For the most part the groundworks within this area consisted of reducing the width of the existing pavements on either side of the road or moving their positions slightly to allow the road to be widened by about 2m on either side. However, some of the buildings making up the former Bartle's Foundry were demolished alongside the road on its western side. These were recorded as buildings 1 to 3 and 18 in the historic building survey (Sturgess 2013). These dated from the earlier 20th centuries (buildings 1 to 3) to post 1951 (building 18); other demolitions took place at the complex of buildings focussed on Sylmar Cottage, Penhallick, a well-preserved early house which is locally thought to have been lived in at one time by Richard Trevithick (Thomas forthcoming).

The line of a stone-lined culvert [80] was also recorded in this area (Fig13). It was aligned in a roughly north-west to south-east direction and was traced for about 30m. The culvert was truncated at its northern end, while at the south-eastern end of the site it kinked towards the south near where it exited the limits of the stripped area. No dating evidence was obtained for this feature, though certainly it predates the post

1951 building which it underlay (Sturgess 2013). It is possible that this might have been the drain for the nearby (SW 66527 40995) weighbridge located at the entrance to South Crofty Mine (Adam Sharpe, pers. comm.).

A circular tank or cistern [81] was uncovered within the grounds of Sylmar Cottage (see appendix 1 for full details). Apart from clay lining surviving at its base suggesting that it was perhaps water tight when constructed, there was no evidence for its original function or date.

No other features of archaeological interest were recorded in this section of the road corridor.

6.5 Dudnance Lane to Wilson Way

The road corridor in this section extended (Fig 14) from Station Road in the west at SW 67025 40838 passing in an easterly direction past the southern end of Carn Brea Leisure Centre (at SW 67224 40934) and through the site of a large soil dump at SW 67272 40972 before turning to the north-east to connect with Wilson Way at SW 67304 41256, where a new roundabout and junction were constructed.

This section of the road corridor varied from 25m to 30m in width for most of its length, though the area of the old railway sidings centred at SW 67110 40889 was cleared and levelled in its entirety in order to provide a site compound.

Within the area of the site compound and immediately below the compacted crushed tarmac and gravel of the track way and the very thin soil (less than 0.15m) and scrub vegetation found elsewhere, a layer of granite gravel railway track ballast was recorded. Within this ballast could be seen the imprints of railway sleepers (Fig 29), these preserving the lines of parallel rail tracks [73] running in a north-east to south-west direction. No sidings were shown here on the 1880 OS map, but they were clearly depicted on the 1909 OS map (Fig 5), suggesting they were associated with the expansion of the station with the construction of a set of railway sidings forming a small yard known as Carn Brea Yard.

It was found that the railway ballast overlaid a very thick deposit of tin processing waste consisting of fine sands and silts. A large soak away (roughly 70m x 10m) pit for the road centred at SW 67099 40893 was entirely cut through the tailing deposits. A trial pit to establish the thickness of the deposit was excavated to a depth of about 6m (the maximum reach of the swing shovel) but the base of the material was not reached.

These tailing sands were seen to blanket a large swathe of the road corridor (Fig 9), extending along it as far east as SW 67290 40997, underlying the large soil dump (centred at SW 67270 40973) resulting from the construction of the Carn Brea Leisure Centre running track. There is a photograph of this mammoth deposit of tailings in one of Joff Bullen's mining photo books, (Bullen 1999 p75) on which the spoil dump can be seen in the background. Bullen records that it consisted of sand tailings from Tincroft and the Carn Brea Mines, and these were subsequently re-worked. No other features of archaeological interest were recorded in this area.

To the north-east of this deposit towards Wilson Way the road corridor cut through a level, virtually featureless area. The recorded soil profile here was thin, a typical profile being 0.05m of grass, roots and topsoil overlying 0.1m of light grey-brown clay loam, and 0.1m of dark grey-brown clay. Underlying this was a layer (up to 0.08m thick) of grey, green-brown silty sand (possibly tailings) that overlaid orange-brown clay and highly fractured rock, the decayed natural bedrock.

The topsoil was fairly uniform across the entire length of the corridor in this area (over a distance of about 150m) with little variation. This, coupled with the flat featureless nature of the field, suggested that this area had undergone large-scale land reclamation and landscaping.

Examination of the 1880 and 1909 OS maps (Figs 4 and 5) and the 1946 RAF aerial photograph (Fig 6) show that this area had been the location of extensive spoil and tailing dumps from the Carn Brea dressing floors, and Tincroft mine. This area was a continuation of the remnant tailing dumps described above, except that here the tailing sands had been to all intents and purposes completely removed. These had been progressively removed for re-processing for their mineral content during the 20th century, the final removal and landscaping occurring before 1974 when the Carn Brea Leisure Centre and its running track were constructed. This process seems to have removed most traces of any mining features within the immediate landscape (Sharpe 1993).

A shaft [74] was located on the eastern edge of the road corridor. Its presence was initially indicated by a slight sub-circular depression about 4m in diameter within the field surface. The removal of topsoil revealed a completely choked shaft, the lower part of this being rectangular in shape and orientated north-east to south-west. Its mitigation involved excavating a cone around the shaft to a depth of about 6m and creating a plug of concrete (Fig 14).

This shaft lies close to an engine house marked on the 1880 OS map, part of the Highburrow Shaft complex, however, no traces of any building structures were recorded, these probably lying a slight distance to the north-east, outside the road corridor.

Mining searches had suggested the location of another shaft [75] at SW 67303 41030 (Sharpe 1993; Emma Blakesley, pers. comm.). Unfortunately, a careful soil strip and ground search failed to locate it. Broken timber lagging boards, and square sectioned timbers (remnants of shaft setts) were, however, noted within the topsoil, which suggests that the shaft lies in the near vicinity, but that evidence for it at surface had been completely destroyed and sealed by previous landscaping works.

A pipeline [76] comprising sections of cast iron pipes (of about 0.4m diameter) was recorded towards the northern end of this section. This ran in a north-west to south-east direction. It was traced for a distance of roughly 10m but both ends had been truncated and lost. A small fragment of walling was noted on the southern side of the pipeline within the trench section. This seemed to be orientated east to west. Unfortunately the whole area seems to have been truncated by past activity, which makes determination of the date and function of this feature difficult.

On the 1880 OS map (Fig 4) a small tailings works is shown at this location, consisting of three or four settling strips fed by a watercourse coming into the site from the north-west (Sharpe 1993). It is possible that these features are the last remnants of the tailings works, the orientation of the walling suggesting one of the separation strips, whilst the pipeline might well have been part of its water supply or possibly its outflow arrangements. By the time of the 1909 OS map (Fig 5) this small works had been removed or become buried under tailing dumps.

A stone-lined culvert [77] was located at SW 67056 40844 running roughly north-west to south-east and was traced for a distance of about 5m. Its roof was at a depth of about 1.5m below the current ground surface. No dating evidence was obtained for this feature; it is of note though that its orientation is the same as that of the buildings shown in this area on the 1880 OS map (Fig 4).

7 Discussion

The course of the Camborne, Pool to Redruth link road cuts through some of the most important and dense areas of historic mining in Cornwall, including through the setts of formerly very important mines such as Dolcoath, Cooks Kitchen, South Crofty and Tincroft. As a result all except a couple of features representing historic field boundaries

recorded in the course of this project were mining related. Their preservation varied along the route of the road, many areas having been subjected to major episodes of landscaping in the past which included the removal and reprocessing of tailings dumps and mine spoil tips for their mineral content, especially during the early 1970s (Sharpe 1993). Other areas saw former industrial land partially remediated and returned to a mix of light industrial use or public amenity use. The works involved activities such as shaft capping, landscaping and the construction of the Carn Brea Leisure Centre and associated running track.

Despite the variability in preservation evident from the watching brief, the project has provided some valuable information about poorly documented activities, in particular the early phases of development of some of these historic mines.

Within the area of the Western Fields, the intensive mining activity recorded within Field 6 provides particularly useful evidence for the methods used by miners to locate, and then exploit the mineral lodes that outcropped within this area (Fig 15). Two major lodes are known to cross this field in a roughly north-east to south-west direction (Entral and Silver Lodes). The surface outcrops of these lodes were initially prospected using strings of prospecting pits running roughly perpendicular to the strike of the lodes (i.e., from north-west to south-east), though they were subsequently re-prospected using shallow tunnels – a rarely-documented form of this activity.

At other sites where comparable activity has been recorded, such as at the early mining complex at Hallenbeagle (Sharpe and Thorpe 2014) it has been found that the density of pits increases as the lode is approached; these features seem often to be paired or set at right angles to each other to refine the definition of the lode outcrops. In Field 6, however, the spacing of the pits demonstrates a fairly regular pattern across the field. It is possible that the prospectors may have become confused by the indications of at least one small additional lode [53] outcropping to the north of Silver Lode; in this area a cluster of prospecting pits excavated to intercept its strike seems to have drawn their search northwards away from the line of the main lode.

The network of shallow tunnels underlying the prospecting pits on the outcrop of Silver Lode demonstrates a further method used by the miners to identify the point at which to sink their openworks and shafts. These tunnels, for example [3], [50] and [52], had roofs which were separated by very little rock from the floors of the prospecting pits. Only 1.5m below the surface, these small tunnels seemed to follow the line of the lode, and incorporated regularly-spaced branching tunnels, probably in order to confirm the strike, width and value of the lodes. The tunnel system seems to respect the alignments and positions of the prospecting pits excavated from surface and this begs the question as to whether these tunnels were created by the same teams of miners. It may be significant that the line of the main tunnel [3] is also diverted northwards at roughly the same location as the overlying prospecting pits, close to the point where the lode was worked by stope [53]. It is also possible that Silver Lode may have forked at this point, though this was certainly not clear from the evidence recorded on the ground (this could have been easily missed with the rapidity in which material was being removed by the machines, making detailed observations at times difficult). Although their complete extent was not revealed during the watching brief, the discovery of these prospecting tunnels is important, as such features have only very rarely been discovered previously in Cornwall.

Unfortunately no direct dating evidence was recorded for these prospecting pits and tunnels. However, there may be one piece of indirect evidence suggesting a broad date for them. It is noticeable that there were a lot less prospecting pits around the outcrop of Entral Lode. This may be because it was far more evident near surface - several outcrop shafts [24], [25], [37] and [38] were sunk along its length. These shafts, following the lode down along its dip from its outcrop tend to be relatively 'shallow' in modern terms, their depths being limited to constraints imposed by the removal of ore and waste by hand, or windlass, and most can be expected to have been no more than 10m deep, their excavation limited by the depth of the local water table and the

significant limitations imposed by the need for hand pumping or baling. Such features are thought likely to predate the establishment of drainage adits which would have allowed deeper sections of lodes to be worked without the need for pumps. These outcrop shafts are probably the 'Tin works' depicted on the 1737 Doidge Map of Tehidy Manor running through this field; clearly the lodes had been exploited by these workings by this date (Fig 3).

For this section of the Entral Lode this method of exploitation does not seem to have been prosecuted with great intensity, only four shafts being sunk in the area exposed during the soil strip (as compared to Hallenbeagle where a comparable length would have contained up to 10 shafts). A number of reasons might explain this perhaps the methods used to exploit this area might represent a technologically improved approach to that utilised at Hallenbeagle. These outcrop shafts seem to have been infilled following their use, as the backfill of one, shaft [37], had a prospecting pit [9] sunk within and cutting its upper fills. This pit is of similar dimensions to other neighbouring pits and fits within the pattern of prospection seen within the rest of the field, suggesting broad contemporaneity between it and its neighbours. The outcrop shafts are therefore likely to be relatively early features within the history of the exploitation of these lodes.

This evidence suggests that the period of exploration during which the pits and tunnels were created may well post-date the early to mid-18th century when the earlier shafts were depicted on Doidge's Map. However, they are indisputably early in form, and may represent a re-prospection of this area not long after the first phase shafts were backfilled. No workings were shown here on the 1880 OS map (Fig 4). It is likely that shaft [40] was sunk to cut Entral Lode at depth as the lode dipped in that direction (Emma Blakesley, pers. comm.); it is probably of mid-19th century date.

The upper sections of the stoping recorded on Entral Lode [48] and Silver Lode [49] were probably created during the 18th century at the latest, as part of the early operation of Dolcoath Mine. Drilling by Cormac Engineering Services indicated that stopes on the Entral lode were still open at a depth of nearly 300ft from surface (Emma Blakesley, pers. comm.), though these deeper excavations are likely to represent 19th century activity.

It is uncommon for archaeologists to be able to record and demonstrate a sequence of working on tin and copper lodes in Cornwall, so this opportunity to record such evidence has provided a useful opportunity to add to our knowledge concerning the methodologies used by early Cornish miners.

The uncovering of the tunnel complex centred around shafts [64], [65] and [66] near Dolcoath Avenue was also important in furthering our understanding of the operation of a little documented aspect of Dolcoath Mine. Previous work in the area had revealed elements of a network of tunnels associated with the transportation and utilisation of water below-ground. It had been speculated that part of the system might have followed the line of Dolcoath Main Lode into the area affected by the road corridor (Buckley and Sharpe 1993, 38). This supposition was confirmed during the watching brief in the western section of the road corridor. The sophistication of this leat network was suggested by the group of three shafts which gave access to the system, almost certainly for its maintenance. However, unlike the sections of the system previously recorded, this area included paired tunnels most likely for the transportation of water to underground waterwheels, though one may (possibly) have been used as an underground walkway (though considered unlikely, Adam Sharpe, pers. comm.).

When first examined, the Red River Valley appeared to be featureless, little evidence surviving of the densely packed tailing works features and elements of dressing floors recorded on the 1880 and 1909 OS maps (Figs 4 and 5), in archive photographs (for example Bullen 1999) and also to a degree on the 1946 RAF aerial photograph (Fig 6). It had been feared that the former operation of the sand works within the valley and

subsequent land reclamation activities within the valley had destroyed much of its archaeology.

However the survival of the rag frame bases (possibly settling tanks) [84] and perhaps more importantly the sets of wooden launders [85] [85] and [87] suggested that this might not be the case and that further archaeological features are likely to survive below the deep deposits of tailings sands and clays which blanket the valley base to depths of up to 2m. Unfortunately, most of the features were found to be heavily truncated both by past activities and by the construction of the road. As a result, the first indications that a feature might be present in any location would be smashed fragments of wood within a spoil heap. Because of this truncation, and the piecemeal way the ground was stripped, no clear pattern to the features and their relationships to each other could be determined, even in such areas as [87] where launders and a round frame base were recorded, and no phase relationship between the features could be determined. The patchy nature of the evidence also made determination of dating of the features problematical in that as no overall pattern could be identified, and these features could not be specifically linked to features depicted on either the 1880 or 1909 OS maps. Construction materials suggest that most of the recorded features are likely to be of 20th century date, representing the last phase of industrial activity within the valley however.

The other sections of the road corridor provided only limited glimpses into the archaeology of the area, the section leading eastwards to Wilson Way being notable for the way in which modern reprocessing and the landscaping of huge tailings dumps had either hidden or destroyed most surviving evidence for previous mining activity. The substantial depth of tailing sands underlying the Carn Brea Yard railway sidings was at least 6m, and gives a dramatic indication of the scale and quantity of material being processed and produced by the mining industry around the Pool area, particularly given that this represents only the base of a formerly much more substantial deposit of material, much of which was removed for re-working. The clearance of this material and the development of the Carn Brea Leisure Centre effectively removed the visual evidence for an exceptionally intense phase of mining activity here which had spanned more than three centuries.

In conclusion the CPR Link Road scheme has provided an opportunity to archaeologically examine a swathe of land running through one of the formerly most important industrial areas of Cornwall. It has shown that despite the apparently archaeologically uninteresting nature of this landscape, and despite the demolition of buildings and the landscaping or redevelopment of former industrial sites, enough of their below-ground archaeology survives to provide important insights into the activities of the men whose graft and skill were to transform this area into a world-renowned centre of mining excellence.

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9 Project archive

The CAU project numbers are **146265** (Western Fields), **146266** (Red River Valley, Chapel Road), **146277** (Dudnance Lane to Wilson Way), **146287** (Dudnance lane, Bartles section) and **146288** (South Crofty).

The project's documentary, digital, photographic and drawn archive is maintained by Cornwall Archaeological Unit, Cornwall Council, Fal Building, County Hall, Treyew Road, Truro, TR1 3AY. The contents of this archive are as listed below:

- Projects file containing site records and notes, project correspondence and administration (combining 146265, 146266, 146277, 146287 and 146288).
- Field plans and copies of historic maps stored in an A2-size plastic envelope (GRE824/1-20).
- Digital photographs stored in the directory: R:\Historic Environment (Images)\SITES.A-D\Camborne Pool Redruth Road Scheme CPR Watching Brief 2013 - 2014 images
- English Heritage/ADS OASIS online reference: cornwall2 - 198468
- This report text is held in digital form as: G:\TWE\Waste & Env\Strat Waste & Land\Historic Environment\Projects\Sites\Sites C\CPR Highway Scheme 2013\Watching Briefs\Report Final draft\Report

A felt miners' 'tull' or hat most likely dating from the 19th century was found in Tunnel [68] within field 10 of the western fields section of the road route. Discussions are still ongoing as to where this is to be deposited, Geevor Tin Mine Museum being the most popular suggestion. No final decision had been made at the conclusion of the watching brief, the hat currently being held, albeit temporarily at the CAU Finds Store.

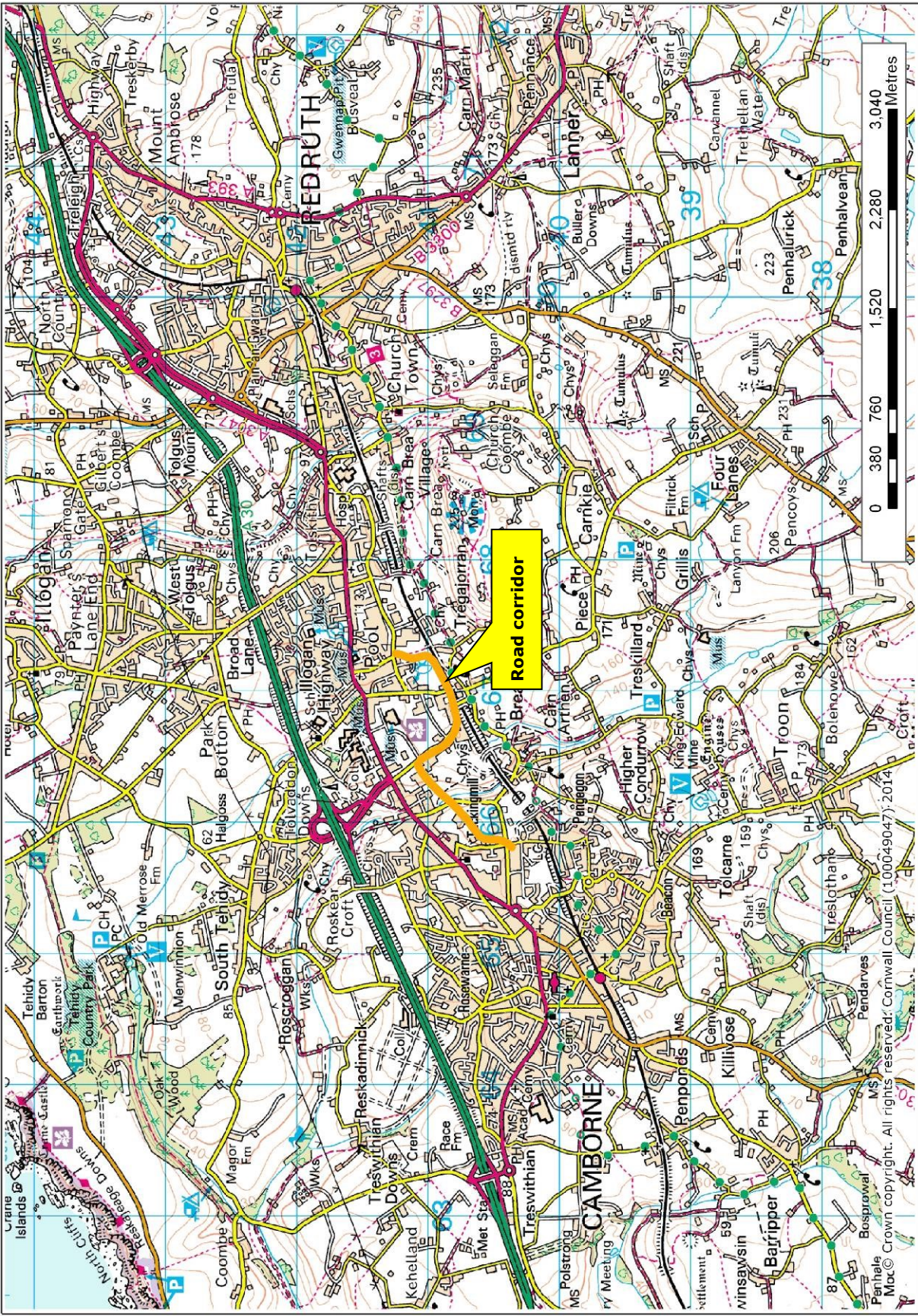


Figure 1. Location of the CPR link road (route shown in orange).

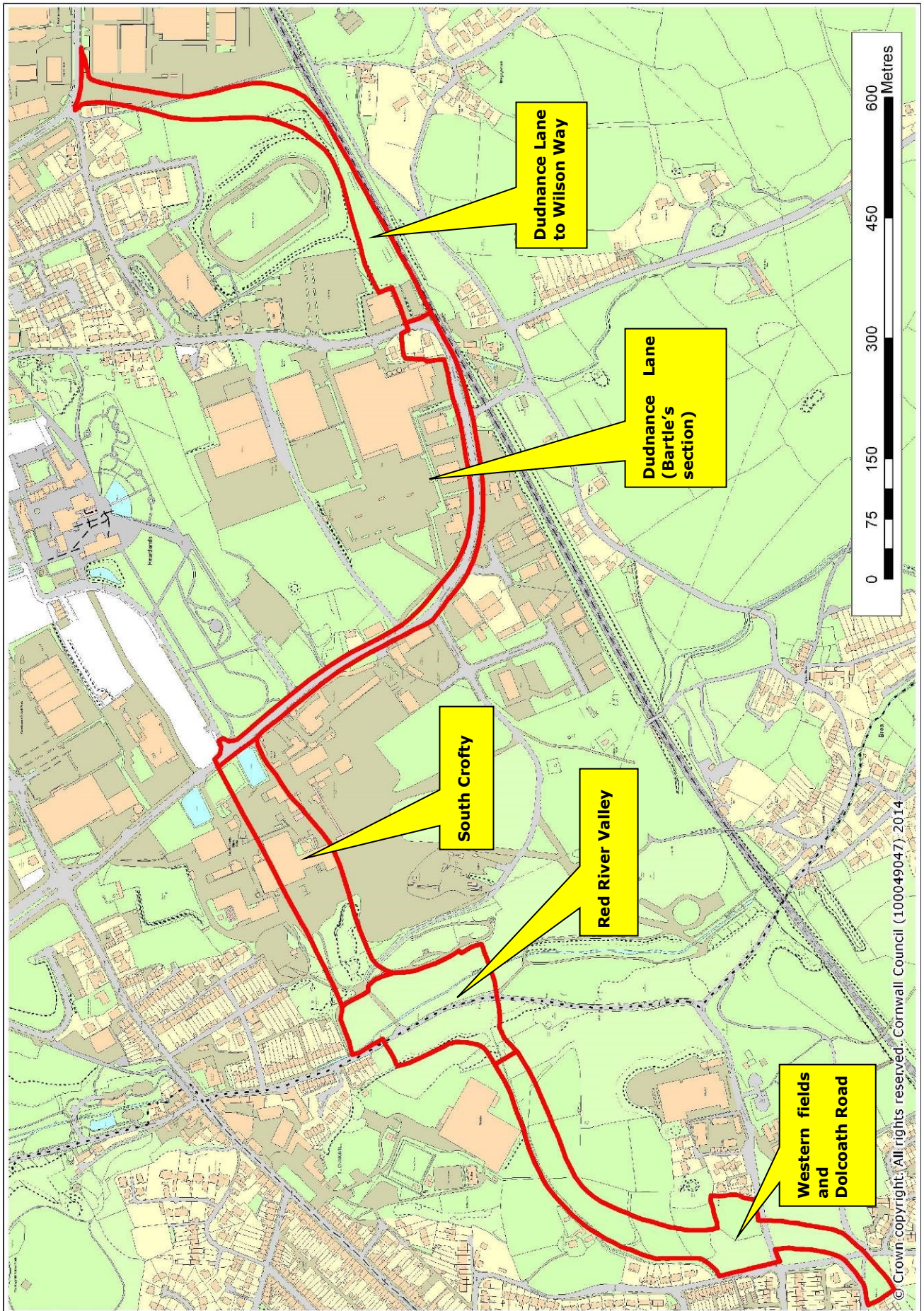


Figure 2. Road corridor showing site subdivisions.



Figure 3. Georeferenced (onto current OS map) part of the Map of the Manor of Tehidy, 1737, by William Doidge (held at CRO) showing the area of the western fields. The line of the road corridor is marked in red, major lodes in blue.

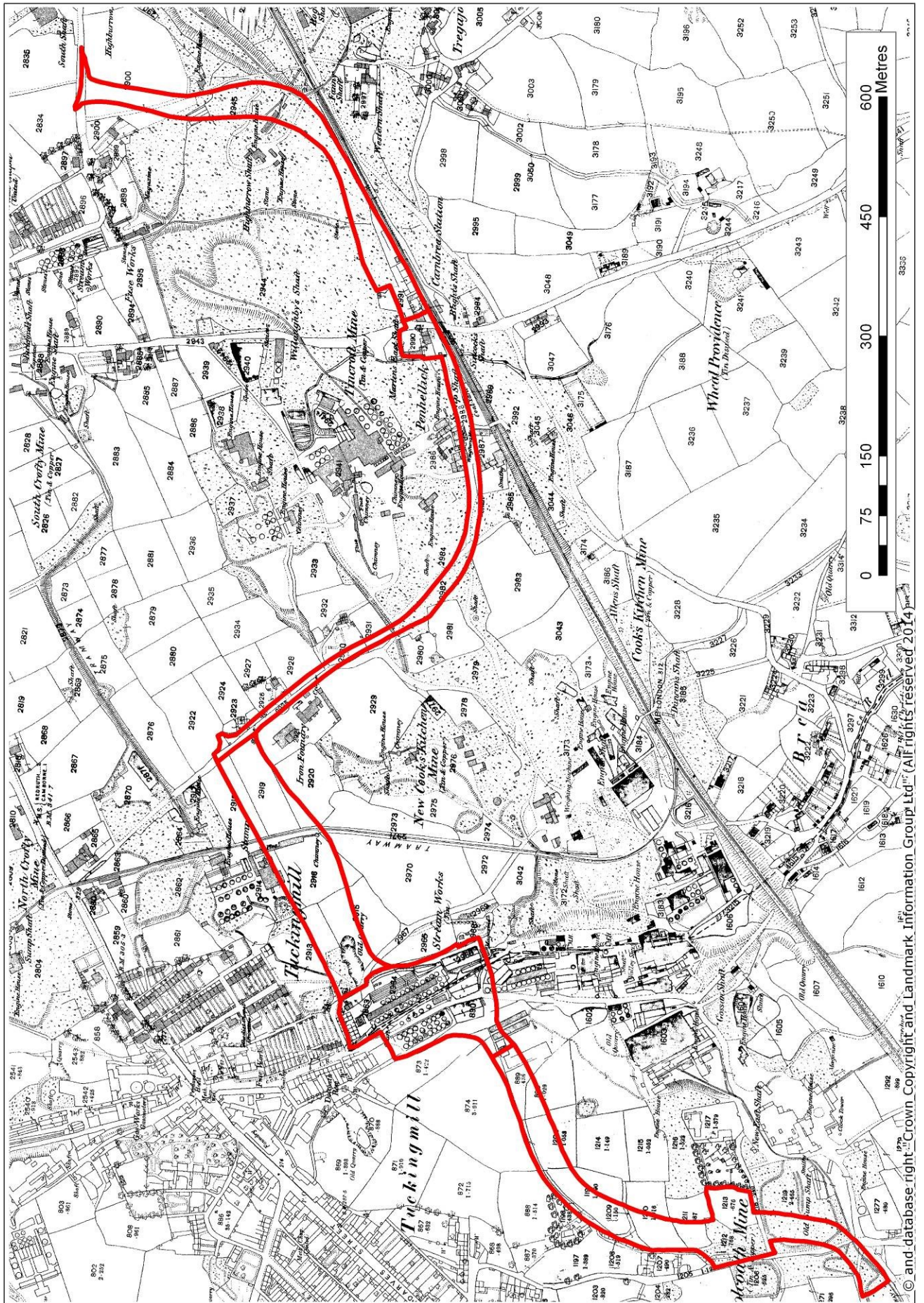


Figure 4. 1880 OS Map, showing the road corridor (in red).

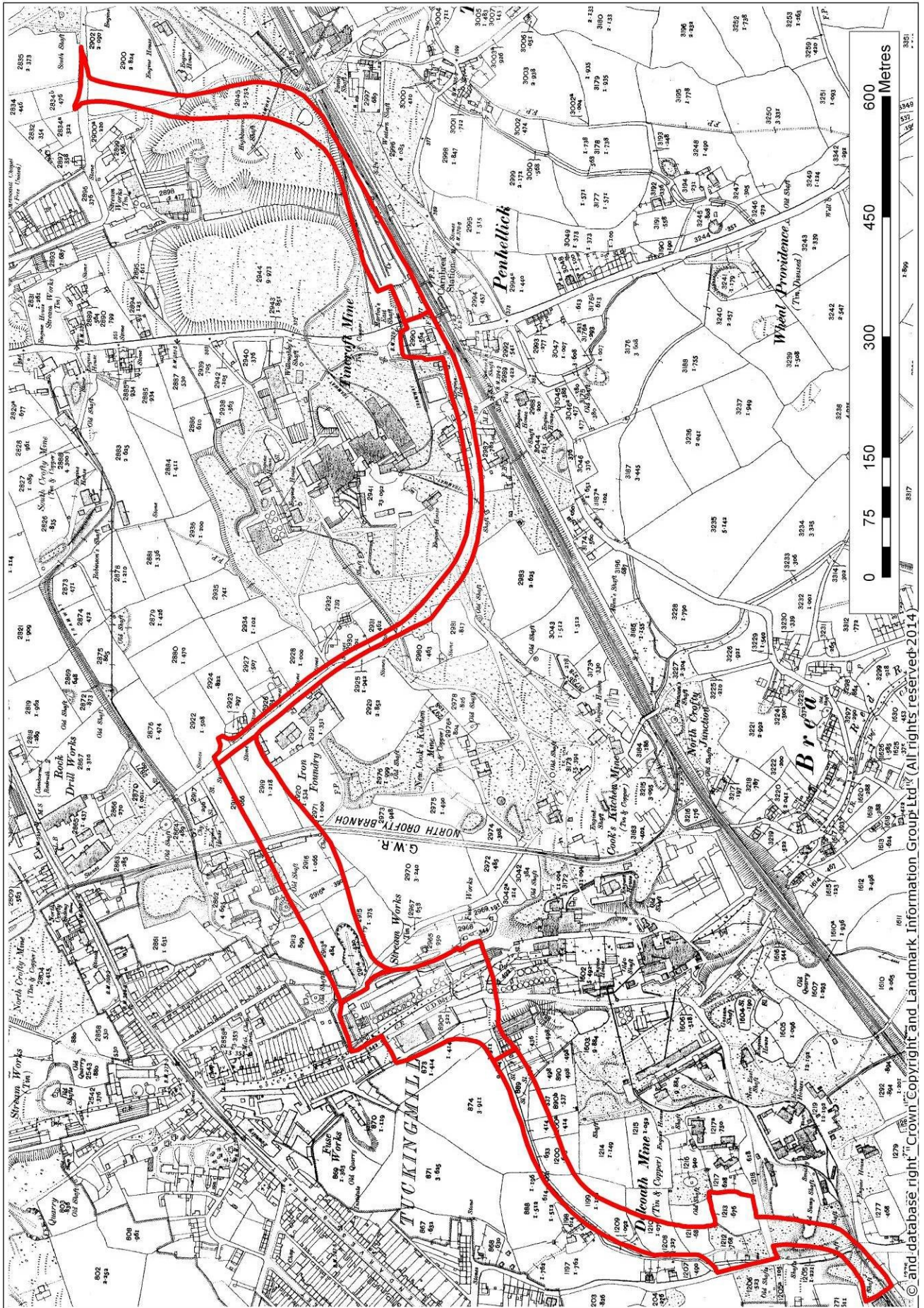


Figure 5. 1909 OS Map, showing road corridor (in red).

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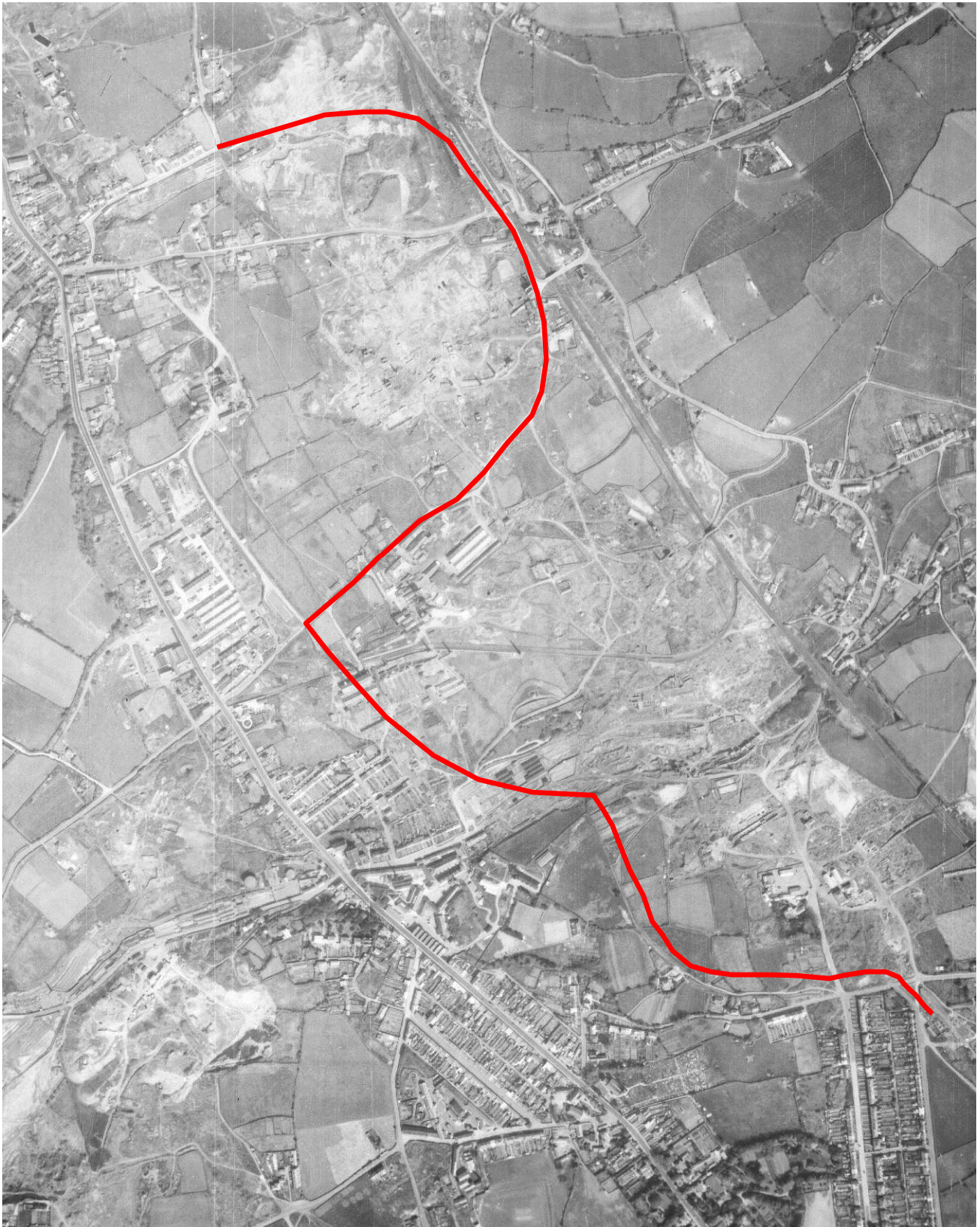


Figure 6. The area traversed by the CPR link road taken by the Royal Air Force in 1946 (Ref a08 5004) Road corridor (red).



Figure 7. General view of the Western Fields Area, Field 4 looking north-east towards South Crofty showing the nature of the soil stripping.



Figure 8. General view of the area around South Crofty looking towards the arsenic quarry [82].



Figure 9. General view of Wilson Way showing spread of tailing sand over entire area.



Figure 10. Western Fields, Field 10, Dolcoath Road. Shaft [64] entrance to tunnel [67]

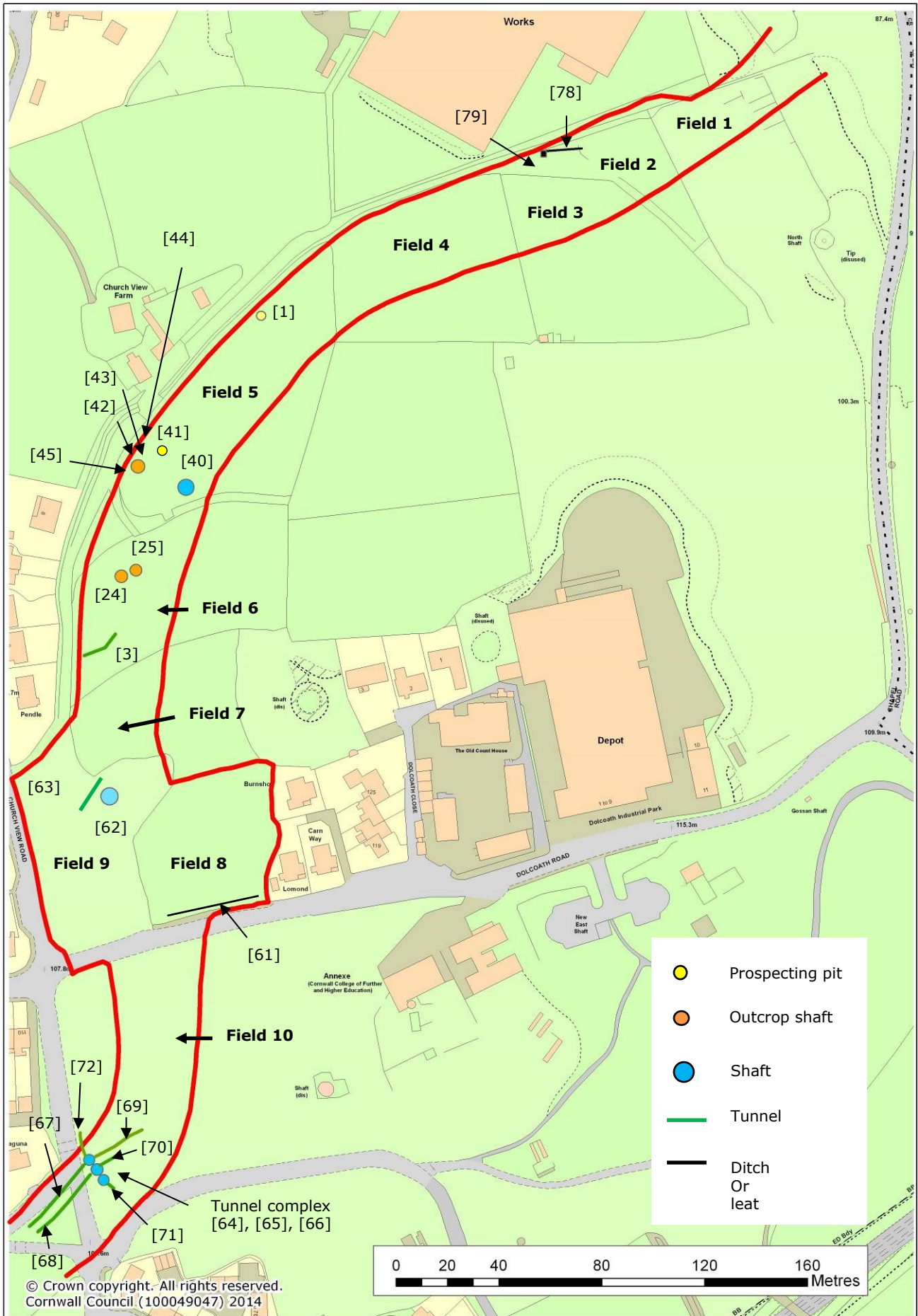


Figure 11. Western Fields, showing road corridor (red), field numbers, and significant features recorded

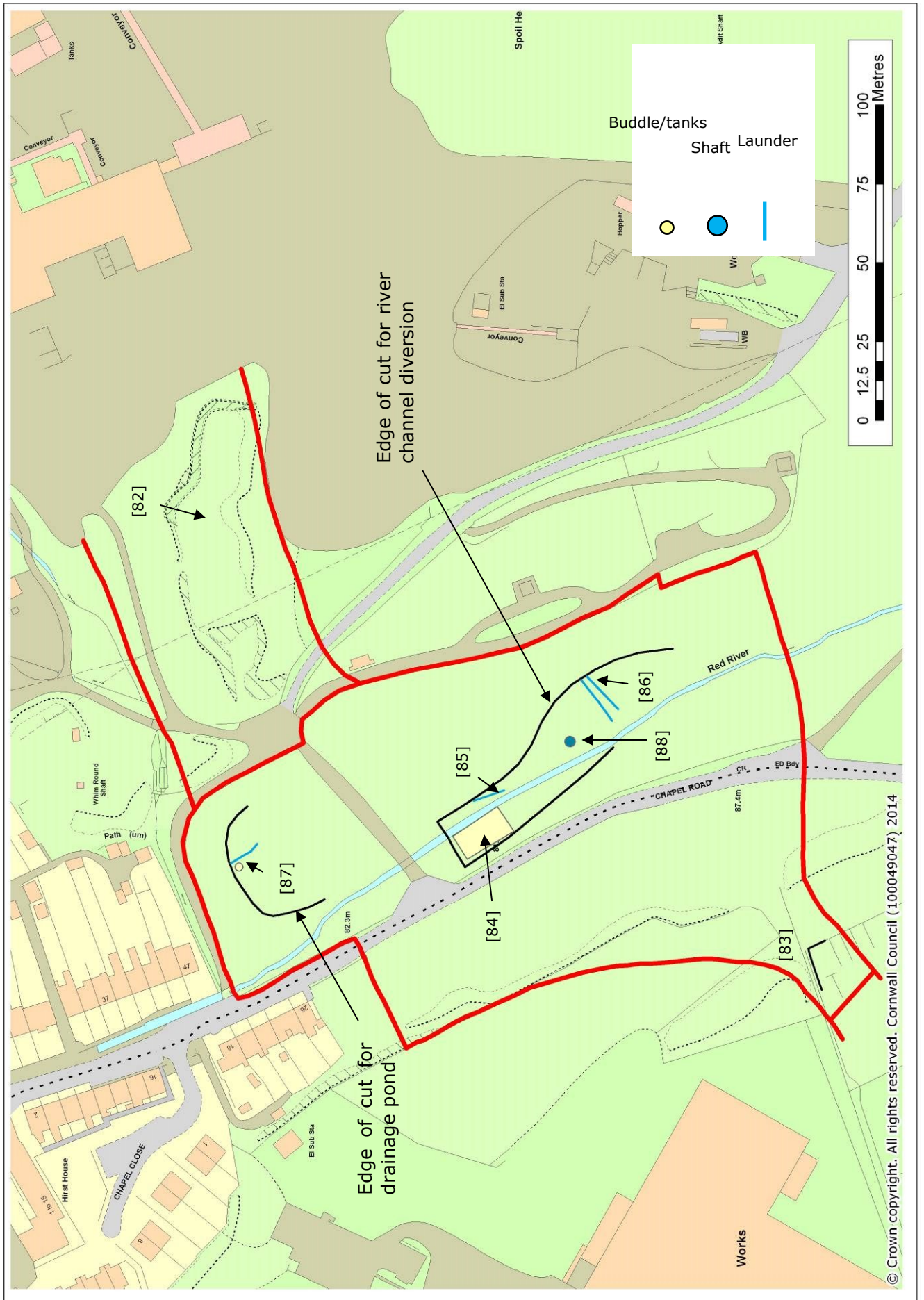


Figure 12. Red River Valley and part of South Crofty showing road corridor (red) and significant features recorded (see Figure 8 for a detailed plan of site [84] and Figures 11 and 12 for details of [85] and [87]).

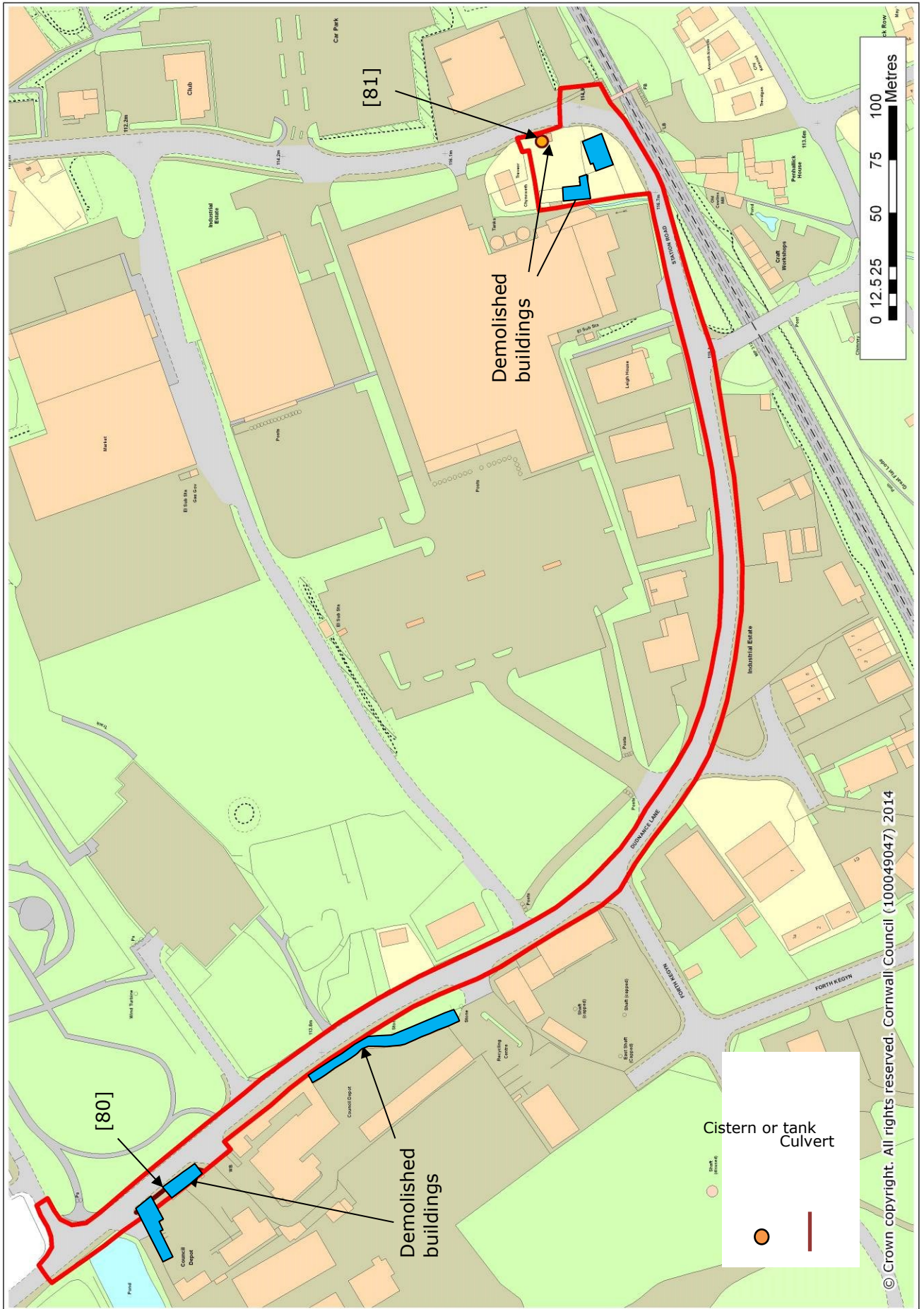


Figure 13. Dudnance Lane (Bartle's section) showing road corridor (red) demolished buildings (blue) and significant features recorded.

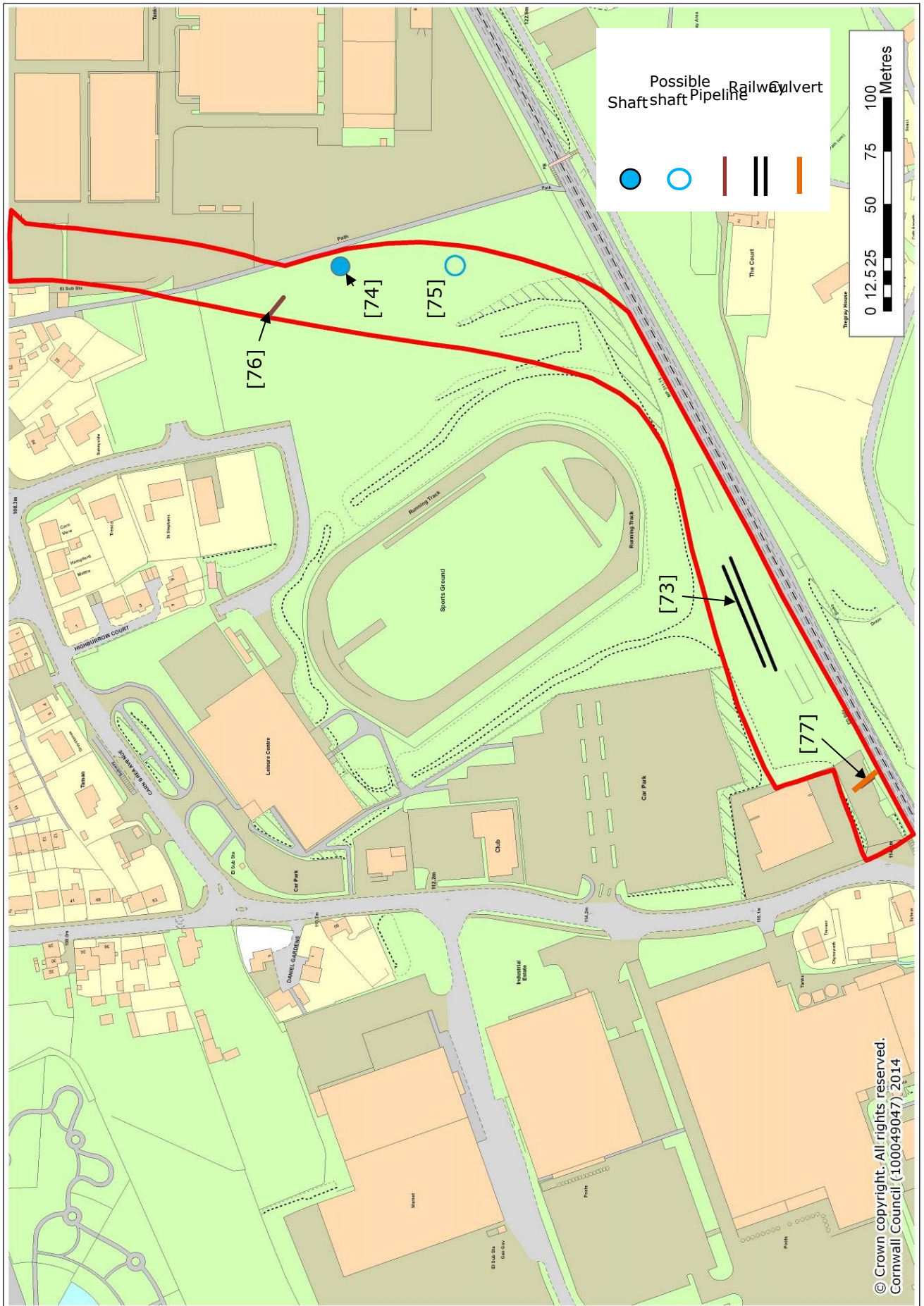


Figure 14. Dudnance Lane to Wilson Way showing road corridor (red) and significant features recorded.

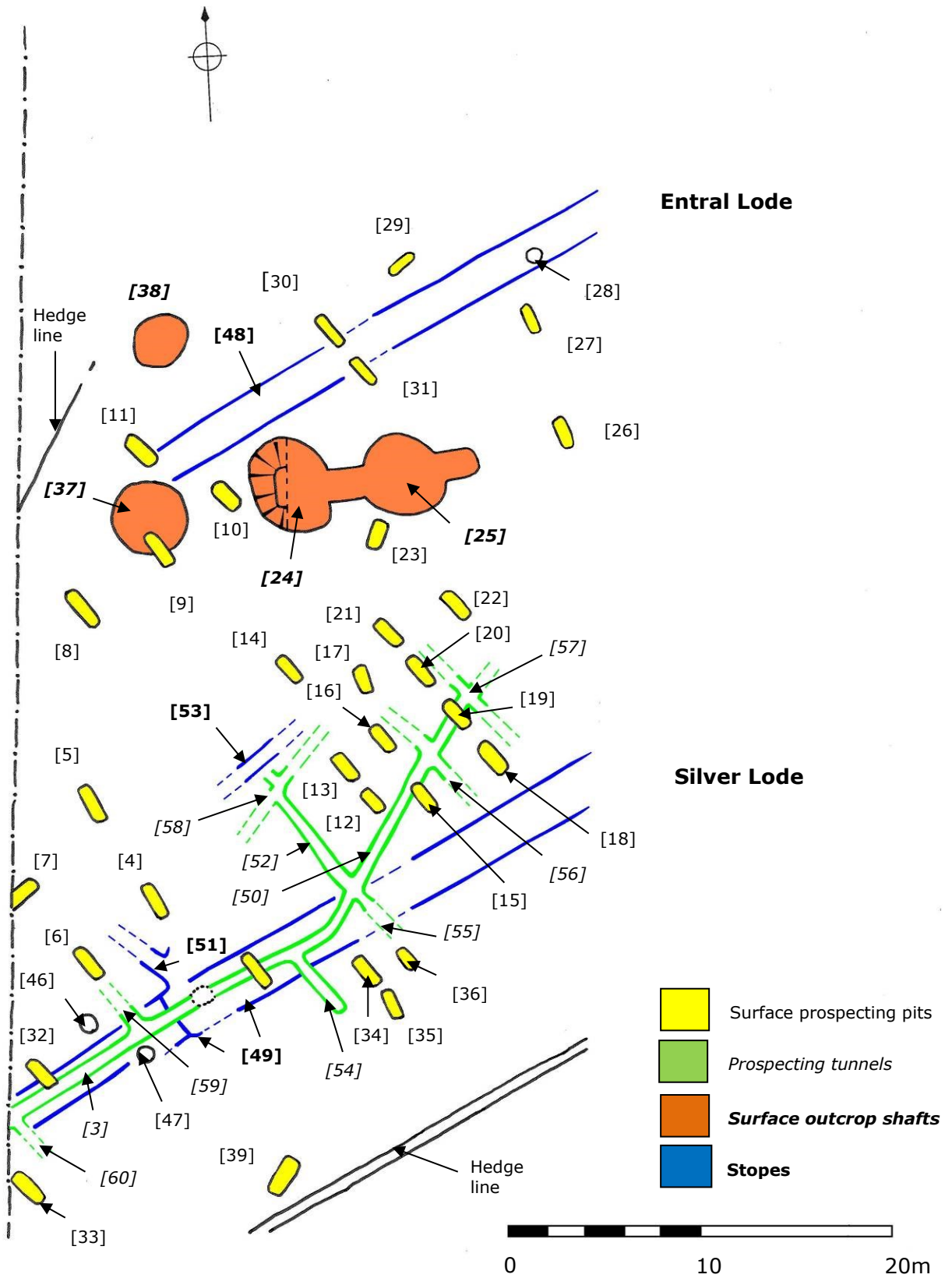


Figure 15. Western Fields, Field 6. Mining features recorded within the road corridor showing various levels of exploration and workings.



Figure 16. Western Fields. Field 6. Prospecting pits [4], [5], [6] and [7] looking south-east.



Figure 17. Western Fields. Field 6. Outcrop shafts [24] and [25] looking west.

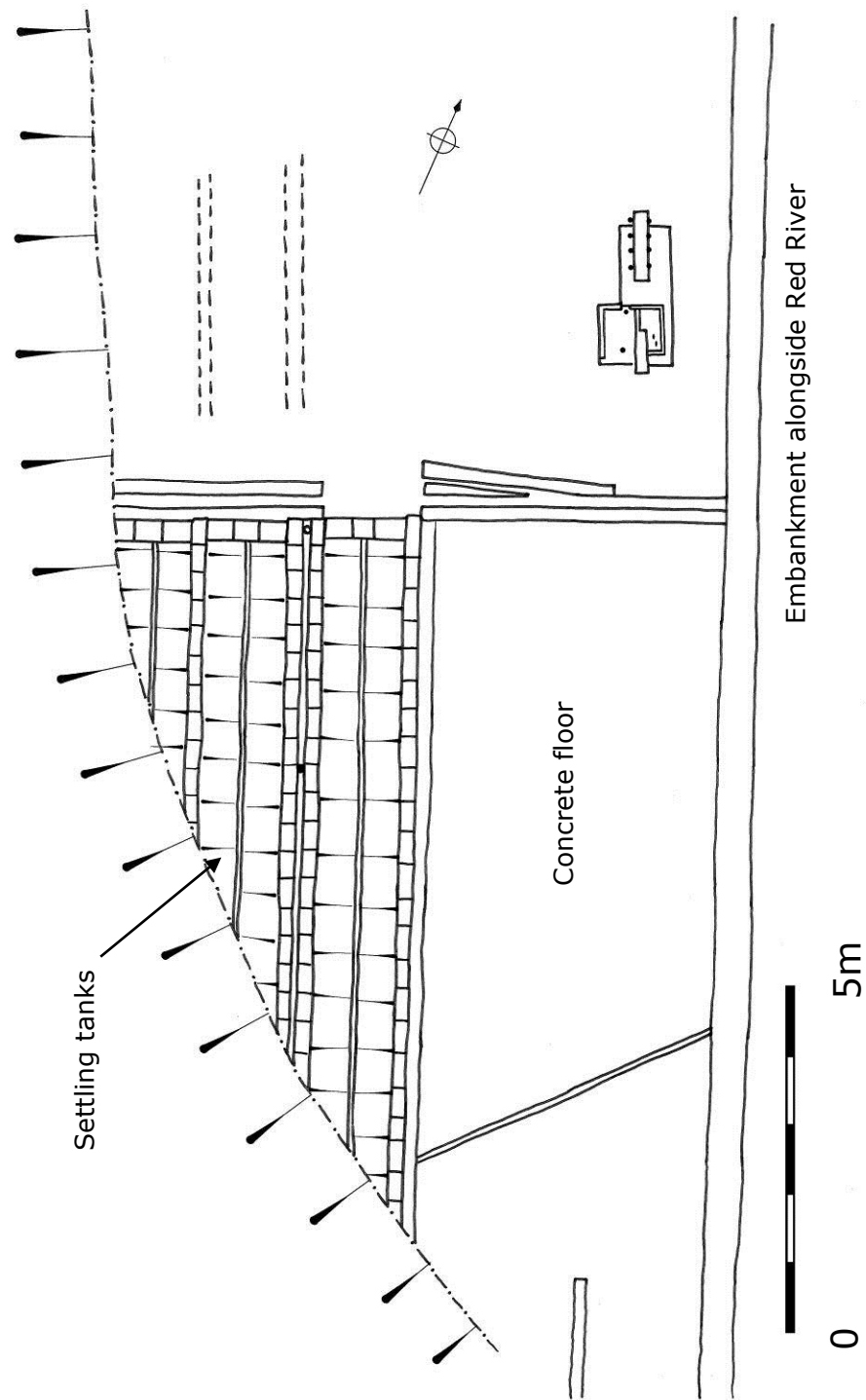


Figure 18. Red River Valley, Concrete flooring and settling tanks or the bases of rag frames [84], part of the tailing works within the valley.



Figure 19. Red River Valley. Photograph of the concrete flooring and settling tanks or rag frame bases [84], part of the tailing works within the valley looking south-east.



Figure 20. Red River Valley. Photograph of one of the rag frame bases within feature [84], part of the tailing works, looking north-west.

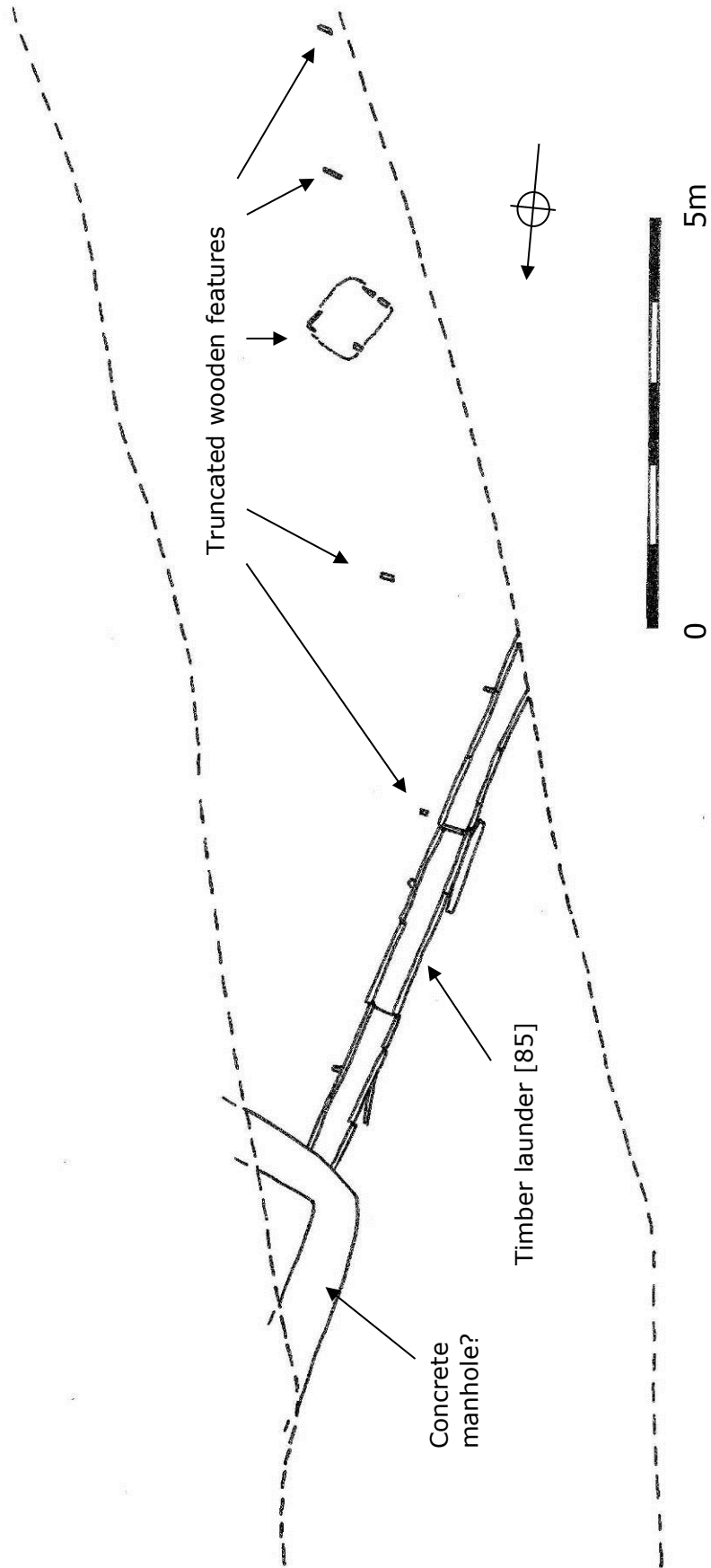


Figure 21. Red River Valley. Plan of Laundry [85]

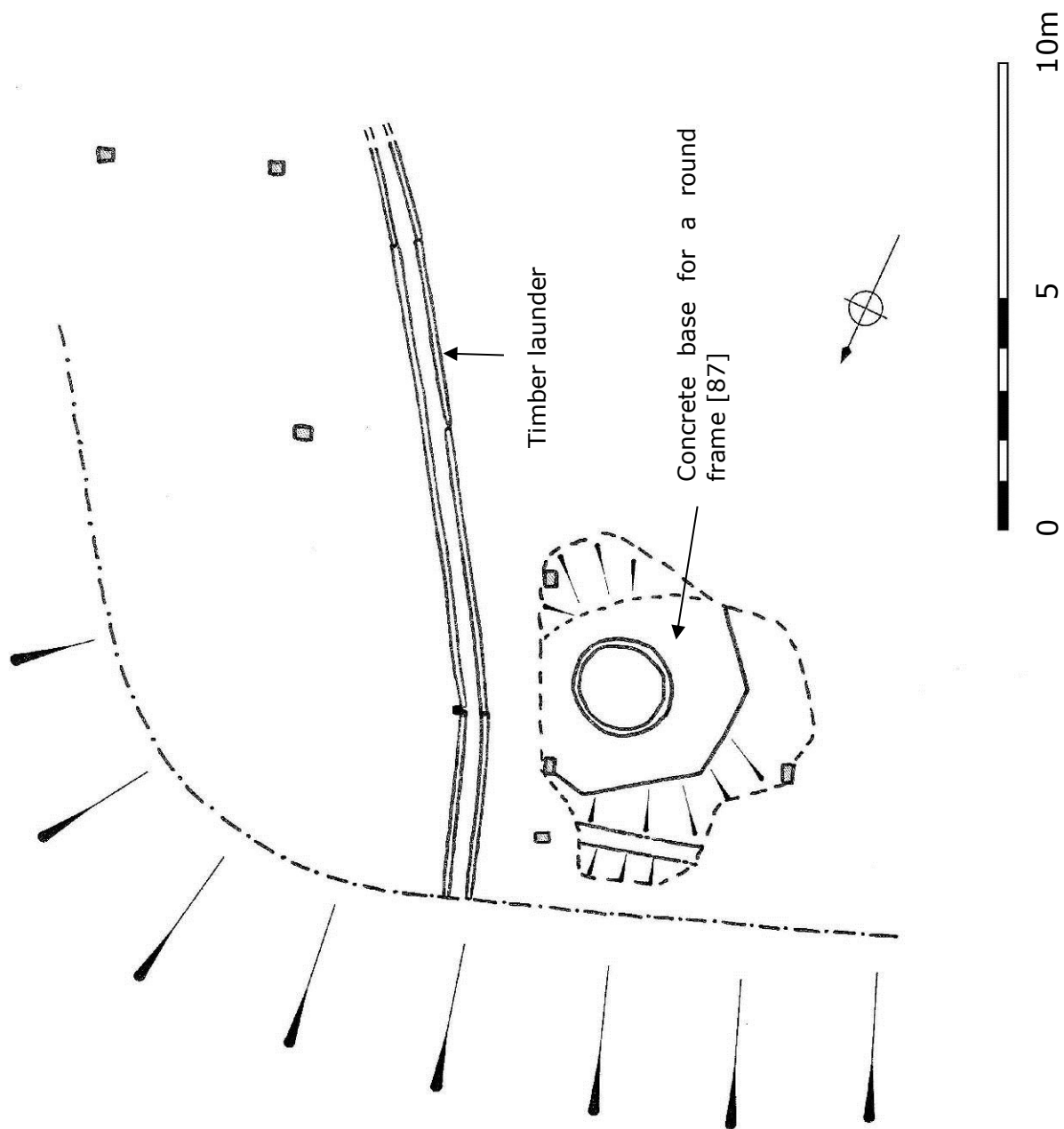


Figure 22. Red River Valley. Plan of timber launder, and base of a round frame[87].



Figure 23. Red River Valley. Photograph of launder [85] looking north.



Figure 24. Red River Valley. Photograph of launder within feature [87] part of the tailings works looking north.



Figure 25. Red River Valley. Base for a round frame within feature [87] looking east.



Figure 26. Red River Valley. Surviving walling [83] of settling tanks on western flank of valley looking south.



Figure 27. Western fields, Field 6. Photograph showing crown of slope working Silver Lode [49] with tunnel [51], overlain by prospecting tunnel [3], and branch tunnel [59].



Figure 28. Western fields, Field 9. Shaft [62] caught in section showing timber lining.



Figure 29. Photograph. Dudnance Lane to Wilson Way. Note the sleepers of the 1909 railway tracks preserved as 'ghosts' by the ballast material



Figure 30. Western Fields, Field 10. Felt miner's 'tull' or hat most likely dating from the 19th century (though possibly early 20th century) from tunnel [68].

10 Appendix 1. Site inventory

Site No.	Site type	Area	Location	Description
1	Prospecting pit	Western Fields. Field 5	SW 65924 40649	Elongated oval shape with straight roughly parallel sides about 2.3m long x 1.5m wide. Orientated north-east to south-west. Infilled with mixed yellow-brown and dark grey-brown clays with some stony rubble. 1.8m deep, with steep almost vertical sides and a flat bottom.
2	Hardcore rubble surfacing for field entrance	Western Fields. Field 5	SW 65877 40587	Semi-circular area of disturbed ground and stony rubble 5m in diameter. Initially thought to be a possible shaft being in close proximity to known shaft [40]. However, investigation showed this rubble to be less than 0.3m thick with nothing underlying it so it was more likely to be material that had been imported to the site to improve access to a field, the material lying just inside a gateway.
3	Tunnel	Western Fields. Field 6	SW 65859 40509 to SW 65848 40515	This initial length of this tunnel was traced for a length of 18m. Cut through very rotten bedrock it was seen to follow the line of the lode in a north-east to south-west direction. The roof varied in depth between 1.5m and 2m below the current ground surface, the tunnel dipping steeply to the south-west. The tunnel had an arched roof with near vertical sides, and it was floored in bedrock. It had an average height of about 1.5m and a width of 1m, though this did vary, where a harder band of rock was encountered the tunnel became narrower to <i>circa</i> 0.80m. Two side tunnels were seen leading off this tunnel. These were tunnels [54] and [59]. At its north-eastern end, the tunnel changes direction, to a NNE/SSW direction becoming tunnel [50].
4	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2m long x 1m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble. 1.5m deep, with steep almost vertical sides and a flat bottom.
5	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 2m long x 1.2m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble (some mineralised). 1.6m deep, with steep almost vertical sides and a flat bottom.
6	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 1.8m long x 1.2m wide. Orientated north-west to south-east. Infilled with mixed yellow-brown and dark grey-brown clays with some stony rubble (some mineralised). About 1.5m deep, with steep almost vertical sides and a flat bottom.
7	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 1.8m long x 1.2m wide. Full dimensions not recorded as enters baulk on side of road corridor. Orientated north-east to south-west. Infilled with dark grey-brown clays with some stony rubble.
8	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2.1m long x 1m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble. 1.8m deep, with steep almost vertical sides and a flat bottom.
9	Prospecting pit	Western	Part of a group of	Sub-rectangular shape with straight roughly parallel

Site No.	Site type	Area	Location	Description
		Fields. Field 6	pits centred at SW 65862 40515	sides roughly 2.1m long x 1m wide. Orientated north-west to south-east. Infilled with dark grey-brown clays. 1.5m deep, with steep almost vertical sides and a flat bottom.
10	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.8m long x 1m wide. Orientated north-west to south-east. Infilled with light grey-brown clays with some stony rubble. About 1.6m deep, with steep almost vertical sides and a flat bottom.
11	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.8m long x 1m wide. Orientated north-west to south-east. Infilled with light grey-brown clays with some stony rubble (some mineralised). 1.8m deep, with steep almost vertical sides and a flat bottom.
12	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 1.5m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble. 1.7m deep, with steep almost vertical sides and a flat bottom.
13	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.8m long x 0.4m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble.
14	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.8m long x 0.4m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble (some mineralised).
15	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.2m long x 0.45m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble. 1.5m deep, with steep almost vertical sides and a flat bottom.
16	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 1.9m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble. 1.8m deep, with steep almost vertical sides and a flat bottom.
17	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.8m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble (some mineralised).
18	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides. Dimensions not fully recorded as within baulk. About 1.8m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble.
19	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 1.8m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble. 1.4m deep, with steep almost vertical sides and a flat bottom.
20	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.4m long x 0.6m wide. Orientated north-west to south-east. Infilled with mixed yellow, grey-brown clays with some stony rubble (some mineralised). 1.6m deep, with steep almost vertical sides and a flat bottom.
21	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.8m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble.
22	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 1.8m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble.

Site No.	Site type	Area	Location	Description
23	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2.2m long x 1m wide. Orientated north-east to south-west. Infilled with mixed yellow-brown and Dark grey-brown clays with some stony rubble.
24	Outcrop shaft	Western Fields. Field 6	SW 65868 40545	A large sub-oval feature 5m long x 4m wide with its long axis orientated north-west/south-east. Infilled with mixed dark brown-black and yellow-brown clays with stony rubble and mineralised mine waste. Corona of darker material around periphery. On excavation proved to be coned becoming a vertical shaft at a depth of 2.0m. Shaft was rectangular in shape about 2m long x 1.8m wide orientated roughly north to south and was followed to a depth of 4m+. It was not bottomed. On the eastern wall of the cone of this shaft was a trench about 2m long and 1.6m wide running in a roughly east-north-easterly direction to connect with outcrop shaft [25]. This trench was about 1.5m deep. The feature appears to lie on Entral Lode.
25	Outcrop shaft	Western Fields. Field 6	SW 65874 40548	A sub-circular feature 4.0m diameter. Infilled with mixed dark brown-black and yellow-brown clays with stony rubble and mineralised mine waste. On excavation proved to be coned becoming a vertical shaft at a depth of 1.8m. Shaft was roughly circular with a diameter of about 2.5m. It was followed to a depth of 3.5m+. It was not bottomed. Connected to shaft [25] on the south-western side by a 1.6m wide trench, this continued on the eastern face of the shaft for another 2m, following the same alignment in an east-north-easterly direction but it was not seen to connect with anything.
26	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 2m long x 0.9m wide. Orientated north-west to south-east. Infilled with mixed yellow-brown and dark grey-brown clays with some stony rubble.
27	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.9m long x 0.8m wide. Orientated north-west to south-east. Infilled with yellow, grey-brown clays with some stony rubble.
28	Pit	Western Fields. Field 6	SW 65871 40543	Sub-circular pit roughly of 1m diameter, infilled with mixed yellow-brown and dark grey-brown clays with some stony rubble (mineralised). Not excavated.
29	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2m long x 0.5m wide. Orientated north-east to south-west. Infilled with grey-brown clays with some stony rubble.
30	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides roughly 2.1m long x 0.5m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble.
31	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2.0m long x 0.4m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble.
32	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2.0m long x 0.4m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble. 1.5m deep, with steep almost vertical sides and a flat bottom.
33	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2.0m long x 0.8m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble.
34	Prospecting pit	Western	Part of a group of	Sub-rectangular shape with straight roughly parallel

Site No.	Site type	Area	Location	Description
		Fields. Field 6	pits centred at SW 65862 40515	sides about 2.0m long x 0.8m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble.
35	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.8m long x 0.5m wide. Orientated north-north-west to south-south-east. Infilled with yellow, grey-brown clays with some stony rubble.
36	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW65862 40515	Sub-rectangular shape with straight roughly parallel sides about 1.5m long x 0.5m wide. Orientated north-west to south-east. Infilled with grey-brown clays with some stony rubble.
37	Outcrop shaft	Western Fields. Field 6	Pair of outcrop shafts centred at SW 65873 40541	A sub-circular feature 4.0m diameter. Infilled with mixed dark brown-black and yellow-brown clays with stony rubble and mineralised mine waste. On excavation proved to be coned becoming a vertical shaft at a depth of 2m. Shaft was roughly circular with a diameter of about 2.5m. It was followed to a depth of 4m+. It was not bottomed.
38	Outcrop shaft	Western Fields. Field 6	Pair of outcrop shafts centred at SW 65873 40541	A sub oval feature 2.5m long x 2.4m wide orientated north-east to south-west. Infilled with mixed dark brown-black and yellow-brown clays with stony rubble and mineralised mine waste. On excavation proved to be coned becoming a vertical shaft at a depth of 1.5m. Shaft was roughly circular with a diameter of about 2m. It was followed to a depth of 3.5m+. It was not bottomed.
39	Prospecting pit	Western Fields. Field 6	Part of a group of pits centred at SW 65862 40515	Sub-rectangular shape with straight roughly parallel sides about 2.1m long x 0.5m wide. Orientated north-east to south-west. Infilled with grey-brown clays with some stony rubble.
40	Shaft	Western Fields. Field 5	SW 65909 40581	Initially exposed as a circular area, of diameter 4.0m cut into natural. Infilled with grey-brown clay and some stony rubble. Excavation revealed that the top was coned to a depth of about 2.0m. From this point the shaft became rectangular in plan measuring 2.5m long x 1.5m wide and orientated north-west/south-east. Excavated to a depth of about 6.0m, but not bottomed. It was choked with clays and stony rubble for the entire depth investigated.
41	Prospecting pit	Western Fields. Field 5	SW 65878 40572	Sub-rectangular shape with rounded corners. This had roughly parallel sides <i>around 2m</i> long x 0.9m wide with the long axis orientated north-west to south-east. It was infilled with grey-brown clays with some stony rubble. This proved to be 1.5m deep, with steep almost vertical sides and a flat bottom.
42	Probable shaft	Western Fields. Field 5	SW 65874 40575	Oval shaped area [42] of disturbed ground measuring 3m long x 2m wide orientated north, north-east, south south-east. Infilled with loose grey-brown clay and large stone blocks some of which appeared to be highly mineralised. This was excavated to a depth of 3m but not bottomed. Edges of the feature were not clearly defined possibly due to earth movement with collapse of material forming a cone. Feature completely choked with mine waste
43	Outcrop shaft or small openwork	Western Fields. Field 5	SW 65874 40580	Zone of disturbed material about 6m long and varying in width from 2m to 4m becoming wider to the north [43] orientated roughly north to south. The edges were quite sharp and defined suggesting that this was a cut feature. It was infilled with mixed clays and stony rubble much of which was mineralised. Though not investigated further this did have the appearance of an outcrop shaft or small openwork. It was cut at its southern end by shaft [42] and at its northern end by pit [44].
44	Modern rubbish pit	Western Fields.	SW 65914 40585	Though mostly obscured by being within the baulk this appeared to be sub-circular in shape with a diameter of 2m. It was partially excavated down to a

Site No.	Site type	Area	Location	Description
		Field 5		depth of 0.8m, and proved to be infilled with very loose grey-brown clays and modern material including fragments of plastic. Proving to be a modern rubbish pit, it was not investigated further.
45	Prospecting pit	Western Fields. Field 5	SW 65874 40573	Sub-rectangular shaped pit which had rounded corners. This pit had roughly parallel sides roughly 2.2m long x 1.2m wide with the long axis orientated north-east to south-west. It was infilled with grey-brown clays with some stony rubble. This proved to be 1.8m deep, with steep almost vertical sides and a flat bottom.
46	Pit	Western Fields. Field 6	centred at SW 65860 40510	Sub-circular pit 0.8m diameter, infilled with grey-brown clays and some stony rubble (some mineralised). U-shaped profile pit 1m deep.
47	Pit	Western Fields. Field 6	centred at SW 65860 40510	Sub-circular pit 1m diameter, infilled with grey-brown clays and some stony rubble (some mineralised). U-shaped profile pit 0.9m deep.
48	Stope	Western Fields. Field 6	SW 65854 40529 to SW 65873 40541	Crown of an open stope encountered at a depth of 5m. Stope believed to be on Entral Lode. Stope between 2m to 3m wide (due to collapsing material could not be investigated closely) Orientation of stope is north-east to south-west. Traced for a length of circa 20m though certainly crossed the entire width of the road corridor. Earlier investigations by drilling had apparently shown this stope to be open at a depth of 300ft.
49	Stope	Western Fields. Field 6	SW 65854 40502 to SW 65878 40518	Crown of an open stope encountered at a depth of 5m below the top of the natural. Stope believed to be on Silver Lode. Stope varied between 2m to 3m wide. Max depth of the open part of the stope was 10m before it became choked, though this did vary. Orientation of stope was north-east to south-west, and at its south-western end it was seen to be dipping steeply to the south-west. Pick marks were recorded on the north western face of the stope at its south-western end. The stope was traced for about 30m across the entire width of the road corridor. A tunnel [51] was found at the south-western end of the stope, cut into its north-western face.
50	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	A continuation of tunnel [3] at the north-easterly end, however, changing direction and swinging towards the north to follow a line trending roughly north-north-east, to south-south-west. Traced for a distance of about 15m. The tunnel had an arched roof with near vertical sides. It had an average height of about 1.5m and a width of 1m, though this did vary. The roof was on average 1.5m below the current ground surface. Course of tunnel crossed by three tunnels running north-west to south-east, tunnels [52]/[55], [56] and [57]. Given a separate number as when first uncovered was thought to be a separate tunnel due to different orientation from [3].
51	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	This tunnel was on the north-western face of Stope [49]. It was found to run and dip steeply in a north-westerly direction, but became choked after a distance of about 2m. As it disappeared under the edge of the road corridor it was not traced further. The tunnel, cut into harder rock had an arched roof which lay 5m below the ground surface. It was 1.8m high, with a width of 1.5m. Either a communications tunnel or a cross-cutting prospecting tunnel.

Site No.	Site type	Area	Location	Description
52	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	A branch tunnel off tunnel [50] running in a north-west direction. Continued as tunnel [55] to the south-east of the junction with tunnel [50]. The tunnel had an arched roof with near vertical sides. It had an average height of about 1.5m and a width of 1m, though this did vary. The roof was on average 1.5m below the current ground surface though the tunnel dipped towards the north-east so at the intersection with tunnel [58] it was at a depth of 1.8m. The tunnel was traced for a length of about 6m before at the north-western end connects with tunnel [58].
53	Stope	Western Fields. Field 6	SW 65859 40518	The crown of a small stope was breached at a depth of 1.8m. Orientated north-east to south-west. Varying in width from 0.8m to 1m in width it was found to be partially open to a depth of 2m. Below this level it was filled with mine waste. Due to choked nature of stope, this was only traced for about 3m before line was lost. Lode was not observed at either end of road corridor. Stope completely disappeared at a depth of about 4.5m, so was only a small working.
54	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	A branch tunnel off tunnel [3] at its north-eastern end, some 2m before tunnel [3] changed direction to the NNE (becoming tunnel [50]) this branch running in a south-easterly direction. Traced for a distance of about 4m before it came to an abrupt end in solid rock. It was 1m wide, with the arch-shaped roof being about 1.5m below the ground surface.
55	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	The south-easterly continuation of tunnel [52]. The tunnel had an arched roof with near vertical sides. It had an average height of about 1.5m and a width of 1m. Traced for a distance of about 1.2m before it became completely choked. It was not followed further. The roof was on average 1.5m below the current ground surface. Branches off tunnel [50].
56	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	This tunnel cross cuts tunnel [50] some 7m to north-east of tunnel [52]/[55] and running parallel with the latter. This tunnel was only traced for a distance of 1m either side of tunnel [50] before becoming choked and completely blocked. It had an average height of about 1.5m and a width of 1m with the roof being at a depth of about 1.5m below the ground.
57	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	This tunnel cross cuts tunnel [50] at its north-eastern end, running in a north-west to south-east direction and thus parallel with tunnels [56] and [52]/[55]. This tunnel was only traced for a distance of about 1.5m either side of tunnel [50] before becoming choked and blocked. There seems to have been a major tunnel collapse at this point as it also marks the furthest point that tunnel [50] was traced before its course was lost.
58	Tunnel	Western Fields. Field 6	Part of a group of tunnels centred at SW 65862 40515	Tunnel running north-east to south-west, and thus apparently parallel to tunnel [50] and connected to it by tunnel [52]. This tunnel was only traced for a distance of about 2.5m before it became choked and blocked at both ends and its course untraceable. It was roughly 1.5m high, about 1m wide, with the arch shaped roof being about 1.8m below the ground surface.
59	Tunnel	Western Fields. Field 6	SW 65861 40506	A branch tunnel off tunnel [3] running in a north-westerly direction. Traced for about 2m before it became choked and was lost. It was roughly 1.5m high, about 1m wide, with the arch shaped roof

Site No.	Site type	Area	Location	Description
				being about 1.8m below the ground surface at 8m from western edge of road corridor.
60	Tunnel	Western Fields. Field 6	SW 65853 40503	A branch tunnel off tunnel [3] running in a south-easterly direction. Traced for about 1.5m before it became choked and was lost. It was roughly 1.5m high, about 1m wide, with the arch shaped roof being about 2m below the ground surface. At the south-western end of tunnel [3] immediately at the junction with the edge of the road corridor.
61	Ditch	Western Fields. Field 8	SW 65925 40416 to SW 65885 40407	Running roughly east-north-east, to west-south-west some 2.5m inside the roadside hedge boundary and running parallel to it. Cut roughly 0.8m wide infilled with yellow, grey-brown clay with some shillet fragments. Had the appearance of being a machine cut modern service trench. Not investigated further.
62	Shaft	Western Fields. Field 9	SW 65863 40453	A large shaft, situated on top of a slight mound of spoil. Slight sub-circular depression seen in surface after vegetation cleared was about 4.0m diameter. A timber-lined shaft was encountered at a depth of about 0.30m below the surface. The top part of shaft was rectangular in plan measuring 2.5m long x 1.5m wide and orientated roughly west to east. The top 2m of the shaft had been cut through soft rock. This was timber-lined and boarded. The bottom of the lining was set on a shaft sett made up of large thick timbers resembling rail sleepers. These were set onto hard rock ledges. The corner posts of the lining were formed from large square sectioned vertical set beams <i>circa</i> 0.20m x 0.20m. The whole assemblage of timberwork was held together by large hand forged iron nails. These were square sectioned (approximately 0.02m x 0.02m) and about 0.30m long. The whole timber lined structure had been completely infilled with light grey-brown clay and shillet rubble. At the base of the timber lining, iron sheeting (including some boiler plate) was found lying upon iron bars that had been laid in a crisscross grid over an open shaft. This open shaft continued as a square shaped (roughly 2m x 2m) vertical sided rock cut feature cut into hard rock for about 2m. After this it appeared to become circular in plan, of roughly 2m diameter. This shaft appeared to be open to a depth of about 20m after which it became choked with debris. Associated with tunnel/adit [63] which lay <i>circa</i> 0.5m to the west.
63	Tunnel/Adit Possible stope	Western Fields. Field 9	SW 65863 40453	Immediately adjacent to and on the western side of Shaft [62] this tunnel had an arched roof and ran north-east to south-west. It appeared to be about 1.5m wide with vertical rock sides, a maximum height of about 1m being seen as the floor was obscured by debris and thus not seen. Top of roof at a depth of 2.3m below current ground level. There was no evidence for a lode with the roof or surrounding rock, which suggests that it is more likely to have been a tunnel, or adit, rather than the crown of a stope. The tunnel was traced for a distance of about 10m before becoming choked at either end.
64	Shaft /Access way	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	Rectangular shaped shaft roughly 2.5m long x 2m wide with axis orientated north-east to south-west. The top timbers of the shaft were encountered at depth of 2.5m below current ground surface. Shaft bottom at a depth of 4.5m with a 'sump' at the north-eastern end 2m x 1.5m that was a further 0.5m deep. Both the shaft and the sump were flat

Site No.	Site type	Area	Location	Description
				<p>bottomed and formed of solid rock. Sump was rock cut and not lined with timber.</p> <p>Infilled with grey-brown clay, stony rubble and mining debris. The bottom 0.30m was infilled with light grey-brown silts.</p> <p>At the south western end connected with tunnel [67].</p> <p>Connected with tunnel [69] at the north-eastern end. Connected with tunnel [72] on north-western side.</p> <p>A small timber lined tunnel, 1m long and measuring roughly 1.5m high, and 1m wide, connected with shaft [65] on the south-eastern side.</p>
65	Shaft /Access way	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	<p>Rectangular shaped shaft roughly 2.5m long x 2m wide with axis orientated north-east to south-west. The top timbers of the shaft were encountered at depth of 2.5m below current ground surface. Shaft bottom at a depth of 4.5m with a 'sump' at the north-eastern end 2m long x 1.5m wide that was a further 0.5m deep. Both the shaft and the sump were flat bottomed and formed of solid rock. Sump was rock cut and not lined with timber.</p> <p>Infilled with grey-brown clay, stony rubble and mining debris. There was no evidence for any silts at the base.</p> <p>Connected by short tunnel to shaft [64] on north-western side.</p> <p>A small timber lined tunnel, 1m long and measuring roughly 1.5m high, and 1m wide, connected with shaft [66] on the south-eastern side.</p> <p>At the south western end connected with tunnel [68].</p> <p>Connected with tunnel [70] at the north-eastern end.</p>
66	Shaft /Access way	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	<p>Rectangular shaped shaft roughly 2.5m long x 2m wide with axis orientated north-east to south-west. The top timbers of the shaft were encountered at depth of 1.9m below current ground surface. The flat, rock floor of the shaft was at a depth of 5m. There was no 'sump', unlike the neighbouring shafts. Infilled with grey-brown clay, stony rubble and mining debris.</p> <p>Connected by short tunnel to shaft [65] on north-western side.</p> <p>Connected with tunnel [71] on the south-eastern side.</p>
67	Underground leat	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	<p>This was a long tunnel running roughly north-east to south-west that connects with shaft [64]. Traced for a distance of about 60m it appeared to be roughly horizontal, the roof being on average between 2.8m and 3m below the current ground surface. The tunnel was open throughout the entire length recorded.</p> <p>The tunnel, cut through hard rock was flat roofed, being on average about 1.4m wide and 1.8m high. The sides and roof at the north-east end where it connected with shaft [64] were timber lined for a distance of about 10m. At the south-west end there was no evidence for lining.</p> <p>The rock floor was covered in a deposit of wet silts and clays up to 0.50m deep. Water was seen to run down the tunnel.</p>
68	Tunnel	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	<p>This was a long tunnel running roughly north-east to south-west that connects with shaft [65]. Traced for a distance of about 25m it appeared to be roughly horizontal the roof being on average between 2.8m and 3m below the current ground surface.</p> <p>The tunnel, cut through hard rock was flat roofed, being on average about 1.4m wide and 1.8m high. The sides and roof were timber lined for the entire length recorded.</p>

Site No.	Site type	Area	Location	Description
				The tunnel was open for the entire length recorded. The floor was covered in timber planks which ran along its length; however, these did not appear to be duck boarding as they were not fixed in place.
69	Underground leat	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296 Possible extension seen at SW 65881 40323	A continuation of tunnel [67] to the north-east of shaft [64] to which it connects, that runs in a north-easterly direction. It was traced for a distance of about 5m before it became choked. The length of tunnel recorded had a similar appearance and dimensions to that for tunnel [67]. A possible extension of this tunnel was noted by the contractors (Bill Murray of Carillion) some 2m to the west of Bennetts Shaft at SW 65881 40323. At this point the tunnel was rock cut; arch roofed, roughly 1.5m wide and 1.8m high, the lower portion of the floor being covered with stony rubble up to about 0.3m deep.
70	Tunnel	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	A continuation of tunnel [68] to the north-east of shaft [65] to which it connects, that runs in a north-easterly direction. Only the exit from the shaft, and a run of about 2m was traced before it became choked and lost. The length of tunnel recorded had a similar appearance and dimensions to that for tunnel [68].
71	Tunnel	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	A tunnel which exits from shaft [66] on its south-east side running in a south-easterly direction. It was traced for a distance of about 5m before becoming choked and was lost. This is possibly a continuation of tunnel [71]. Its dimensions were similar to the small tunnels co-joining the three shafts [64], [65] and [66] and may indeed be an extension of these. This tunnel was roughly 1.5m high, and 1m wide and timber lined for the length observed. Flat bedrock formed the floor of the tunnel.
72	Tunnel	Western Fields. Field 10. Dolcoath Road	Part of complex centred at SW 65862 40296	A tunnel which exits from shaft [64] on its north-west side and ran in a north-westerly direction. It was traced for a distance of about 6m before becoming choked and was lost. Its dimensions were similar to the small tunnels co-joining the three shafts [64], [65] and [66] and tunnel [71] of which it is possibly a continuation. This tunnel was roughly 1.5m high, and 1m wide and timber lined for the length observed. Flat bedrock formed the floor of the tunnel.
73	Railway sidings	Dudnance Lane to Wilson Way	Centred at SW 67107 40885	Deposit of crushed granite gravel railway track ballast at a depth averaging 0.15m below the current ground surface. The depth of the ballast was about 0.40m. Within this ballast the imprint of railway sleepers was clearly visible, marking out the line of two parallel rail tracks in a north-east to south-west direction. Tracks set approximately 1.3m apart which would suggest a roughly 2m separation between the two sets of rails. Standard gauge is 4' 6", and the British Railways standard separation for two running lines was 6'. Sleepers set approximately 0.3m apart. The impressions of the sleepers suggest they were approximately 0.15m thick, and presumably of wood. Standard BR spacing. Timber sleepers were usually 6" thick, as found here.
74	Shaft	Dudnance Lane to Wilson Way	SW 67301 41093	This appeared initially a slight sub-circular depression in the field surface about 4m in diameter. Removal of topsoil revealed an area of disturbed ground marked by a sub-circular shaped area (3.0m diameter) infilled with mixed clays and stony rubble. On excavation this turned into a 5.0m+ depth shaft. Its cone was approximately 3.0m in diameter

Site No.	Site type	Area	Location	Description
				tapering as a vertical shaft to 2.0m diameter. At the base of the excavation the shaft became roughly rectangular in shape about 2.5m x 2.0m. The orientation of the axis of the shaft was north-east to south-west. The shaft was completely choked with debris.
75	Shaft	Dudnance Lane to Wilson Way	SW 67303 41030	Position of a shaft suggested by documentary evidence. Examination of the area failed to locate the shaft though broken lagging boards and shaft sett timbers were noted in the topsoil that was removed. Probably destroyed, and obscured by earlier landscaping work.
76	Pipeline and walling	Dudnance Lane to Wilson Way	SW 67281 41118	A pipeline comprising sections of cast iron pipes of about 0.4m diameter. Running in a north-west, to south-east direction it was traced for a distance of roughly 10m but unfortunately both ends had been truncated and lost. A small fragment of walling was noted within the western section of the trench lying on the south side of the pipeline. Constructed of granite blocks, it was 0.80m wide, and survived to a height of 1.5m. Only seen in section, it appeared to be orientated west to east. Probably part of a tailings processing works shown on 1880 Map.
77	Stone lined culvert.	Dudnance Lane to Wilson Way	SW 67056 40844	A culvert constructed of two lines of stone walling about 0.6m high, and 0.8m apart capped by large granite slabs. Floored with granite as well, with a deposit of grey silt overlying them. Runs roughly north-west to south-east. Traced for a distance of about 5m.
78	Leat and possible sluice?	Western Fields. Field 2	Centred at SW 66079 40721	A linear ditch was recorded running for a length of about 20m in a roughly north-east, south-west direction. This ditch appeared to be vertical sided, on average 1m wide with up to 0.50m depth surviving. It had some possible traces of clay lining on the sides, whilst the flat bottomed base was covered in light grey silts and clays. It was infilled by red-brown clay. On the south eastern side of the ditch and running parallel to it was a length of stone walling that was traced for roughly 4m. Constructed of shillet rubble blocks (apparently un-mortared) it was about 0.40m wide with, in places, four courses surviving up to 0.30m high. To the east of the walling there was a horizontal layer of compacted black-brown clay the limits of which were not determined. At the southern end of the ditch was a flat granite slab measuring <i>circa</i> 1m x 0.8m. Adjacent to this block on the western side of and running perpendicular to the line of the ditch was very slight evidence for walling that was traced for about 1m. This consisted of shillet rubble blocks <i>circa</i> 0.40m wide. About 0.4m south of the granite slab was a roughly square shaped area of grey clay that measured approximately 1m x 1m. This lay within an area that had been machined away, however, had been described as containing a timber structure, roughly rectangular in shape. Though not recorded archaeologically, when looked at one of the timbers clearly had a mortise cut within it. About 0.5m to the northwest of the grey clay area, rubble block walling was seen in the section running in a north westerly direction.
79	Reservoir?	Western Fields. Field 3	centred at SW 66040 40702	A triangular shaped area within the northern part of the field defined by a wall running from SW66020 40698 to SW66060 40696 in a west-north-west/east-south-east direction. The area to the north of this wall was found to have

Site No.	Site type	Area	Location	Description
				a layer of grey green clays and silts, (up to 0.15m thick) heavily stained with manganese and iron overlying the bedrock. This had the appearance of a clay lining, and overlying silts affected by iron panning and waterlogging which suggests that this area had been significantly affected by water.
80	Stone lined culvert	Dudnace Lane (Bartle's section)	SW 66524 41013 to SW 66506 41034	Stone culvert running roughly north-west to south-east direction which was traced for about 30m. Walls constructed of granite rubble blocks, set about 0.25m apart, up to 0.30m deep and floored with stone. Capped by flat slabs of granite. Open for length observed, with fine grey silt in base. Possible the drain for the foundry weighbridge.
81	Tank or cistern?	Dudnace Lane (Bartle's section) Sylmar Cottage	SW 67004 40851	Circular pit carefully lined with rubble stone walling. Roughly 1.5m diameter and 1.8m deep. The decayed natural bedrock formed the floor to the pit. There was a trace of yellow clay lining from the base to a height of about 0.30m. Modern cast iron pipes led into this pit from the top, these were a recent alteration to the use of this structure (converting it into a soakaway?) This pit was infilled with grey-brown clay, stony fragments, and modern rubbish (including plastic). There was no evidence for the original function of this structure, apart from the clay lining suggesting that it may have been originally water tight, and used as a tank or cistern.
82	Quarry	South Crofty	SW 66214 40912	A large quarry was emptied of modern debris and rubble. Not visible on the 2005 aerial photographic coverage, or on the ground, it is, however, depicted on both the 1880 and 1909 OS maps. This quarry measured roughly 78m long, and 20m wide orientated east-north-east, to west-south-west the mitigation excavation reaching a depth of roughly 4.5m. The fill deposits were not bottomed at this level. Called the 'Arsenic Quarry' by recent miners as formerly used to dispose of contaminated material on the South Crofty site.
83	Settling tanks	The Red River Valley	SW 66121 40735	The corner of a stone built structure with walling surviving measuring 14m long x 12m wide, full dimensions not recorded as buried under spoil and vegetation Building orientated north-east to south-west. Walling up to 1m thick, constructed of stone blockwork the wall running north-west to south-east still standing to a height of 2m. This wall also had three slots roughly 1m wide within it (overflow chutes?) The main north-east to south-west wall survived to a height of 1.5m. The corner of this structure had quoin stones of granite. Traces of internal wall 0.5m thick and up to 1.8m high, running north-east to southwest forming a tank roughly 6m wide. Interior of tank had orange and red silty clays up to 1m deep. No obvious floor encountered. Associated with a leat that ran alongside the western side of the building.
84	Settling Tanks or rag frame bases	The Red River Valley	SW 66180 40804	Immediately adjacent to the old course of the Red River, the bank of which marks the eastern side of this structure which was only partially recorded as lay at the edge of the cutting required for the new river channel. An expanse of concrete flooring was exposed the length that was uncovered being roughly 12.5m long x 4.5m wide, orientated north-west to south-east. There were slots within this floor suggesting wooden partitions.

Site No.	Site type	Area	Location	Description
				To the west of the floor a series of rag frame bases constructed out of concrete blocks and concrete floors were recorded. These bases run parallel to the floor, so these are orientated north-west to south-east. The bases had vertical sides with a V shaped profile floor, were roughly 1.5m wide and 0.6m deep. A channel ran at the apex of the V to concentrate and carry away the waste.
85	Launder	The Red River Valley	SW 66177 40782	A stretch of timber launder was excavated and traced for roughly 7m long running north-west to south-east. Constructed of vertical timbers set on edge about 0.3m apart, and floored with planks. Depth of launder was 0.20m. Infilled with black-brown silts. Wooden posts set at intervals to hold sides of launder upright and in place. Timbers were laid within a trench. Truncated at northern end by a modern concrete structure (manhole?). Various truncated wooden posts and supports were seen in a line running towards the south-east for a distance of about 10m.
86	Launders	The Red River Valley	SW 66209 40809	Two launders were recorded in section. Heavily damaged by machine, appeared to have run in a general north-west to south-east direction. They both appear to have been of similar dimensions to launder [85] in width and shape, but this was difficult to confirm as the walls of the launders with the section had collapsed in upon themselves. In section they both seem to have been laid into thick deposits of tailings sand. Noted that they sloped down towards river.
87	Launders and base of round frame	The Red River Valley	SW 66145 40921	A long curvilinear stretch of launder was traced for a distance of about 30m running in a roughly north-west to south-east direction. Constructed within a trench, lined and floored with timbers. Launder varied in width between 0.30m and 0.40m and averaged a depth of about 0.15m. Approximately 2m to the west of the launder was a polygonal concrete base of roughly 5m diameter in which there was a circular timber lined central depression of 2m diameter. Associated with various wooden posts, though excavation not extensive enough to determine plan and thus function. As the base of the round frame lay below level required for base of soakaway pond, no further excavation was undertaken. All feature buried under tailing sands to a depth of over 1m.
88	Shaft	The Red River Valley	SW 66188 40811	A timber lined shaft was encountered buried under 1.8m of tailing sands and clay. The top part of shaft was rectangular in plan measuring 2.5m long x 1.5m wide and orientated roughly north-west to south-east. The top 2m of the shaft had been cut through soft rock and tailings sands and clays. This was timber-lined and boarded. The shaft was open and had within it modern metal ladder which suggests that this was accessible until at least the 1950s and was probably buried when the sand works were in operation.

11 Appendix 2: Planning brief

BRIEF FOR THE EAST-WEST LINK ROAD, CAMBORNE & POOL OVERARCHING WRITTEN SCHEME OF INVESTIGATION (WSI) FOR BUILDING RECORDING, ARCHAEOLOGICAL RECORDING, INVESTIGATION, AND EXCAVATION

Date: 27th November 2012

Address: East-West Link Road, Camborne & Pool

Application: PA09/01295/F & NR/08/00355/CC ENV

HBSMR: **CC05347**, CCO3569, CCO3570

Applicant: Cornwall Council, County Hall, Truro

Agent: John Foskett, Parsons Brinckerhoff, 11 High Cross, Truro, Cornwall TR1 2AJ

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Historic Environment Planning Advice Officer: Phil Markham, Cornwall Council, Historic Environment Service, Dolcoath Avenue, Camborne TR14 8SX

t. 07973 813572 e. pmarkham@cornwall.gov.uk

Local Planning Authority Officer: Chantal Mclennan, Cornwall Council, Planning & Regeneration, Dolcoath Avenue, Camborne TR14 8SX t. 01209 616965

e. Chantal.Mclennan@cornwall.gov.uk

This brief is only valid for six months. After this period the Historic Environment Planning Advice Officer (HEPAO) should be contacted. Any written scheme of investigation (WSI) resulting from this brief shall only be considered for the same period. The contractor is strongly advised to visit the site before completing their WSI 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 Overarching Written Scheme of Investigation (WSI). Subsequent WSIs/Method Statements will be required for individual elements of archaeological work and ground works in these areas will not begin until these have been approved by Historic Environment Advice and the Local Planning Authority.

Further detail ie names of historic buildings/structures, levels of investigation, and detailed method statements will be presented within the individual Written Schemes of Investigation (WSIs) to be compiled by the Archaeology and Heritage Senior Consultant. These will then be submitted to Phil Markham (HER) for approval prior to being adopted in the field.

1 Introduction

1.1 This brief has been written by the HEPAO and sets out the minimum requirements for an overarching WSI to cover archaeological works at the above site to facilitate the discharge of the conditions detailed below through further WSIs/Method Statements and where required to facilitate the development through further approved written schemes of investigation/method statements.

2 Site Location and Description

2.1 The road scheme links Dolcoath Avenue Camborne to Dudnance Lane Pool via a new road crossing the Red River Valley and cutting through the South Crofty Mine site. There are improvements to Dudnance Lane and a new road linking this to Wilson Way roundabout.

3 Planning Background

3.0 There have been a number of planning applications for Phase 1 and Phase 2 of for the East-West Link Road for Camborne and Pool and the current scheme does not include all of the consented elements.

3.1 Planning application NR/08/00355/CC ENV was submitted on the 23rd July 2008 and was to undertake Phase 1 of highway improvement works (including widening) on Dudnance Lane, Station Road and Wilson Way and adjacent side roads and to construct a new road between Station Road and Wilson Way at Carn Brea Lane.

3.2 This application has been approved subject to a number of conditions. Condition 6 states:

3.3 Prior to the commencement of development (including any site preparation works), the applicant shall have submitted to and had approved in writing by the LPA a programme of archaeological recording in accordance with a written scheme of investigation within the area of the approved site (to include details of the identification and method of recording of any sites and features of archaeological interest).

3.3 Planning application PA09/01295/F was submitted on the 2nd October 2009 and was for the Phase 2 construction a new highway between Dolcoath Avenue and Dudnance Lane and to undertake highway works (and highway modification and improvement works) on Dudnance Lane, Chapel Road, Dolcoath Road, Dolcoath Avenue and adjacent side road.

3.4 This application has been approved subject to a number of conditions. Condition 7 states:

3.5 No development shall commence until the applicant has secured and implemented a programme of archaeological work in accordance with a written scheme of investigation to be submitted to and approved by the local planning authority. The approved road shall be implemented in accordance with the approved archaeological work.

3.6 The applicant, their agents and any subcontractors should note that where there are other conditions requiring satisfaction in advance of the commencement of works on site; it is the responsibility of the applicant to liaise with the planning officer concerned to ensure that the timetabling of these works is managed.

4 Previous Archaeological Work

4.1 Previous archaeological work for this road scheme includes an archaeological assessment of phase 2 of the road scheme undertaken during 2009, 'Phase 2 Camborne, Pool and Redruth Road Scheme, Cornwall, Archaeological Assessment Report 2009R033 Cornwall Council Historic Environment Projects', and 'Basset (Bartles) Foundry, Dudnance Lane, Pool, Cornwall Archaeological Assessment Report 2008R047 Cornwall Council Historic Environment Projects'. Other archaeological assessments have been conducted in the areas of this road scheme and are available at the Cornwall and Scilly Historic Environment Record in Truro. The application documents also contain pertinent archaeological material and these are available from the agent.

5 Requirement for Work

5.1 The following elements of archaeological work will require separate written schemes of Investigation/method statements approving prior to works, however they should be included in brief in the overarching WSI:

5.2 The Bassets / Bartle's Foundry Site will require an English Heritage Level 3 – 4 building record to include rectified photography, measured survey where appropriate and an archaeological 'watching brief' on any ground works. The building recording work will include the character of the surrounding site.

5.3 The South Crofty Mine site will require an English Heritage Level 3 – 4 building record to include rectified photography, measured survey where appropriate and an archaeological 'watching brief' on any ground works. The building recording work will include the character of the surrounding site.

5.4 The Fields west of the Red River will require an appropriate archaeological geophysical survey to be undertaken. The results may enable the targeted excavation of any significant sites. Field boundaries will be recorded where these are cut and an archaeological 'strip and record' will be undertaken prior to the road works.

5.5 The Red River Valley and Mine Waste Area will have a controlled archaeological 'strip and record'.

5.6 The road scheme from Dudnance Lane to Wilson Way roundabout will require a controlled archaeological 'strip and record' of new road sections and an archaeological 'watching brief' on ground works as required. English Heritage level 2– 4 building recording will also be required, to include the Tincroft Mine smithy building and yard on the south side of Dudnance Lane/Station Road.

5.7 The road scheme as a whole will require an archaeological 'watching brief' on all ground works unless this is agreed not to be applicable in certain areas. All buildings of historic merit or that add to the character of the area will be recorded appropriately to English Heritage level 2 -4 prior to works or demolition.

5.8 Further recording/investigation may be required as the development progresses. to be undertaken in agreement with the HER and the client's Senior Archaeology and Heritage Consultant.

6 Building Recording Methodology

6.1 The present proposals will culminate in the destruction of historic environment assets. It is therefore important that these are recorded to an appropriate level; and that the results are made available to interested parties. An English Heritage level 2-4 record for all sites, buildings of historic merit or add character to the area will be required. Any architect/applicant drawings may be used or adapted as required. The recorder(s) will need to consider the following as a minimum:

- Site layout and organisation
- Ground make up of the surface (concrete, foundation remains, stub walls, metal, ceramic etc.) and dumped material.
- Character
- Function
- Materials, methods of construction
- Internal arrangement and details of any foundations where visible
- Fenestration
- Original fixtures and fittings
- Subsequent fixtures and fittings - architectural and industrial
- Evidence of use and status
- Relationship/relevance to the Outstanding Universal Value (OUV) of the Mining World Heritage Site
- Date/period of initial builds and subsequent alterations
- Description of industrial elements undertaken within the buildings or parts thereof;

- The mapped recorded features will be linked to earlier mapped features and photographic evidence where possible.

6.2 The photographic record shall be a comprehensive record to archive standard of the existing buildings and structures, both externally and internally. The photographs will be taken with black and white 35mm or medium format film producing archive quality prints and negatives. Colour photography may be utilised for general shots and where it is appropriate for detail shots. For both general and specific photographs, a photographic scale shall be included.

6.3 The drawn record will be comprehensive where required and act principally to support the photographic and written descriptive record. Where appropriate it should include measured plans of all floors, a site plan at 1:500, a phased plan if the buildings' constructional complexity warrants this and a plan annotated to show the location, shot number and direction of all photographs. If the building displays evidence more than two building phases then a phased plan should be produced.

6.4 Plans may be based on existing architectural drawings where these exist but these must be checked in the field to ensure acceptable accuracy and should be recast where necessary to standard archaeological conventions.

7 Building Recording Results

7.1 The full report shall be submitted within a length of time (but not exceeding six months) to be agreed between the applicant and the historic building contractor, Cornwall Council Historic Environment Service and the Cornwall Records Office. A further digital copy shall be supplied on CD-ROM preferably in 'Adobe Acrobat' PDF format.

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

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

7.4 The report must contain:

- A table of contents.
- The building's precise location in National Grid and address form.
- A brief history of the site.
- A concise non-technical summary of the project results.
- The aims and methods adopted in the course of the investigation.
- The date of the record, name of recorder(s) and the location and contents of the deposited archive.
- A location map, copies of any plans/drawings and copies of such photographs as necessary to illustrate the written description with appropriate annotation.
- A written description of the building and its structure, materials and layout.
- A description and interpretation of industrial processes undertaken within the buildings or parts of;
- A full bibliography where external sources have been used.
- A copy of the brief and approved written scheme of investigation (WSI) will be included as an appendix.
- A digital copy of all photographs (in .TIFF format) making up the archive record to be bound into the rear cover of the HER / HEPAO copy of the report on CDR or DVDR.

7.5 The archive should follow that for the archaeological recording.

8 Archaeological Recording

8.1 Ground works associated with the development may disturb buried archaeological remains. It is therefore important that a suitably qualified archaeologist(s) is/are present during these works in order to identify and record any features of interest.

8.2 The site specific aims are to:

- Establish the presence/absence of archaeological remains
- Determine the extent, condition, nature, character, date and significance of any archaeological remains encountered
- To establish the nature of the activity on the site
- To identify any artefacts relating to the occupation or use of the site
- To undertake palaeo-environmental sampling and analysis as appropriate
- To provide further information on the archaeology of the site from any archaeological remains encountered

9 General Methodology

9.1 All stages of the investigation shall be supported by a written scheme of investigation (WSI).

9.2 The archaeological contractor is expected to follow the code of the Institute for Archaeologists (IfA).

9.3 Details including the name, qualifications and experience of the site director and all other personnel (including specialist staff) shall be included within the WSI.

9.4 All of the latest Health and Safety guidelines shall be followed on site.

9.5 The IfA's Standards and Guidance should be used for additional guidance in the production of the WSI, the content of the report and the general execution of the project.

9.6 Terminology will be consistent with the English Heritage Thesaurus.

10 Archaeological Recording Methodology

10.1 Prior to the commencement of on site works the archaeological contractor should familiarise themselves with the site by examining the information held by the Cornwall and Scilly Historic Environment record (HER), the Cornwall Records Office at Truro and the Cornwall Centre at Redruth, where appropriate.

10.2 An archaeologist shall be present during all ground works associated with the development, unless circumstances dictate a different approach. A toothless ditching bucket can be used for the removal of any overburden until the first archaeological horizon is exposed. This will then be hand cleaned as appropriate.

10.3 Any surviving remains which will be disturbed or destroyed by the development shall be archaeologically excavated and recorded.

10.4 Details of how all archaeological contexts and artefacts will be excavated, surveyed, recovered and recorded shall be provided. The site will be tied into the national grid.

10.5 Details of the site planning policy shall be given in the WSI. The normal preferred policy for the scale of archaeological site plans is 1:20 and sections 1:10, unless circumstances indicate that other scales would be more appropriate.

10.6 The photographic record shall consist of prints in both black and white and colour together with the negatives. Digital photography may be used for report illustration. For both general and specific photographs, a photographic scale shall be included. In the case of detailed photographs it may be appropriate to include a north arrow. The photographic record shall be accompanied by a photographic register detailing as a minimum, feature number, location and direction of shot.

10.7 If significant archaeological deposits are exposed, all works must cease and a meeting convened with the client and the HEPAO to discuss the most appropriate way forwards.

11 Finds

11.1 All finds, where appropriate, will be retained from each archaeological context excavated.

11.2 All finds, where appropriate, shall be washed.

11.3 All pottery, and other finds, where appropriate, shall be marked with the site code and context number.

11.4 The WSI shall include an agreed list of specialist consultants, who may be required to conserve and/or report on finds, and advise or report on other aspects of the work including environmental sampling.

11.5 The requirements for conservation and storage shall be agreed with the appropriate museum prior to the start of work, and confirmed in writing to the HEPAO.

11.6 Finds work should be to accepted professional standards and adhere to the Institute for Archaeologists *Guidelines for Finds Work*.

11.7 Environmental sampling should be guided by *Environmental Archaeology* (English Heritage Centre for Archaeological Guidelines. 2001/02).

11.8 Further English Heritage guidance that may be helpful includes *Geoarchaeology* (2004) and *Archaeometallurgy* (2001).

11.9 The English Heritage Advisor for Archaeological Science will be able to provide archaeological science advice if required (Vanessa Straker 0117 975 0689).

12 Human Remains

12.1 Any human remains which are encountered must initially be left in situ and reported to the HEPAO and the appropriate authorities (the Coroner), where appropriate. If removal is necessary this must comply with the relevant Government regulations. If burials are encountered their legal status must be ascertained and recording and/or removal must comply with the legal guidelines.

12.2 If human remains are not to be removed their physical security must be ensured, preferably by back filling as soon as possible after recording.

12.3 If human remains are to be removed this must be done with due reverence and in accordance to current best practice and legal requirements. The site must be adequately screened from public view. Once excavated human remains must not be exposed to public view.

13 Results Archaeological Recording

13.1 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 County Council Historic Environment Service and the appropriate museum. A further digital copy shall be supplied on CD-ROM preferably in 'Adobe Acrobat' PDF format.

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

13.3 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.

13.4 A contingency shall be made within the costs for full publication in an appropriate journal. The HEPAO will notify the contractor of such a need within four weeks of the receipt of the report.

14 Archive Deposition

14.1 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. Please check the accessioning and deposition information on the Royal Cornwall Museum website and fill in the 'Notification of Fieldwork' form. Once this has been accepted an accession number will be provided by the museum.

<http://www.royalcornwallmuseum.org.uk/policies/>

14.2 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.

14.3 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.

14.4 Where there is only a documentary archive this will be deposited with the Cornwall Record Office as well as the Courtney Library of the Royal Institution of Cornwall.

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

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

14.7 Only on completion of 14.1 to 14.5 (inclusive) will there be a recommendation for the discharge of any archaeological recording condition.

15 Monitoring

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

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

15.3 Requests for recording from the road scheme manager will be forwarded to the HEPAO and the HEPAO will be informed when the recording takes place.

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

15.5 Each subsequent WSI/Method Statement will require approval from Historic Environment Advice and the Local Planning Authority and include sections 15.1, 15.2, 15.3 and 15.4.

12 Appendix 3: Written Scheme of Investigation for Archaeological Mitigation along CPR Scheme: Overarching project design for archaeological recording

Introduction

Historic Environment (HE) Projects has been asked by Mr. Tom Eaton of Parsons Brinckerhoff to provide a Written Scheme of Investigation (WSI) for archaeological recording to be undertaken as part of archaeological mitigation along the CPR road scheme. Archaeological assessments of the road scheme (Parkes 2007; 2009) identified the potential for buried archaeological remains, including those associated with mining and earlier activity to survive within the project area.

Planning application NR/08/00355/CC ENV was submitted on the 23rd July 2008 and was to undertake Phase 1 of highway improvement works (including widening) on Dudnace Lane, Station Road and Wilson Way and adjacent side roads and to construct a new road between Station Road and Wilson Way at Carn Brea Lane.

This application has been approved subject to a number of conditions. Condition 6 states:

Prior to the commencement of development (including any site preparation works), the applicant shall have submitted to and had approved in writing by the LPA a programme of archaeological recording in accordance with a written scheme of investigation within the area of the approved site (to include details of the identification and method of recording of any sites and features of archaeological interest).

Planning application PA09/01295/F was submitted on the 2nd October 2009 for the Phase 2 construction of a new highway between Dolcoath Avenue and Dudnace Lane to undertake highway works (and highway modification and improvement works) on Dudnace Lane, Chapel Road, Dolcoath Road, Dolcoath Avenue and adjacent side road.

This application has been approved subject to a number of conditions. Condition 7 states:

No development shall commence until the applicant has secured and implemented a programme of archaeological work in accordance with a written scheme of investigation to be submitted to and approved by the local planning authority. The approved road shall be implemented in accordance with the approved archaeological work.

The applicant, their agents and any subcontractors should note that where there are other conditions requiring satisfaction in advance of the commencement of works on site it is the responsibility of the applicant to liaise with the Planning Officer concerned to ensure that the timetabling of these works is managed.

Phil Markham (Historic Environment Planning Advice Officer, Cornwall Council) produced an overarching brief for the archaeological recording (27/11/12), which stipulates that all the individual project designs should be linked by a unifying project design. This Written Scheme of Investigation has been guided by that brief.

This project design is an overarching project design for the recording of archaeological features along the entire length of the road corridor. The detailed requirements for the archaeological works along the individual sections of road are covered by separate WSIs.

This document is intended to provide a comprehensive outline statement on the standards necessary for the recording of archaeological deposits which are required as part of the proposed development. It includes the Phase 1 building recording, the Phase 2 fieldwork, as well as post-fieldwork archiving, assessment, analysis and publication which are required as part of the archaeological mitigation.

The scope of the post-fieldwork stages will need to be reviewed in the light of results from the fieldwork. All the elements of archaeological recording undertaken as part of the CPR scheme will need to be combined at this time. An updated project design for analysis will be produced after the completion of the archiving stage.

The work is scheduled to commence in the Spring/Summer of 2013.

Historical background

Landscape

The road scheme is located within an area that the Cornwall Landscape Assessment 1994 has classified as 'Predominantly Industrial', 'Urban Land' with a smaller pocket of 'Anciently Enclosed Land' at the western end of the scheme (Countryside Commission 1996). 'Predominantly Industrial', is land which has been extensively transformed by industrial activity (shafts, stream working, tin salvage works, etc.) since the eighteenth century and which often contains built remains dating to the post-medieval period. However, there is the potential for buried remains, especially those associated with mining-related activity to survive beneath spoil heaps and dumps. 'Urban Land' has also been transformed since the nineteenth century and which often contains built remains dating to post-medieval and modern times, although there is the potential for buried remains, especially those associated with mining-related activity, to survive between and beneath later structures. The area of 'Anciently Enclosed Land' at the western end of the scheme is associated with land which has been farmed since at least the medieval period. This zone has the greatest potential to contain buried archaeological remains.

Archaeological sites

The project area is situated within an area with known archaeological potential, which contains evidence for later prehistoric, medieval settlement and post-medieval industrial activity. In addition to the known sites, there is potential for the survival of unrecorded archaeological remains and artefacts of all periods, and for palaeoenvironmental deposits to survive in the valley floor.

Aims and objectives

The development has the potential to contain important buried archaeological sites. The archaeological investigation of this area therefore provides an opportunity to better understand the character and potential of this resource by recording sites and features affected by it.

The project objectives are as follows:

- To ensure that the site works associated with the development are carried out in such a way as to allow adequate recording.
- To record upstanding buildings and structures as outlined in the Phase 1 project designs for Bartles Foundry, Wilson Way and South Crofty.
- To record archaeological features and deposits affected by the scheme, as described in the Phase 2 project designs for Dudnance Lane to Wilson Way, Bartles Foundry, Red River valley mine spoil area, and the Fields to the west of the River.
- To recover and record artefacts uncovered by the works as appropriate.
- To undertake palaeoenvironmental sampling and analysis as appropriate.
- To disseminate the results of discoveries from all stages of the project appropriately.

2.1 Key objectives

- To locate and record prehistoric, medieval industrial activity and evidence associated with post-medieval mining/industrial activity within the area of the road scheme.

3. Methodology

The archaeological programme will follow six stages: Phase 1 fieldwork; Phase 2 archiving/archive reporting; assessment; analysis; report.

Fieldwork

Archaeological recording should be undertaken in two phases:

Phase 1 building recording/geophysical survey in advance of demolition:

- Bartles Foundry (Building recording and evaluation of buried structures)
- Wilson Way (Building recording)
- South Crofty (Building recording)
- Fields to the west of the River (Geophysical survey)

Phase 2 archaeological watching briefs and excavations as appropriate:

- Dudnace Lane to Wilson Way (Watching Brief)
- Bartle's Foundry (Watching Brief / controlled topsoil stripping and excavation as appropriate)
- Red River valley mine spoil area (Watching Brief)
- Fields to the west of the River (Watching Brief / controlled topsoil stripping and excavation as appropriate)

Phase 1 Building recording, geophysical survey and evaluation

The archaeological recording of selected buildings will take place in advance of the site works according to the levels specified in Phil Markham's briefs for archaeological recording, and geophysical survey. In addition, evaluation trenching will also be undertaken at Bartle's Foundry during this stage to record buried structures associated with the foundry.

Watching Brief

Archaeological recording will take the form of a watching brief along those sections of the road corridor where previous development is likely to have removed most archaeological features, but where some potential for buried remains to survive remain. Site works in these areas will be carried out with an archaeologist in attendance/making visits to record any features which become exposed during the road construction process. Where archaeological remains are encountered the site archaeologist will be given the opportunity to make an appropriate record before work proceeds; where a temporary stop of work is required the site archaeologist will request this via the resident engineer. In the event that a major archaeological site is uncovered this may require a formal excavation stage.

Controlled topsoil stripping and Excavation

In areas where there is higher potential for archaeological deposits to survive below ground, the methodology will switch to a controlled topsoil strip. In these areas, the underlying soil will be stripped cleanly to a level at which archaeological features or layers can be expected to be revealed (i.e. top of the "natural subsoil"). Machines will not run over the stripped area until recorded by the archaeologist.

In the event that significant remains are encountered, the site archaeologist in consultation with the Historic Environment Planning Advice Officer, Cornwall Council will confirm whether or not further excavation is required.

Where complex/extensive remains are encountered the site archaeologist will be given the opportunity to make an appropriate record before work proceeds; a programme to achieve this will be agreed with the client/contractor.

Recording - general

- Site drawings (plans, sections, locations of finds) will be made by pencil (4H) on drafting film; all plans will be linked to the Ordnance Survey landline map; all drawings will include standard information: site details, personnel, date, scale, north-point.
- All features and finds will be accurately located at an appropriate scale.
- All archaeological contexts will be described to a standard format linked to a continuous numbering sequence.
- Photography: scaled monochrome photography will be used as the main record medium, with digital images used more selectively and for illustrative purposes. A photographic scale will be used and a north arrow included as appropriate. A photographic register will be kept, giving feature number, location and direction of shot.
- A location plan will be made linking the site with features that have been mapped by the Ordnance Survey.
- The heights of all features will be tied into the Ordnance Datum.
- Phased plans and sections at a scale of 1:10 and 1:20 will be made of all excavated features.
- Sealed/undisturbed archaeological contexts in the form of buried soils, layers or deposits within cut features (ditches and pits, etc.) will be sampled for environmental evidence and dating material. Advice may be needed from Vanessa Straker (Regional Advisor for Archaeological Science).

Treatment of finds

The fieldwork is likely to produce artefactual/environmental material.

- All finds in significant stratified contexts predating 1800 AD and significant artefacts of later periods (e.g. settlement or industrial features) should be plotted on a scaled base plan and described. Post-medieval or modern finds may be disposed of at the cataloguing stage. This process will be reviewed ahead of its implementation.
- All finds predating 1800 AD or those from later periods which are considered to be of significance will be collected in sealable plastic bags which will be labelled immediately with the context number or other identifier.
- Significant, sealed archaeological contexts (predating c1500 AD) will be considered for sampling for environmental material and the strategy will be discussed with the project manager. All recovered samples will be evaluated at the assessment stage and some may be disposed of. Only flots will be retained for inclusion within the project archive.

POST FIELDWORK STAGES

(To be reviewed in light of results from the fieldwork)

Archiving/Archive report

1. Archiving

Following review with the HE Project Manager, the results from all stages/areas of the fieldwork will be collated as an archive. This will involve washing and cataloguing of finds, the indexing and cross-referencing of photographs, drawings and context records. Initial processing of any palaeoenvironmental samples will be undertaken. This will involve flotation of bulk samples to recover plant macrofossils and other remains.

- All finds and samples, etc. will be stored in a proper manner (being clearly labelled and marked, and stored according to HE guidelines).

- All records (context sheets, photographs, etc.) will be ordered, catalogued and stored in an appropriate manner (according to HE guidelines).
- A summary of the results will be presented to the Historic Environment Planning Advice Officer.
- The site archive and finds will initially be stored at HE premises and transferred to the Royal Cornwall Museum (RCM) and the RCM conditions for archives will be followed. The RCM will be notified of the commencement of the project and included in discussions for sampling and disposal as appropriate.

2. *Archive Report production*

The results from all stages of archaeological fieldwork will be presented in a concise archive report(s). Copies will be distributed to the Client, the County Archaeologist and the main archaeological and local record libraries.

This will involve:

- producing a descriptive text;
- producing maps and line drawings;
- selecting photographs;
- report design;
- report editing;
- dissemination of the finished report;
- deposition of archive and finds in the Royal Cornwall Museum, Truro.

The archive level reporting will include the following:

- Summary
- Introduction - background, site description, objectives, methods
- Results - factual description of the results of the various aspects of the project, with separate sections as necessary for discussion
- Discussion - discussion of the interpretation of the results, highlighting information gained on a chronological or thematic basis
- Archive - a brief summary and index to the project archive
- Illustrations - general location plan
 - detailed location plans to link fieldwork results to OS map
 - selected plans and section drawings (as appropriate)
 - finds drawings (if appropriate)
 - photographs (if appropriate)
 - a copy of the brief(s) will form an appendix
 - a copy of the Written Scheme(s) of Investigation will form an appendix

An OASIS record will be made for the project.

3. **Assessment**

On completion of the archive report an assessment stage will be carried out. This will involve assessment of structural and stratigraphic data and artefactual material, etc. which has been gathered during the project. The outline of the assessment report, and the work required to produce it, will also be determined.

- Liaise with specialists (environmental samples, radiocarbon dating and artefacts, etc) to arrange for assessment of the potential for further analysis and reporting.
- Send off artefacts (ceramics, metalwork, etc.) to the appropriate specialist for further study.
- Send off residues from residues from environmental samples to appropriate specialists.
- Sort out and send off suitable material for radiocarbon dating.
- Project design for further analyses and publication.

4. Academic/Final publication

In the event of significant remains being discovered there may be a further stage of analyses leading to formal publication. This will involve the analysis of structural and stratigraphic data, artefacts, and environmental samples to be governed by an updated project design agreed with the Historic Environment Planning Advice Officer. The final publication will include a synthesis of all the elements of the CPR scheme which merit further publication.

The scope and final form of the report will be reviewed; for example in addition to an archive report the results should be published in an academic journal or as a monograph (e.g. *Cornish Archaeology*) and would include:

- Discussion of the significance of the results in relation to Local, Regional and National research objectives.
- A synthesis of the results from the overall project will be incorporated into any final publication.

Project staff

A team of experienced archaeologists employed by HE Projects will carry out the archaeological fieldwork under the supervision of a Project Officer.

The report will be compiled by an experienced archaeologist(s) employed by HE Projects.

Relevant experienced and qualified specialists will be employed to undertake appropriate tasks during the assessment and analysis stages of the project.

The project will be managed by a member of staff who is a member of the Institute of Field Archaeologists, or the equivalent standard, who will:

- Take responsibility for the overall direction of the project.
- Discuss and agree the objectives and programme of each stage of the project with project staff, including arrangements for Health and Safety.
- Monitor progress and results for each stage.
- Edit the project report.

Monitoring

- This Written Scheme of Investigation must be agreed by the Planning Authority.
- The recording exercise will be monitored. The Historic Environment Planning Advice Officer should be informed one week in advance of the intention to start the recording.
- A summary of the results will be presented to the Historic Environment Planning Advice Officer after the completion of the fieldwork.

- The updated project design and timetable for the archiving, analysis and publication stages will be agreed with the Historic Environment Planning Advice Officer.

NOTE:

- The overall programme for archiving, assessment, analysis and reporting will need to be reviewed in light of the fieldwork results.

Timetable

The archiving and archive report will be completed within 12 months of the ending of the excavations. The timetable for further stages of assessment, analyses and publication will be agreed with the Historic Environment Planning Advice Officer in the light of the results of the excavations.

7. Health and safety during the fieldwork

7.1 Health and safety statement

Historic Environment is within the Transportation, Waste and Environment Department of Cornwall Council. HE Projects follows the Council's *Statement of Safety Policy*.

Prior to carrying out any fieldwork HE Projects will carry out appropriate risk assessments. A Health and Safety plan will be produced if excavations are required.

Copyright

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

Use of the material will be granted to the client.

Insurance

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

Standards

HE Projects follows the Institute for Archaeologists' Standards and Code of Conduct and is a Registered Archaeological Organization.

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

Freedom of Information

All information gathered during the implementation of the project will be subject to the rules and regulations of the Freedom of Information Act 2000.

Andy Jones 30/4/13

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