

Upton Towans, Hayle, Cornwall;
Archaeological Watching Brief
Cornwall Archaeological Unit



Report No: 2022R030

Upton Towans, Hayle, Cornwall;

Archaeological Watching Brief

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Acknowledgements

This study was carried out by Cornwall Archaeological Unit, Cornwall Council.

The Project Manager was Dr Fiona Fleming.

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 old pylon prior to replacement

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Abbreviations

CAU	Cornwall Archaeological Unit
CIfA	Chartered Institute for Archaeologists
HE	Historic England
HER	Cornwall and the Isles of Scilly Historic Environment Record
LPA	Local Planning Authority
MCO	Monument number in Cornwall HER
NGR	National Grid Reference
OD	Ordnance Datum – height above mean sea level at Newlyn
OS	Ordnance Survey
RIC	Royal Institution of Cornwall
SDOHE	Senior Development Officer (Historic Environment)
WSI	Written Scheme of Investigation

1 Summary

Cornwall Archaeological Unit (CAU) was commissioned by Western Power to undertake a watching brief at Upton Towans, Hayle, during the replacement of an electricity pylon. The pylon was located within the Upton Towans National Explosives Scheduled Monument area and within the SSSI.

The area of sand dunes has its earliest history as a site of mining in the 19th century. After closure of the mine the site became the National Explosives factory, reusing the mines as a source of water. The site was abandoned after the assets were sold off in the early 20th century.

Extant features were identified within the track surface, being bricks from demolition material, metal fittings and the remains of a runoff drain.

The remains found date from the 19th and 20th century.

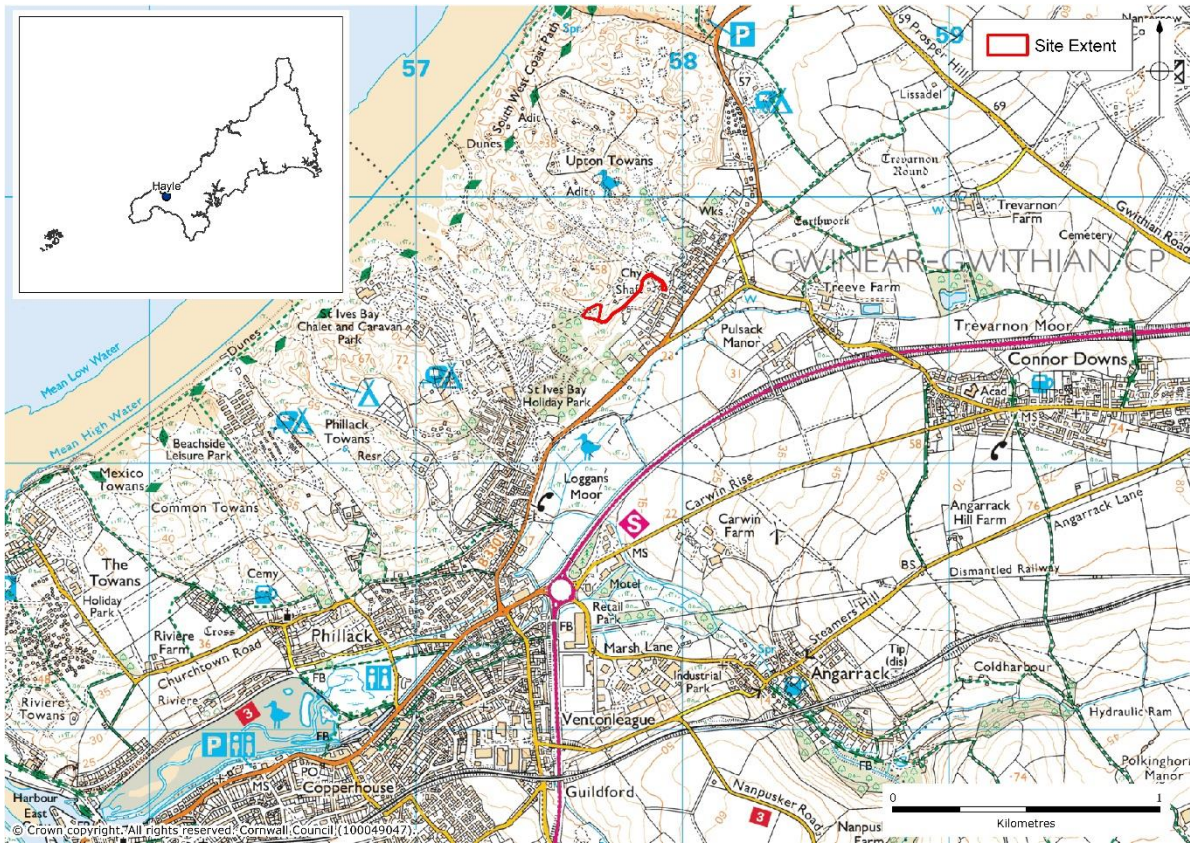


Fig 1 Location map.

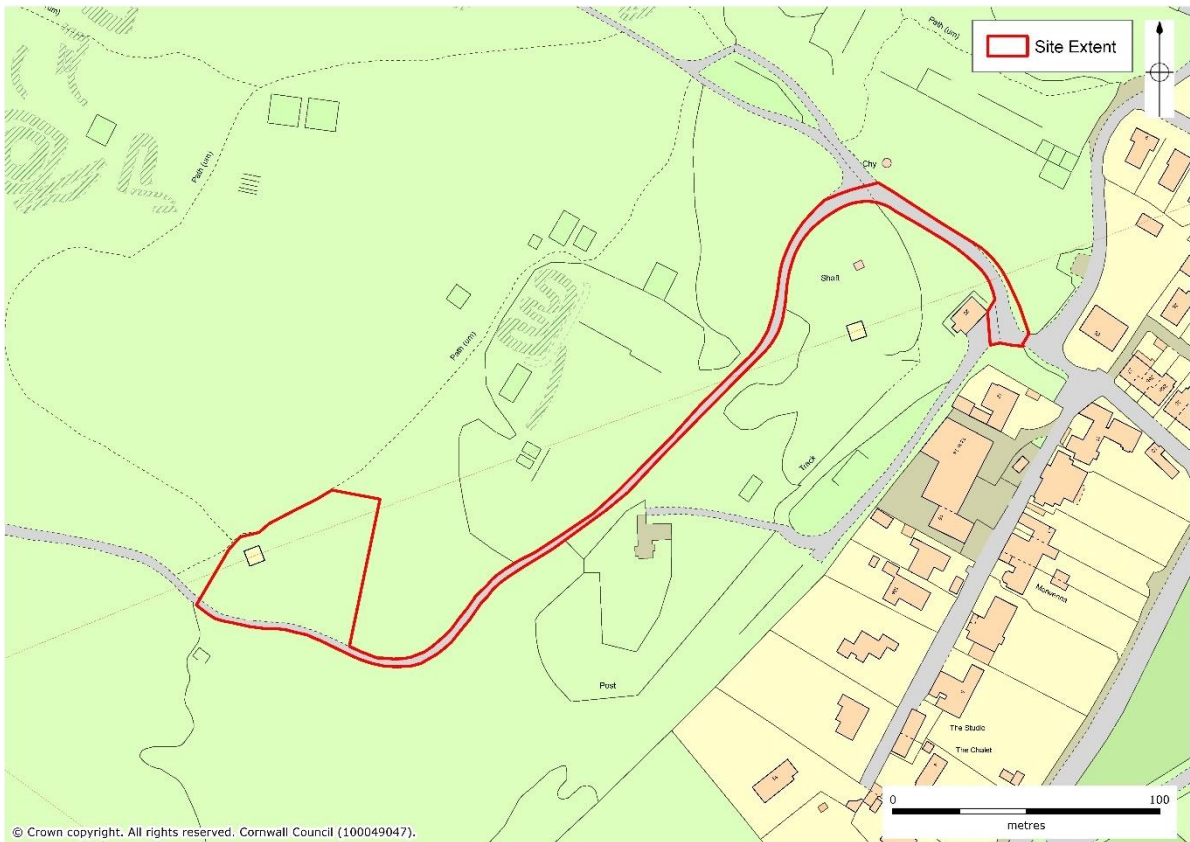


Fig 2 Site extent.

2 Introduction

2.1 Project background

Cornwall Archaeological Unit (CAU) was commissioned to undertake a watching brief during the laying of a temporary surface to facilitate the replacement of an original 1930s electric pylon within the bounds of the National Explosives Factory, Upton Towans, Hayle, which is a Scheduled Monument (List Entry Number 1463206). This work was carried out by request of the Historic England Assistant Inspector of Ancient Monuments as part of the Scheduled Monument Consent (ref S00242353) granted 14th March 2022.

Further details of the background and the aims and methods of the project can be found in the Written Scheme of Investigation (WSI) reproduced here in Appendix 2.

2.2 Location and setting

The pylon and track are situated along the southeast side the Upton Towans sand dunes. The site has formerly been used for mining and explosives manufacturing, and presently as a local nature reserve designated as a SSSI. The site of the National Explosives Factory is designated as a Scheduled Monument (List Entry Number 1463206).

The site of proposed works is centred at SW 57665 39564. It is located on a gentle south-facing slope, rising from 30m to 44m OD. The soils are sand dune soils, blown sand over Devonian Period mud, silt and sandstones. Current Historic Landscape Character is Rough Ground/Industrial.

3 Aims and objectives

See WSI (Appendix 1)

4 Working methods

See WSI (Appendix 1)

5 Site History

5.1 Medieval/Post-medieval (AD 410-1540/1540-1900)

Extracted from Jones (1999), Upton and Gwithian Towans Structural Recording Work.

The project area is located within what was the ancient manor of Connerton (Henderson 1956, and Thomas 1964, etc.). It was held by the Crown until William Rufus gave it to Robert Fitzhamon, the Earl of Gloucester. By the 13th century it had passed into the hands of the Arundells who held it until 1701. In 1831 the estate was purchased by Francis Paynter, but soon afterwards the manor was sold off and broken up. By the time of the 1839 Gwithian Tithe Map, the Towans were divided into Great Towan (plot 323), part of Church Towan Tenement, under ownership of Peter Curnow Veale, and Common Towan (plot 294 – to the northeast of the project area), under multiple ownership and tenancy (Fig 3).

It is likely that the area was farmed until the earlier post medieval period (*circa* 1550), by which time the area had become covered by windblown sand. However, despite the fact that the area was sand covered, it still retained some economic value. Various references (e.g., Polsue 1868, 162) document that the Towans continued to be used for sheep grazing until the site use became industrial. The sand from the Towans was also valued as a manure, (it was estimated that the sand was 70% calcium carbonate) and was taken away and spread onto fields to sweeten the acidic soils (Royal Cornwall Gazette 1843). Rabbits were also harvested from the Towans in the 19th Century (Barton 1972). The 1839 Tithe map for Gwithian documents no evidence for mining activity on Upton

Towans but during the nineteenth century the Towans became increasingly used for industrial purposes and two, or possibly three, mines operated within the area, predominantly during the period 1819-1882, although mining in the area generally probably predates this period. Copper, silver and lead were mined, but the workings were fairly limited in nature and produced relatively small amounts of ore. Wheal Emily (MCO33822), to the northeast of the project area, and Boiling Well Mine (MCO11858), located within the project area, close to the track, are shown as disused on the 1880 OS, 1:2500 scale map.

Boiling Well mine was worked in the period prior to 1815 but this was a short-lived enterprise (Hamilton Jenkin 1963). Its main period of operation was between 1819 and 1821 when over £400 worth of lead ore was recovered from the mine, but its 36 inch engine proved too small to cope. The mine was reworked in the years following 1821 under a variety of names including Wheal Rice and North Wheal Alfred, before reverting to the name of Boiling Well (Hamilton Jenkin 1980). The mine finally closed in 1862 having produced 3,906 tons of copper, 459 tons of lead, 54 tons of zinc blende and 5,000 ounces of silver.

Probably the most identifiable archaeological sites within the project area are those associated with the National Explosives Factory (MCO28594), which opened in 1899 to manufacture nitro-glycerine based explosives. The factory was designed on Continental methods under the direction of the Hungarian engineer, Oscar Guttmann, as a new venture of the parent Kennall Vale Gunpowder Company (see Earl 1978, and Earl and Smith 1991 for a detailed history).

There were several reasons why an explosives factory came to be there. The main factors were: an existing and expanding market in mining and quarrying for high explosives; an area clear of population but close enough to Hayle so that a workforce could be attracted; amongst hilly ground so that there was plenty of natural screening to confine the effects of an accident; access to engineering skills; proximity to a shipping port and to the national railway network. Finally, although the Towans were located far away from the industrial centre of Britain the factory was built at the time when the Cornish mining industry, although in decline, was still a substantial purchaser of explosives and there were many active quarries.

The factory was divided into two main sections: the non-danger area where the services were sited and the danger area where the processes considered dangerous went ahead. The various buildings were connected by a series of narrow-gauge tramways, leats, channels and site roadways.

The non-danger area of the factory contains the remains of a small cottage which may have been used as a site office, the nitric acid works, the chimney, the nitrocotton works and the services area of the National Explosives Factory.

The danger area buildings were small and spread out among the Towans. They mostly consisted of lightly constructed process and storage buildings on mass concrete foundations set within substantial protective bunds. Few of these buildings survive, although the monolithic embankments and bunds which surrounded them are well preserved. Heating was by steam generated in the service area and carried by lagged pipes on overhead trestles. Water and compressed air were piped in as required. Electric lighting was used, the lamps being placed outside the buildings to avoid any chance of sparks inside the buildings which might ignite the explosive. The large volume of water needed by the factory was pumped out from one of the shafts of the old Boiling Well mine.

By late 1890 the factory was fully operational. It had been designed to manufacture 500 tons of dynamite a year, although the capacity was soon increased, and many local mines and quarries were supplied. Export of explosive outside Cornwall soon commenced, developing into a world-wide business reaching as far afield as Australia.

It was soon apparent that the demand for blasting gelatine was sufficient for National to expand its plant to include the manufacture of gelignite and the special equipment needed for gelatine was installed in 1891. This included a plant to make 'collodion' which was

formed through gelignite being heated with nitro-glycerine in special pans and mixers. Also, different types of apparatus had to be installed in a new set of cartridging huts built into bunds in the sand dunes. Alongside all this the acid making and treatment plant was also expanded. The factory made its own nitric acid, and recovered waste acid from the nitro-glycerine plant by separating the diluted sulphuric acid from the impurities and then concentrating it. It was then used to make the nitric acid by retorting with imported sodium nitrate to make the high strength nitric acid which was needed. Special boiling vats and pulping machinery had to be installed to finish and stabilise the collodion ready for use. Nearly all the collodion was in the non-danger area, as the processes were 'safe' up to the point where the material had to be dried. The stoves used for this were set in the danger area, as dry collodion was extremely inflammable and dangerous.

5.2 Modern (AD 1901–present)

In the period leading up to the First World War, National's business was multi-disciplined, but the war brought great changes. In Britain a nearly disastrous shortage of explosives to supply the needs of the military developed. National embarked on another expansion of their cordite plant, concentrating on the pre-war acetone solvent-based form of the later type of cordite, Cordite MD. This form of cordite was insisted on by the Navy, so it was the National and only one other plant which supplied the Navy with its cordite to nearly the end of the war.

The increase in activity at the start of the 20th century resulted in National constructing a railway line into Hayle, sidings in the factory serving the acid-making plant. A large loading shed was built to cope with supplies such as the cotton bales and for loading finished explosives into the special railway vans.

Towards the end of the First World War National Explosives were faced with the problem of over-production and shrinking markets. Effectively, the company ceased to exist in 1917. By 1920 the company had been taken over by the Nobel group, the sell-up had started and the dismantling of the factory went ahead. Some of the plant found new uses in the district, cordite presses being acquired by Poole's in Hayle and used for plate bending. Various earthenware vessels from the factory became reused as fishponds or egg pickling jars. So ended one of the most interesting and fascinating industrial ventures in Cornwall.

The continued declining economic importance of the Towans is indicated by Second World War 'Wall of Light' Structure on Gwithian Towans, designed to lure German bombers away from the town of Hayle. Since the Second World War the Towans have mainly been used for recreational purposes. The electricity pylons were built on the site in the 1930s and have had only minor repairs since (pers comm site personnel)

6 Site description

The site comprises a winding gravel-surfaced trackway leading to an electricity pylon set on a concrete base (Fig 7). The pylon is understood to be the original pylon erected in the 1930s, and now due for replacement. There are areas of patch repairs to the surface of the track which is first shown on the c1907 OS map (Fig 5), with the majority of the surface probably dating from when it was originally laid at the turn of the century. Towards the west end of the track there is an area of broken bricks embedded in the surface of the track (Figs 15-19). This broadly corresponds with the position of now demolished engine houses and the bricks may be demolition material from these structures. Also towards the west end, in close vicinity to an extant chimney, there are metal fittings in the surface of the track; the origin of these remains uncertain (Figs 28-29). There are the remains of a drain at the southeast end of the track (Fig 32).

A watching brief was undertaken during the laying of temporary surfacing. The conditions were fine. It was preceded by photographic recording of the trackway to the pylon and the area in front of it (Figs 7-32). The temporary surface was laid after the recording

work (Figs 33-36). The surface comprised tarpaulin sheets with hardcore over. The intention was for a watching brief to be undertaken whilst the old pylon was taken down and the new one put up, however the date communicated to CAU for this work succeeded the works by a day and so only the new pylon was recorded shortly after erection (Figs 37-40).

Holes c0.8m² and 0.5m deep were dug by hand around the pylon feet, and a temporary small wooden box of shuttering was inserted in each hole, to form square concrete surrounds known as muffs. These replaced the previous similar muffs in the same positions. The old muffs were made of micaceous poured concrete. They had been c0.5m high, partly within the old ground surface, and were 0.4m-0.5m square (pers. comm. to CAU from contractors).

Under the old muffs, each re-used old pylon foot stood, as is usual for pylons, on a 'chimney' as it is known, a square-section base also of concrete. The tops of these were revealed in all the muff holes, some 20cm below ground surface. They had generally been broken into slightly in the process of removing the old pylon and muffs. That on the north east was well-preserved, however. It formed a little platform 23cm (9") square (Fig 39).

How far down into the ground the chimneys ran was not evident. They were exposed to depths of only around 10cm below their tops. The material exposed in section on the sides of the renewed muff holes consisted of very sandy soil beneath the old turf line. No artifacts, stratigraphy of interest, or below-ground features other than the chimneys, could be seen in these holes, similar in size to their predecessors (Fig Fig 37).

The site was monitored a final time after the temporary surface had been removed and photographs were taken of the areas that had been covered with temporary surfacing (Figs 41-44). Damage to the site was minimal, mainly affecting the condition of the grass while it had been covered. A small area of hardcore was left behind in a hole by an animal (Fig 44).

7 References

7.1 Primary sources (in chronological order)

Tithe Map and Apportionment, 1839. Parish of Gwithian (licensed digital copy at CRO)

Ordnance Survey, c1880. 25 Inch Map First Edition (licensed digital copy at CAU)

Ordnance Survey, c1907. 25 Inch Map Second Edition (licensed digital copy at CAU)

Ordnance Survey, MasterMap Topography

7.2 Publications

Jones, A, 1999, Upton and Gwithian Towans Structural Recording Work. Cornwall Archaeological Unit, Truro.

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7.3 Websites

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Cranfield University 2022. *Soilscapes Viewer* [Soilscapes soil types viewer - National Soil Resources Institute. Cranfield University \(landis.org.uk\)](#)

Heritage Gateway 2012. [Heritage Gateway - Home *](#)



Fig 3 Site outline shown against the 1839 Gwithian Tithe Map.

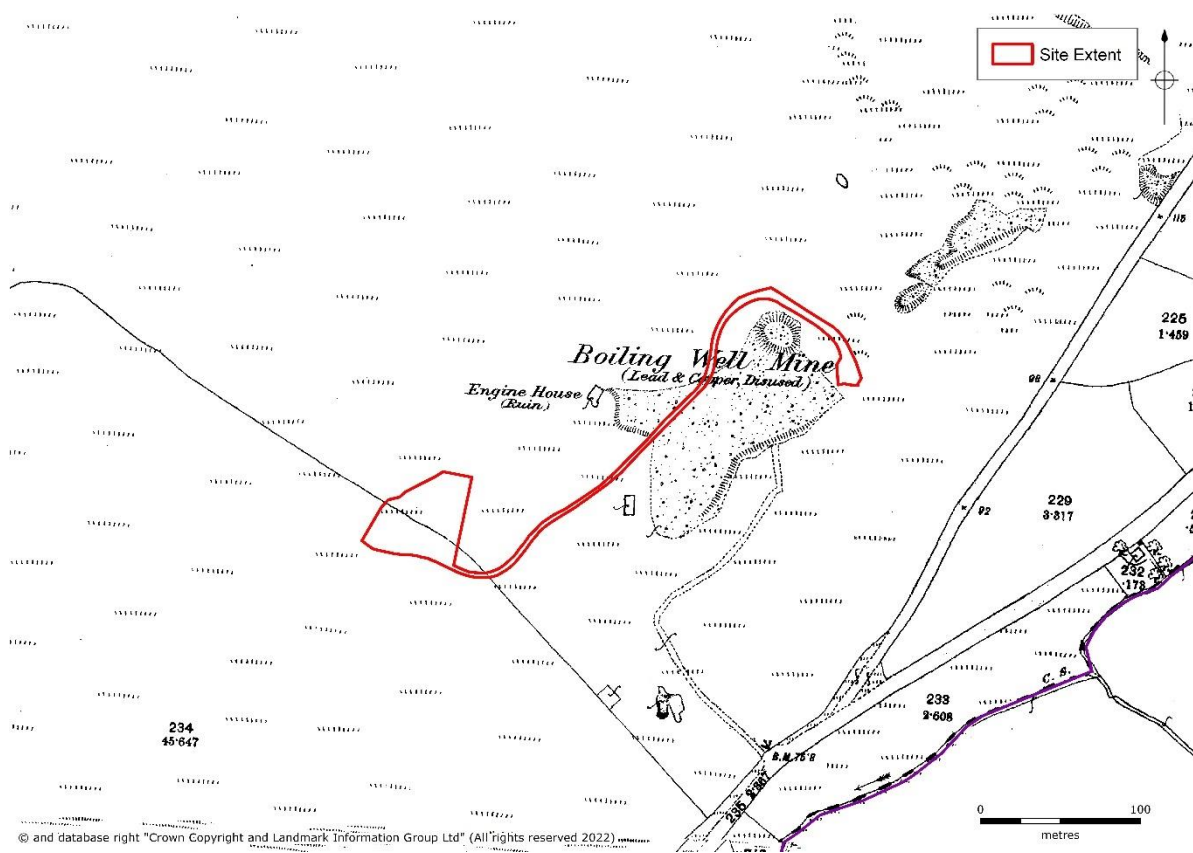


Fig 4 Site outline shown against the OS 1st Edition c1880 map.

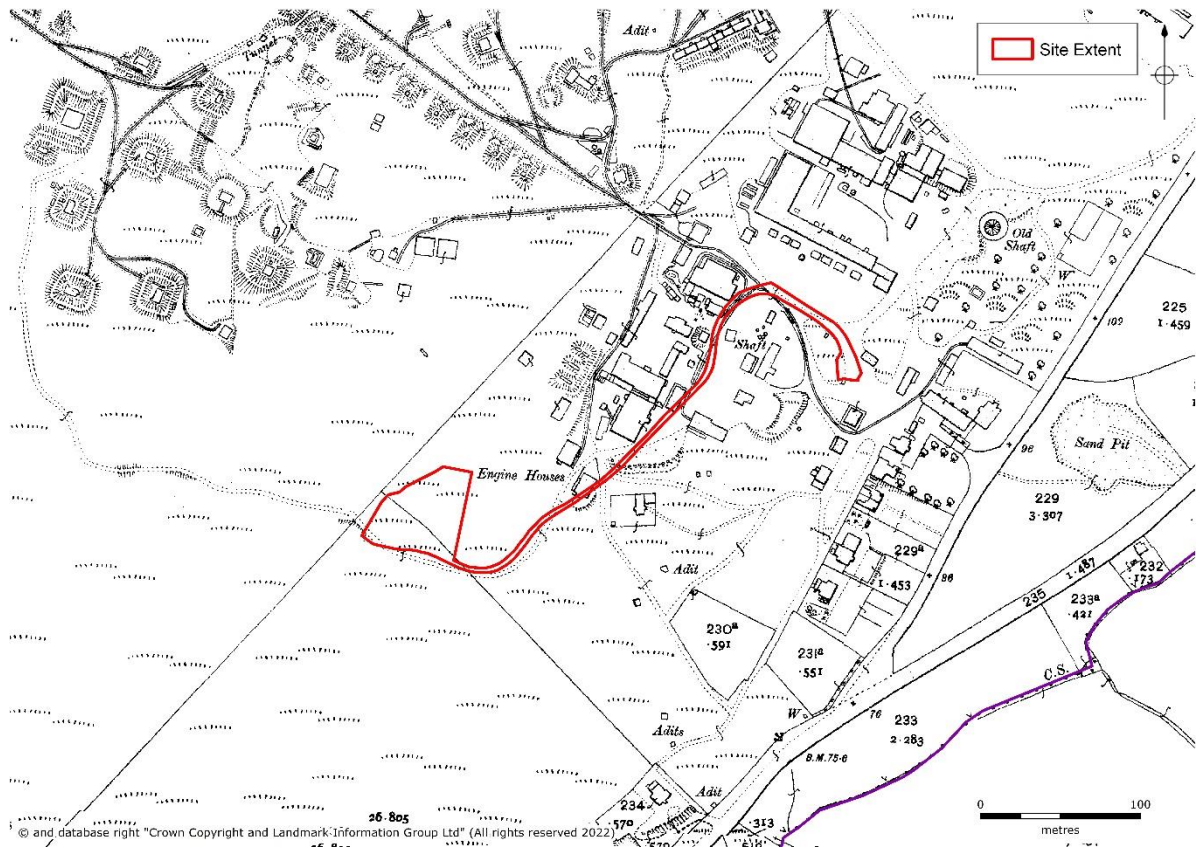


Fig 5 Site outline shown against the OS 2nd Edition c1907 map.



Fig 6 Aerial photograph of site in 1946 (RAF AP Ref a05 5142).



Fig 7 The pylon prior to removal looking north.



Fig 8 The area in front of the pylon looking north.



Fig 9 The area in front of the pylon looking north.



Fig 10 Track in front of the pylon looking west.



Fig 11 Looking east towards the pylon.



Fig 12 Looking southwest along the track.



Fig 13 Looking northeast along the track towards the chimney.



Fig 14 Looking northeast along the track towards the chimney.



Fig 15 Looking northeast along the track towards the chimney with the area of bricks in the foreground.



Fig 16 Historic bricks in the trackway surface.



Fig 17 Historic bricks in the trackway surface.



Fig 18 Historic bricks in the trackway surface.



Fig 19 Historic bricks in the trackway surface.



Fig 20 Looking northeast along the track towards the chimney.

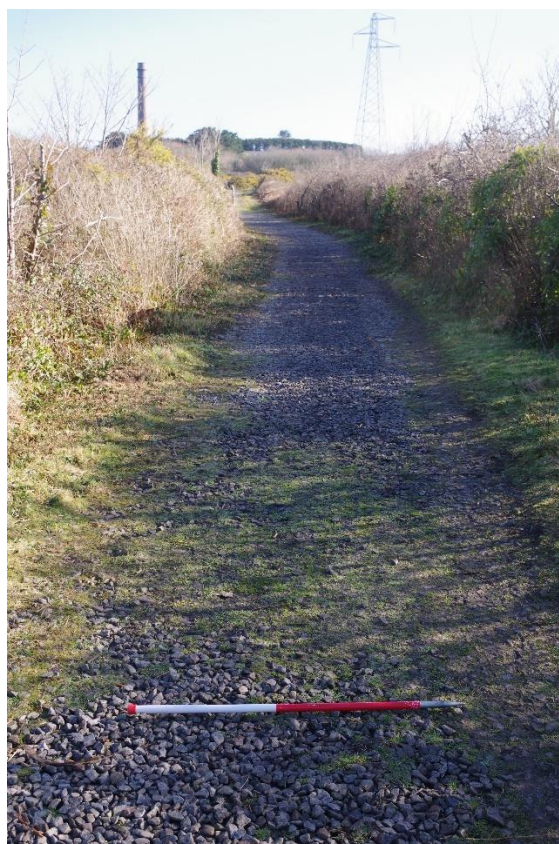


Fig 21 Looking northeast along the track towards the chimney.

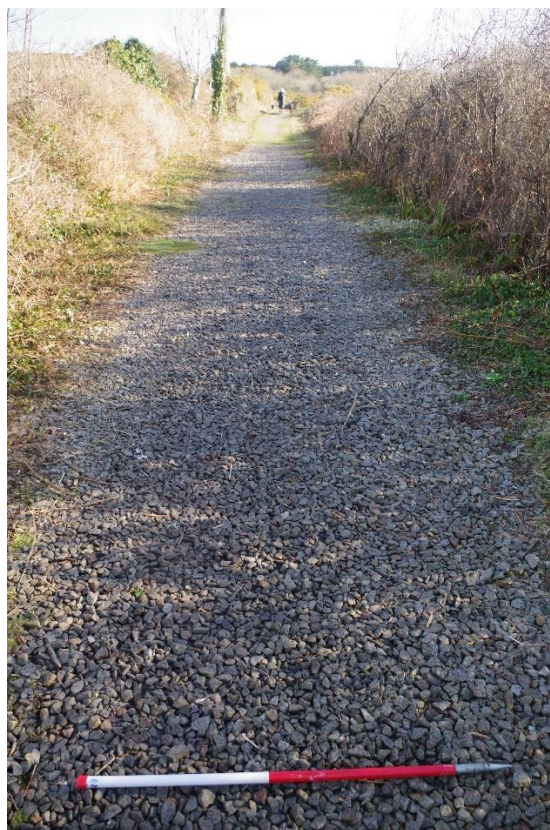


Fig 22 Looking northeast along the track.



Fig 23 Looking northeast along the track towards the chimney.

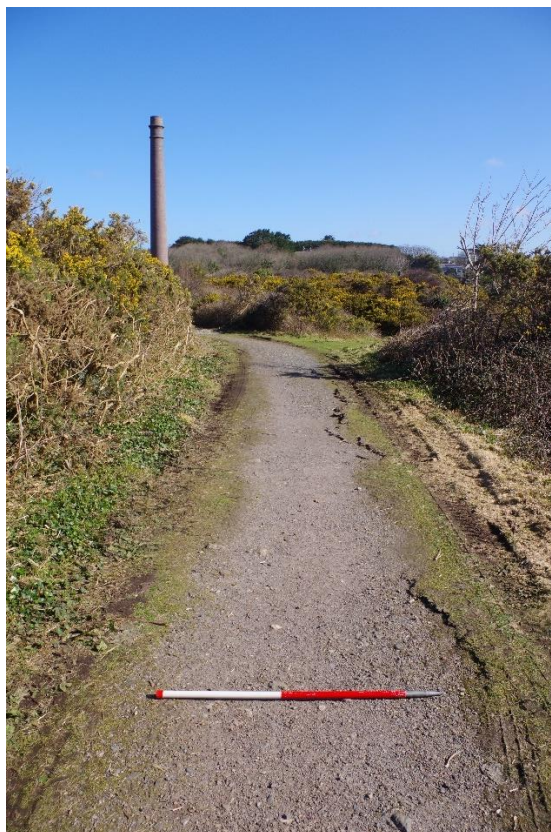


Fig 24 Looking northeast along the track towards the chimney.



Fig 25 Looking northeast along the track towards the chimney.



Fig 26 Looking northeast along the track towards the chimney.



Fig 27 Looking east along the track towards the chimney.



Fig 28 Looking southeast along the track with metal fittings in the foreground.



Fig 29 Metal fitting in the track surface.

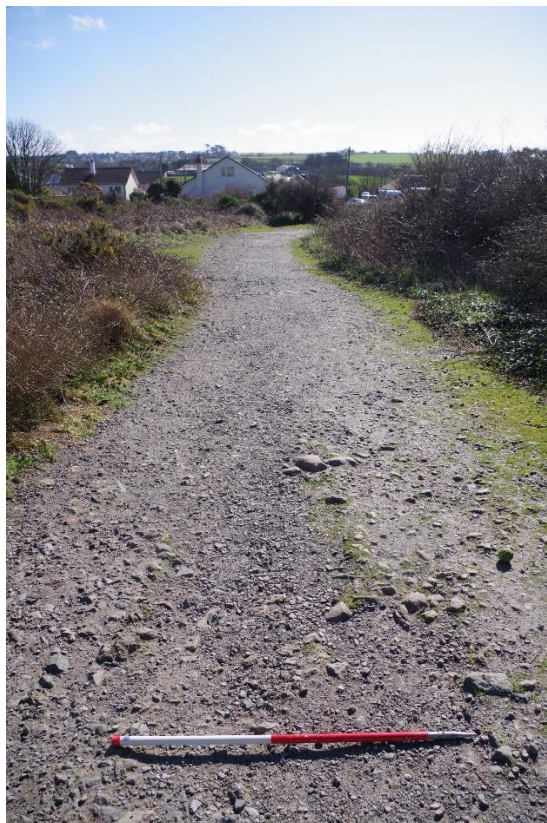


Fig 30 Looking southeast along the track.



Fig 31 Looking southeast along the track.



Fig 32 Looking southeast along the track showing remains of drain in foreground.



Fig 33 First stretch of temporary surface.



Fig 34 Extended temporary surface next to the pylon.



Fig 35 Full extent of temporary surfacing by pylon.



Fig 36 Small patch of temporary surface near bricks in track.



Fig 37 Northwest leg of the new pylon.



Fig 38 Southwest leg of the new pylon.



Fig 39 Northeast leg of the new pylon.



Fig 40 The new pylon erected.



Fig 41 Area of small temporary surface after removal looking west.



Fig 42 Bend in track before pylon after works looking west.



Fig 43 Area in front of pylon after removal of temporary surface.



Fig 44 Area in front of pylon after removal of temporary surface.

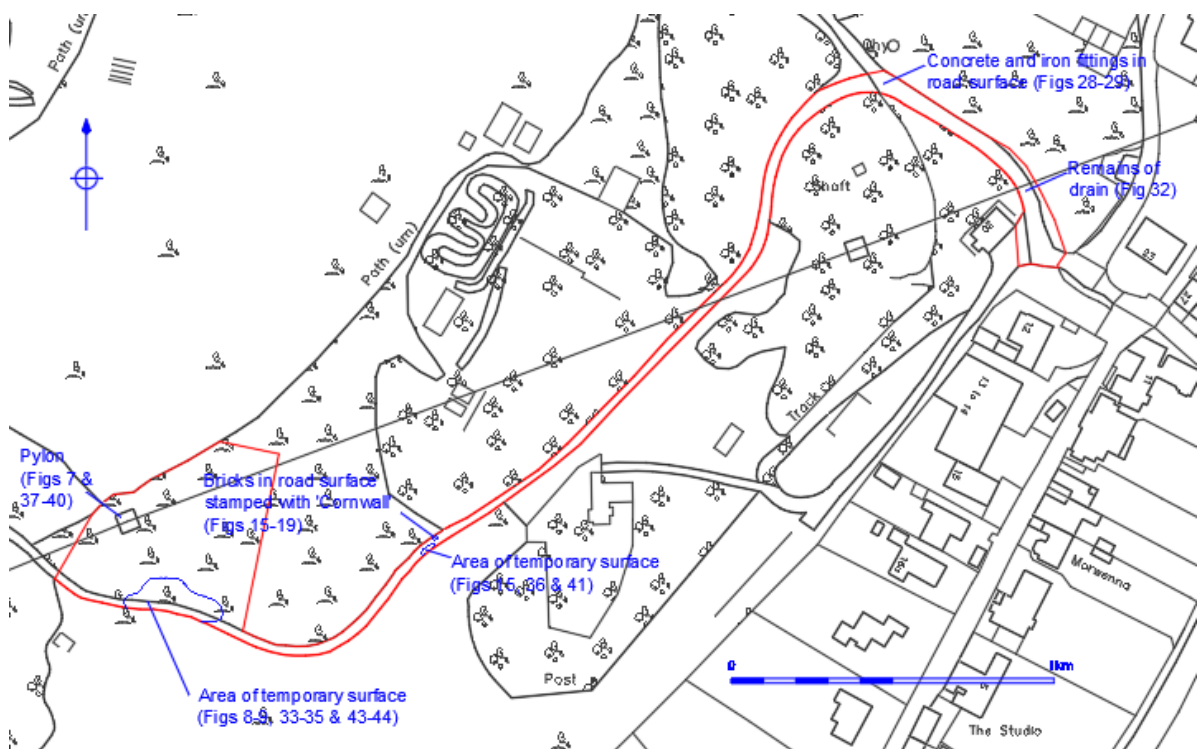


Fig 45 Plan of site showing identified features and areas of temporary surfacing.

Appendix 1: Photographic Archive

Held by the Archaeology Data Service - ADS

Photo numbers match figure numbers in the report.

Filename	Caption	Copyright Holder Organisation	Creation Date (dd/mm/yyyy)
7.JPG	The pylon prior to removal looking north	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
8.JPG	The area in front of the pylon looking north	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
9.JPG	The area in front of the pylon looking north	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
10.JPG	Track in front of the pylon looking west	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
11.JPG	Looking north towards the pylon	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
12.JPG	Looking west along the track	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
13.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
14.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
15.JPG	Looking northeast along the track towards the chimney with the area of bricks in the foreground	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
16.JPG	Historic bricks in the trackway surface	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
17.JPG	Historic bricks in the trackway surface	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
18.JPG	Historic bricks in the trackway surface	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
19.JPG	Historic bricks in the trackway surface	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
20.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022

21.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
22.JPG	Looking northeast along the track	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
23.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
24.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
25.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
26.JPG	Looking northeast along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
27.JPG	Looking east along the track towards the chimney	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
28.JPG	Looking southeast along the track with metal fittings in the foreground	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
29.JPG	Metal fitting in the track surface	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
30.JPG	Looking southeast along the track	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
31.JPG	Looking southeast along the track	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
32.JPG	Looking southeast along the track showing remains of drain in foreground	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
33.JPG	First stretch of temporary surface	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
34.JPG	Extended temporary surface next to the pylon	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
35.JPG	Full extent of temporary surfacing by pylon	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
36.JPG	Small patch of temporary surface near bricks in track	Cornwall Archaeological Unit, Cornwall Council	18/03/2022
37.JPG	Northwest leg of the new pylon	Cornwall Archaeological Unit, Cornwall Council	20/04/2022

38.JPG	Southwest leg of the new pylon	Cornwall Archaeological Unit, Cornwall Council	20/04/2022
39.JPG	Northeast leg of the new pylon	Cornwall Archaeological Unit, Cornwall Council	20/04/2022
40.JPG	The new pylon erected	Cornwall Archaeological Unit, Cornwall Council	20/04/2022
41.JPG	Area of small temporary surface after removal looking west	Cornwall Archaeological Unit, Cornwall Council	03/05/2022
42.JPG	Bend in track before pylon after works looking west	Cornwall Archaeological Unit, Cornwall Council	03/05/2022
43.JPG	Area in front of pylon after removal of temporary surface	Cornwall Archaeological Unit, Cornwall Council	03/05/2022
44.JPG	Area in front of pylon after removal of temporary surface	Cornwall Archaeological Unit, Cornwall Council	03/05/2022

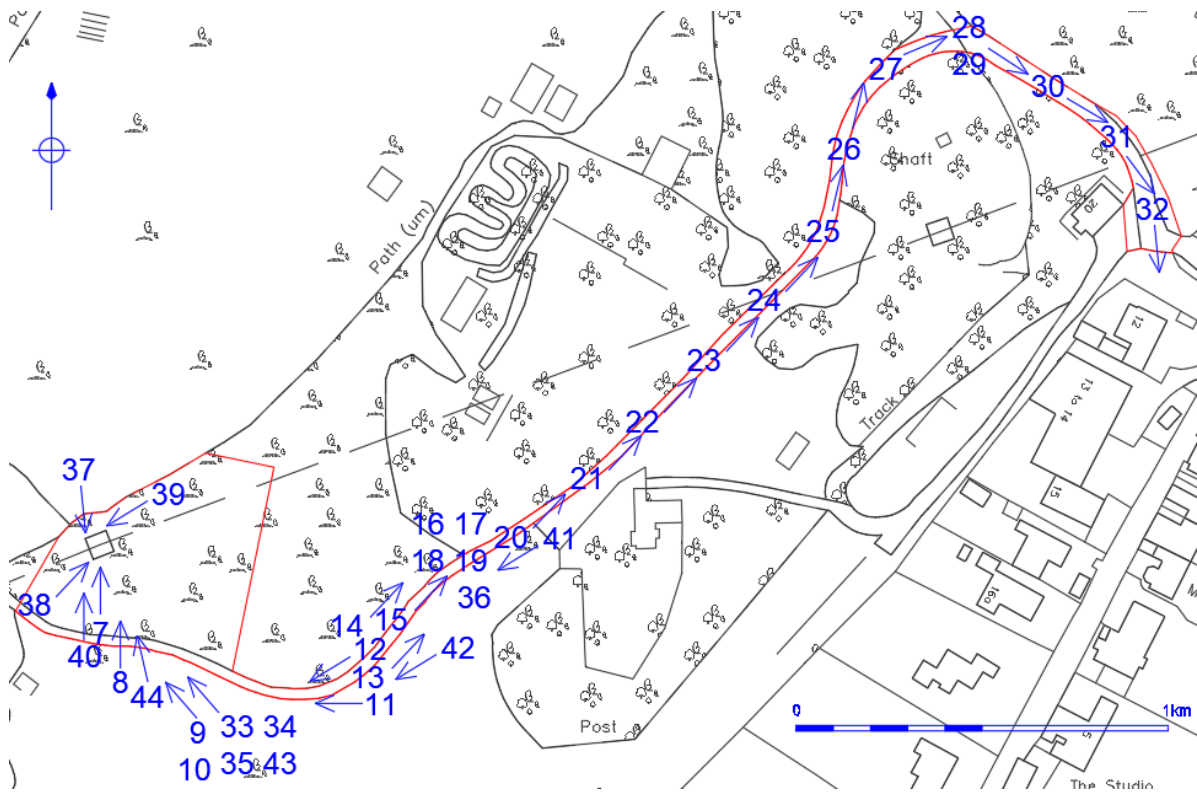


Fig 46 Photo directional plan.

Appendix 2: Written Scheme of Investigation

Hayle, Upton Towans, Written Scheme of Investigation for archaeological watching brief

Client: Western Power

Project background

Cornwall Archaeological Unit was contacted by Western Power on 19 August 2019 with a request for costs for undertaking an archaeological watching brief and photographic record on works on Upton Towns, Hayle, to replace an electricity tower and for stabilisation of the access trackway. The proposed works will involve the laying down of terram membrane and aggregate to form a stable surface for the movement of heavy plant; there are no plans for any ground reduction as part of this stage. The membrane and aggregate layers will be removed following completion of the electricity tower replacement. The new tower will be replaced on existing foundations and will not involve any disturbance of new ground.

The site of proposed works is centred at SW 57665 39564. It is located on a gentle south-facing slope, rising from 30m to 44m OD. The soils are sand dune soils, blown sand over Devonian Period mud, silt and sandstones. Current Historic Landscape Character is Rough Ground/Industrial.

This document sets out a Written Scheme of Investigation (WSI) by Cornwall Archaeological Unit (CAU) for the above programme of works. The proposed works site falls within a recently designated monument and the watching brief was requested by the area's Historic England Assistant Inspector for Ancient Monuments (HE AIAM) to satisfy a condition of Scheduled Monument Consent for works to take place.

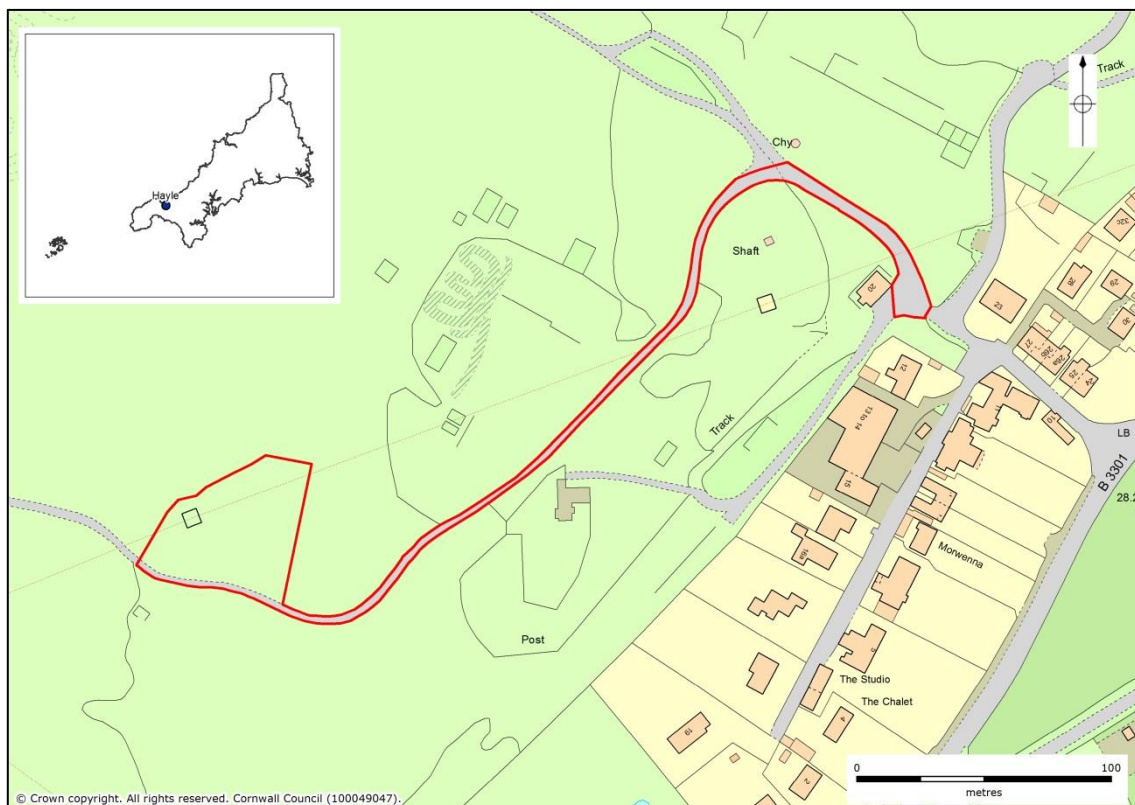


Figure 1: site location map.

Site history

Archaeological sites recorded in the Cornwall and Scilly Monuments Record have monument numbers (prefix MCO) in brackets

Upton Towans is part of the extensive Hayle-Gwithian system of dunelands which lie to the east of the Hayle Estuary and extend as far as Godrevy. The Hayle-Gwithian Towans sand dune complex is the second largest in Cornwall and is recognised as having an extremely important archaeological and historical dimension. Upton Towans was acquired from Porthvan Enterprises Limited by Cornwall County Council and is leased to the Cornwall Wildlife Trust for a peppercorn rent over a 99-year period. In contrast to Gwithian Towans, Upton Towans comprises a large expanse of sand dunes which have been more dramatically modified by the former explosives works and mining. The area is archaeologically significant both in terms of visible extant archaeological remains and because of the potentially well-preserved archaeological deposits which are likely to be sealed beneath the sand dunes. Such buried land surfaces may include field boundaries, and their associated settlements. The alkaline nature of the dunes is also important, as it permits the survival of bone, which is highly unusual in Cornwall due to its generally acidic soil conditions. The Cornish sand dune systems provide the best chance for the study of faunal remains from different periods and where cemeteries exist, yield opportunities for the analysis of human skeletal material. Random collection of artefacts exposed in Hockin's pit sand quarry to the north of Gwithian has taken place over a number of years, artefacts recovered from the site ranging from prehistoric flint, pottery and metalwork to medieval midden material, and pottery.

The area is designated as a Site of Special Scientific Interest and adjoins two sections of Heritage Coast. Within the Local Plan the area is identified as an Area of Great Scientific Value (AGSV), an area of Area of Great Historic Value (AGHV), an Area of Great Landscape Value (AGLV) and a Management Priority Area.

The proposed works site is located on the site of the former Boiling Well Mine (MCO11858). This was a copper, lead, zinc and silver mine in operation prior to 1815 and which re-opened in 1819, continuing in operation until 1862. The OS 1st Edition map records the mine as disused and shows the site of a ruined engine house within 50m of the north side of the current trackway. One other unnamed building is also recorded on the OS 1st Edition map, within 20m of the south side of the trackway.

By the later 19th century the National Explosives Factory (MCO28594) was established on Upton Towans, constructed for the manufacture of nitro-glycerine based explosives. The site was deliberately dispersed amongst the dunes, most of it consisting of lightly constructed process and storage buildings on mass concrete foundations set within substantial protective bunds. Few of these light buildings survive, although the monolithic embankments and bunds which surrounded them are largely well preserved. The buildings were connected together by a series of narrow gauge tramways, leats, channels and site roadways. Many of the channels and leats have left little trace but the roads and tramways, now largely grassed over, are still used today by walkers and form a network of footpaths across the site. The eastern end of the site, close to the location of the proposed works, was concerned with the production of nitric acid. Most of the upstanding building fabric and the chimney (MCO61687 and 61688) are located in this part of the site, though much of this area has become overgrown and strewn with building rubble. The site closed at the end of the First World War.

Although no ground reduction is planned as part of the proposed works there is the potential for work to impact on upstanding archaeological remains associated with the 19th century mine and explosives factory.

Project extent

Aims and objectives

The principal aim of the study is to gain a better understanding of the archaeology of the works area in order to understand the potential impacts of the works and to inform any future monitoring work.

The objectives are to:

- Obtain a photographic record of the site prior to commencement of works.
- Monitor the stabilisation works on the access trackway.
- Monitor the replacement of the existing electricity tower.
- Obtain a photographic record of the site on completion of works and once removal of the temporary access road has taken place.
- To produce a written report summarising the findings of the monitoring works and to complete a record on the work for the OASIS/ADS-Online database.

Working methods

All recording work will be undertaken according to the Chartered Institute for Archaeologists (CIfA) guidance (CIfA 2014a, 2014b, 2014c). Staff will follow the CIfA *Code of Conduct* (2014d). The Chartered Institute for Archaeologists is the professional body for archaeologists working in the UK.

Creation of the physical and digital archive

Following review with the CAU Project Manager the results from the fieldwork will be collated as an archive.

This will involve the following.

- All finds, etc., will be washed, catalogued, and stored in a proper manner (being clearly labelled and marked and stored according to CAU guidelines).
- All records (drawings, context sheets, photographs, etc.) will be ordered, catalogued and stored in an appropriate manner (according to CAU guidelines).
- Any black and white negative film will be catalogued and deposited with the site archive.
- Colour digital images taken as part of the site archive will be either converted from colour to black and white negative film and added to the site archive, or deposited with the Archaeology Data Service (ADS).
- Completion of the Historic England/ADS OASIS online archive index.
- All correspondence relating to the project, the WSI, and a single paper copy of the report, stored in an archive standard (acid-free) documentation box.
- Drawn archive storage (plastic wallets for the annotated record drawings).
- Additional digital data (survey, external reports, etc)

Archive deposition

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

- The project archive will be deposited initially at ReStore PLC, Liskeard and in due course (when space permits) at Cornwall Record Office.
- Digital data will be stored on the Cornwall Council network which is regularly and frequently backed up.
- Digital data (CAU reports, external reports, survey data, geophysics data, digital photographs etc) forming part of the site archive will be deposited with the ADS.

CAU uses the following file formats for stored digital data:

- DOCX Word processed documents
- XLSX Spreadsheets

PDF	Exports of completed documents/reports/graphics
JPG	Site graphics and scanned information
DNG or TIF	Digital photographs
DWG	AutoCAD drawings, measured surveys
MXD	ArcView GIS (electronic mapping) data
AI	Adobe Illustrator graphics

Pre-fieldwork

In advance of the fieldwork CAU, will discuss and agree with the client:

- Working methods and programme.
- Health and Safety issues and requirements.
- Transfer of Title for artefacts.
- Obtaining an accession number from the appropriate archive repository.

Fieldwork: photographic record

Prior to the commencement of any works a photographic record of the site will be made. High resolution digital photographs will be taken on archaeological features within the development area. Photographic recording will comprise colour photography using a digital SLR camera (with a resolution of 10 million pixels or higher; CAU will follow Historic England (2015) guidance on digital image capture and storage) / black and white negative photography using an SLR camera. A metric scale will be included in all record shots. Photographs will include a record of significant features and general working shots. Representative general views of the site will also be taken from within and surrounding it to show its setting and context.

A photographic record of the site will also be made on completion of works and once the temporary trackway has been removed. The same principles and standards as above will apply.

Fieldwork: watching brief

The Historic England Assistant Inspector of Ancient Monuments (HE AIAM) has requested that a watching brief is carried out on the site during stabilisation works to the access trackway and the replacement of the electricity tower. This work will be guided by CIfA's guidance on undertaking watching briefs (CIfA 2014b).

It is understood that no reduction of groundworks are to take place as part of the works. It is, however, possible that upstanding archaeological remains are exposed as part of the stabilisation works. Should archaeological features be revealed, works will be halted and the exposed features cleaned up by hand to determine their significance prior to their recording. The contractor will allow reasonable time for the cleaning up and/or excavation and recording of any features thus revealed. Where a temporary stop of work is required the site archaeologist will request this via the developer and the HE AIAM. If complex and/or significant archaeological deposits are encountered then the archaeological requirements will be reviewed by the client, the HE AIAM, and CAU.

Fieldwork: recording

Should archaeological recording be required the archaeologist will:

- Identify and record any archaeological features that are revealed; the level of recording will be appropriate to the character/importance of the archaeological remains.

- Site drawings (plans and sections) will be made by pencil (4H) on drafting film; 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.
- Photographic recording will comprise colour photography using a digital SLR camera (with a resolution of 10 million pixels or higher; CAU will follow Historic England (2015) guidance on digital image capture and storage) / black and white negative photography using an SLR camera. Photographs will include a record of significant features and general working shots. A metric scale, site and context identifier, and a north arrow where appropriate, will be included in all record shots.

Treatment of finds

The fieldwork may produce artefactual material. In this instance the following recording and retention policies will be followed:

- In the event that objects containing precious metal(s) are encountered, the coroner will be informed as per the provisions of the Treasure Act 1996.
- Significant finds in stratified contexts will be plotted on a scaled base plan or with a Leica GPS unit and recorded as small finds.
- All finds will be collected in sealable plastic bags which will be labelled immediately with the site code, the context number or other identifier, the type of material, and the finder's initials. The only exception to this policy will be that large assemblages of modern (post-1800) material may be representatively sampled.
- Modern (post-1800) finds may be disposed of at the cataloguing stage. This process will be reviewed ahead of its implementation.

Reporting

The results from the project will be drawn together and presented in a concise archive report.

The report will include the following elements:

- Summary
- Project background
- Aims and objectives
- Methodology
- Location and setting
- Designations
- Site history
- Archaeological results
- Significance
- Conclusions
- References
- Project archive index
- Supporting illustrations: location map, historic maps, plans, elevations/sections, photographs

Timetable

The study is anticipated to commence during August 2019. CAU will require at least 2 weeks' notice before commencement of work, in order to allocate field staff and arrange other logistics.

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

Monitoring and Signing Off Condition

Monitoring of the project will be carried out by the HE AIAM.

- The HE AIAM will monitor the work and should be kept regularly informed of progress.
- Any variations to the WSI will be agreed with the HE AIAM, in writing, prior to them being carried out.
- If significant detail is discovered, all works must cease and a meeting convened with the client and the HE AIAM to discuss the most appropriate way forward.

Monitoring points during the study will include:

- Approval of the WSI
- Completion of fieldwork
- Completion of archive report

References

CIfA, 2014a. *Standard and guidance for archaeological field evaluation*, CIfA, Reading

CIfA, 2014b. *Standard and guidance for an archaeological watching brief*, CIfA, Reading

CIfA, 2014c. *Standard and guidance for archaeological excavation*, CIfA, Reading

CIfA, 2014d. *Code of Conduct*, CIfA, Reading

Historic England 2015. *Guidance note on Digital Image Capture and File Storage*, Historic England, Swindon

Cornwall Archaeological Unit

Cornwall Archaeological Unit is part of Cornwall Council. CAU employs 20 project staff with a broad range of expertise, undertaking around 120 projects each year.

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

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

Standards



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

<http://www.archaeologists.net/codes/ifa>

Terms and conditions

Contract

CAU is part of Cornwall Council. If accepted, the contract for this work will be between the client and Cornwall Council.

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

Project staff

The project will be managed by Dr Andy Jones or Dr Fiona Fleming who will:

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

Work will be carried out by CAU field staff, with assistance from qualified specialists and sub-contractors where appropriate. All staff will follow CAU's Health and Safety Policy and work in accordance with a site-specific risk assessment.

The project team is expected to include:

Dr Andy Jones BA, PhD, FSA, MCIfA

Dr Andy Jones is responsible for the management of Cornwall Archaeological Unit, as well as the origin and management and publication of a wide range of projects, in particular development-related assessments, evaluations and excavations. Major projects include excavation and publication of sites at Stannon, Tremough and Scarcewater. He has recently completed the publication of projects undertaken at Bosiliack, Tremough Camelford School and the Whitehorse Hill Cist, and is currently involved in the North Cliffs Mesolithic project. Principal research interests lie in the 4th to 2nd millennium cal BC (Neolithic and Bronze Age) and the interpretation and publication of sites dating to this period. Andy has been involved with the SWARF Neolithic and Bronze Age Group is a member of the South West Implement Petrology Group, a council member of the Prehistoric Society, and a Cornwall Archaeological Society committee member. He is a Member of the Chartered Institute for Archaeologists and a Fellow of the Society of Antiquaries.

Dr Andy Jones has lectured widely and his principal interest lies in 4th to 2nd millennium cal BC (Neolithic and Bronze Age) and the interpretation and publication of sites dating to this period.

Fiona Fleming BSC Hons, MA, PhD, MCIfA

Dr Fiona Fleming has worked with Cornwall Archaeological Unit since 2006. An experienced field archaeologist and skilled in the use of Auto CAD and Geographical Information Systems (GIS), Fiona specialises in landscape assessment and characterisation and has most recently been involved in large scale projects, such as the Cornish Ports and Harbours Project and the South West Coast Rapid Coastal Zone Survey (RCZAS). Fiona is also part of CAU's aerial investigation and mapping team and is currently working on and helping manage Historic England funded projects such as the Dorset Stour and Inner Humber Estuary NMP projects.

Fiona's particular interests lie in Landscape Archaeology and research into both the physical and social aspects of rural settlement development in South West England from the late Iron Age through to the early medieval period.

Carl Thorpe (assistant archaeologist) BSC, PCIfA

Carl has worked for the Cornwall Archaeological Unit since 1995. An experienced field archaeologist, Carl has worked on numerous watching briefs and excavations throughout Cornwall. With a detailed knowledge of Cornish later prehistoric, Romano-British, medieval and post-medieval ceramics, Carl is a specialist in the analysis and illustration of ceramics, stone and other artefacts.

Carl has a lot of outreach experience, including giving guided tours around archaeological sites and giving lectures on post-Roman ceramics found in Cornwall, and the Romans in Cornwall. He has also run training days on ceramic identification, and finds identification days for the public.

Carl's research interests include the Romans in Cornwall, post-Roman period trade connections and early medieval inscribed stones; medieval graffiti and graffiti games.

Report distribution

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

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

Copyright

Copyright of this Written Scheme of Investigation will be reserved to Cornwall Archaeological Unit, Cornwall Council. It may only be used/reproduced with permission from Cornwall Archaeological Unit.

Existing copyrights of external sources will be acknowledged where required.

Freedom of Information Act

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

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

Health and safety statement

CAU follows Cornwall Council's *Statement of Safety Policy*.

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

Insurance

CAU is covered by Cornwall Council's Public and Employers Liability Insurance, with a policy value of £50m. The Council also has Professional Negligence insurance with a policy value of £10m.

*Dr Fiona Fleming
Senior Archaeologist
19/08/2019*

Cornwall Archaeological Unit

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