Penrhos Works
Anglesey

Archaeological Evaluation and Geoarchaeological Borehole Survey

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Crynodeb

Comisiynwyd Wessex Archaeology gan RPS Consulting Services i gynnal gwerthusiad archeolegol ac arolwg twll turio geoarchaeolegol ar dir o fewn hen safle Alwminiwm Môn ger Caergybi, Ynys Môn. Gwnaethpwyd y gwaith ar y cyd â'r bwriad i adeiladu is-orsaf drydan 132kV.

Amcan penodol y gwerthusiad ffos oedd archwilio tystiolaeth ar gyfer Ffordd Llundain-Caergybi Thomas Telford o'r 19eg ganrif, gyda'r cwrs gwreiddiol yn mynd drwy'r safle. Amcan penodol yr arolwg twll turio geoarchaeolegol oedd ymchwilio potensial palaeoamgylcheddol ardal o ddyddodion Fflat Llanw a nodwyd yn flaenorol ar y safle. I gyflawni yr amcanion hyn, cloddiwyd dwy ffos werthuso i ragod cwrs y ffordd, a chloddiwyd un twll turio a thri sampl ebill o fewn yr ardal o arwyddocâd palaeoamgylcheddol posibl.

Ni nodwyd unrhyw dystiolaeth o ffordd Llundain-Caergybi Telford o fewn y naill ffos na'r llall. Ni chofnodwyd unrhyw olion eraill o weithgarwch archeolegol, gyda un ffos yn cynnwys fawr ddim ond dyddodion naturiol ac yr llall yn dangos llawer o dystiolaeth o aflonyddwch modern (20fed neu 21ain ganrif).

Mae'r dilyniant gwaddodol a gofnodwyd gan y gwaith geoarchaeolegol yn awgrymu amgylchedd arfordirol di-dor ac amgylchedd ger yr arfordir sydd yn adlewyrchu natur ddeinamig tirweddau o'r fath mewn ymateb i berthynas newidiol tir a môr. Mae gwaelod y dilyniant yn cynnwys traeth graeanog a dyddodion fflat llanw, wedi eu gorchuddio â mawn trwchus (0.75–2.25 m islaw lefel y ddaear), a allai fod wedi ffurfio mewn corstir rhwystr cefn. Ar ben y mawn isaf mae tywod mân wedi ei ddidoli'n dda a all gynrychioli dyddodion fflat llanw pellach ond sydd yn ymddangos yn fwy tebygol o fod o darddiad aeolian (a chwythwyd gan y gwynt), sydd yn cynrychioli ymlediad tua'r tir o system twyni ym mae Penrhos ac sydd wedi ehangu a datchwyddo i raddau helaeth. Nid yw oedran dilyniant y dyddodion yn hysbys, er bod y dyddodion cors arwynebol ar frig y dilyniant yn debygol o fod yn fwy diweddar.

Mae gan y dyddodiad mawn is a gofnodwyd yn nhwll ebill AUG-01.2 (0.75–2.25 m islaw lefel y ddaear) botensial geoarchaeolegol uchel. Mae'r dyddodiad cors mawnaidd uchaf (cors arwynebol) yn debygol o fod yn fwy diweddar mewn dyddiad ac mae ganddo botensial geoarchaeolegol cymedrol. Nid oedd posib cael mynediad diogel i'r lleoliad craidd a gynigiwyd yn wreiddiol gyda rig drilio tra na allai y craiddydd Rwsia dreiddio i'r tywod wedi ei ddidoli'n fân ar ben y mawn. Felly dim ond drwy ddefnyddio ebill dwylo y gellid adennill samplau o'r mawn, ond mae gan y rhain botensial uchel o halogiad ac nid ydynt yn addas ar gyfer asesiad na dyddio gwyddonol. Os effeithir y dyddodion hyn, dylid adfer twll turio geoarchaeolegol pwrpasol drwy'r dyddodion, a chynnal rhaglen sydd yn targedu asesiad palaeoamgylcheddol a dyddio gwyddonol y dyddodion mawn, gan ddadansoddi maint gronynnau y tywodydd mân i benderfynu a yw'r rhain o darddiad aeolian.

Cedwir yr archif ar hyn o bryd yn swyddfeydd Wessex Archaeology yn Sheffield. Bydd yr archif ddogfennol a digidol yn cael ei hadneuo gyda Chomisiwn Brenhinol Henebion Cymru (CBHC) ar ôl cwblhau'r prosiect. Ni chynhyrchodd y gwaith maes archif o ddarganfyddiadau.

Diolchiadau

Hoffai Wessex Archaeology ddiolch i RPS Consulting Services am gomisiynu'r gwerthusiad archeolegol, yn enwedig Nick Cooke. Mae Wessex Archaeology hefyd yn ddiolchgar am gyngor yr Uwch Archeolegydd Cynllunio a fu'n monitro'r prosiect ar gyfer Cyngor Sir Ynys Môn, ac i Rock Civil Engineering Ltd am eu cydweithrediad ac eu cymorth ar y safle.

Summary

Wessex Archaeology was commissioned by RPS Consulting Services to undertake an archaeological evaluation and geoarchaeological borehole survey on land within the former Anglesey Aluminium site near Holyhead, Anglesey. The works were undertaken in association with the proposed construction of a 132kV electricity substation.

The specific objective of the trench evaluation was to examine evidence for Thomas Telford's 19th-century London–Holyhead Road, the original course of which passes through the site. The specific objective of the geoarchaeological borehole survey was to investigate the palaeoenvironmental potential of an area of Tidal Flat deposits previously identified on the site. To meet these objectives, two evaluation trenches were dug to intercept the course of the road, and one borehole and three auger samples were excavated within the area of potential palaeoenvironmental significance.

No evidence of Telford's London–Holyhead road was noted within either trench. No other traces of other archaeological activity were recorded, with one trench containing little other than natural deposits and the other showing much evidence of modern (20th or 21st-century disturbance).

The sedimentary sequence recorded by the geoarchaeological work suggests a continuous coastal and near coastal environment reflecting the dynamic nature of such landscapes in response to changing land-sea relationships. The base of the sequence comprises gravelly beach and tidal flat deposits, overlain by a thick peat (0.75–2.25 m below ground level), which may have formed in a back-barrier marshland. The lower peat is overlain by a well-sorted fine sand which may represent further tidal flat deposits but that seems more likely to be of aeolian (wind-blown) origin, representing the landward encroachment of a dune-system located within Penrhos bay and which has subsequently prograded and largely deflated. The age of the deposit sequence is unknown, although the surficial marsh deposits at the top of the sequence is likely to be of a more recent date.

The lower peat deposit recorded in auger hole AUG-01.2 has a high geoarchaeological potential. The upper, peaty marsh deposit (surficial marsh) has a moderate geoarchaeological potential. The coring location that was initially proposed could not be safely accessed with a drilling rig while the Russian corer could not penetrate the finely sorted sands overlying the peat. Samples of the peat could therefore only be recovered in hand augers which have a high potential for contamination and are not suitable for assessment or scientific dating. In the event these deposits are impacted, a purposive geoarchaeological borehole should be recovered through the deposits, and a targeted program of palaeoenvironmental assessment and scientific dating undertaken on the peat deposits, with particle size analysis on the overlying finely sorted sands to determine whether these are of an aeolian origin.

The archive is currently held at the offices of Wessex Archaeology in Sheffield. The documentary and digital archive will be deposited with the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) on completion of the project. The fieldwork did not generate a finds archive.

Acknowledgements

Wessex Archaeology would like to thank RPS Consulting Services for commissioning the archaeological evaluation, in particular Nick Cooke. Wessex Archaeology is also grateful for the advice of the Senior Planning Archaeologist who monitored the project for Isle of Anglesey County Council, and to Rock Civil Engineering Ltd for their cooperation and help on site.

Penrhos Works, Anglesey

Archaeological Evaluation and Geoarchaeological Borehole Survey

1 INTRODUCTION

1.1 Project and planning background

1.1.1 Wessex Archaeology was commissioned by RPS Consulting Services to undertake an archaeological evaluation and geoarchaeological borehole survey on land within the former Anglesey Aluminium site ('the Penrhos Works') located south of London Road, Holyhead, Isle of Anglesey, LL65 2TJ (Fig. 1).

1.1.2 The work was undertaken in association with the proposed construction of a 132kV electricity substation that would include with new fencing, access track and underground cabling.

1.1.3 A planning application (FPL/2023/189) submitted to Isle of Anglesey County Council (IACC) was granted 25 September 2024, subject to conditions.

1.1.4 The Senior Planning Archaeologist advising IACC requested that archaeological evaluation trenching should be carried out along the former route of the A5/London–Holyhead road, which was here designed by Thomas Telford. It was also advised that a geoarchaeological borehole should be drilled within a former tidal inlet in order to better understand the deposit sequence in that part of the site.

1.1.5 All works were undertaken in accordance with a written scheme of investigation (WSI) which detailed the aims, methodologies and standards to be employed (Wessex Archaeology 2024). The Senior Planning Archaeologist IACC approved the WSI, on behalf of IACC, prior to the fieldwork.

1.1.6 The borehole survey was undertaken 21 August 2024, with the trench evaluation and auger survey following on 03–04 September 2024.

1.2 Scope of the report

1.2.1 The purpose of this report is to provide a detailed description of the results of the evaluation, to interpret the results within a local, regional or wider archaeological context and assess whether the aims of the evaluation have been met.

1.2.2 The presented results will provide further information on the archaeological resource that may be impacted by the proposed development and facilitate an informed decision with regard to the requirement for, and methods of, any further archaeological mitigation.

1.3 Location, topography and geology

1.3.1 The evaluation area is located between the current course of the A5 to the north and the A55 to the south and is centred on NGR 226765 381120.

1.3.2 The ground surface is largely flat and lies between the 5 m and 10 m contours. The lowest lying ground is situated towards the northern site limits. The evaluation has a coastal setting, with Penrhos Beach lying 90 m to its north and Beddmanarch Bay 350 m to its east.

1.3.3 The bedrock geology of the site is Mica Schist and Psammite of the New Harbour Group. Superficial geology across the site is variable. The majority of the site is overlain by diamicton till. The area of the former inlet has a covering of tidal clay and silt. The western part of the site has three patches of glaciofluvial sand and gravel (British Geological Survey; BGS 2024).

2 ARCHAEOLOGICAL, HISTORICAL AND GEOARCHAEOLOGICAL BACKGROUND

2.1 Archaeological and historical context

Introduction

2.1.1 The archaeological and historical background of the site and the surrounding area was previously assessed in a desk-based assessment (DBA) as part of a previous proposed development of a renewable energy plant (Gwynedd Archaeological Trust 2009). The results of this DBA are summarised below; also given are relevant entry numbers from the Gwynedd Historic Environment Record (HER) and the National Monuments Record of Wales (NRMW). Numbers from the HER will be denoted by their primary reference number (PRN), and those from the NRMW by their national primary reference number (NPRN). Additional sources of information are referenced, as appropriate.

Neolithic (4000–2200 BC)

2.1.2 Two burial chambers are recorded at Trefignath (PRN 2500, NPRN 95535) and Trearddur (PRN 2504, NPRN 402429). Trefignath is a chambered tomb built in three separate stages between 3750 and 3500 BC and was in active use as a burial chamber until 2250 BC. The cairn around the chamber was removed in AD 1870 and the chamber itself was heavily damaged in the 1890s. The burial chamber at Trearddur is now considered doubtful, consisting of two stones on a rocky rise, with one stone erect, the other recumbent. The rise on which this monument sits was initially suggested to be a cairn, but it is currently interpreted as a natural outcropping, with the stones possibly being raised deliberately as a ceremonial monument.

2.1.3 Two Early Neolithic settlements consisting of post-built rectangular buildings are located to the west of the Trefignath chambered tomb, with further settlement remains located 500 m north of the aforementioned remains.

2.1.4 Two polished axes were found in the vicinity of the site. Four other polished axes were also found on the northern part of Holy Island, two of which originate from the Graiglwyd axe factory above Penmaenmawr. These were uncovered when excavating the pit for a new turntable at locomotive sheds near Kingsland in 1926 (PRN 2507).

Bronze Age (2200–700 BC)

2.1.5 Two barrows were prominently situated on Holyhead Mountain although are no longer visible (PRN 1760). Further barrows are present at Garn (PRN 3804, NPRN 58980) and Gorsedd Gwlwm (PRN 3798, NPRN 300839), as well as a barrow cemetery of three barrows at Porth Dafarch (PRN 1772–6, NPRN 308082 and 56021). A barrow was also uncovered underneath the early Christian cemetery at Ty Mawr.

2.1.6 Standing stones are also present within the area, the nearest being the example at Ty Mawr (NPRN 302268), which lies to the west within Parc Cybi. Further standing stones are also

present next to Stanley Mill (PRN 2009, NPRN 302269) and a pair to the west of Plas Meilw (PRN 2748, NPRN 95537).

2.1.7 A cemetery of eight cists, a ring ditch and enclosures were uncovered between the Ty Mawr barrow and the Ty Mawr standing stone (NPRN 417386).

Iron Age (700 BC–AD 60)

2.1.8 Holy Island is the location for a number of notable Iron Age settlements including the 6.8 hectare hillfort of Caer y Twr (PRN 1760, NPRN 93839) on Holyhead Mountain. Near the foot of the south-eastern slope of the mountain is a settlement (PRN 1755, NPRN 93837 and 308078), which consists of stone roundhouse foundations.

2.1.9 A promontory fort, Dinas, is located at Porth Ruffydd on the south coast of Holy Island (PRN 807, NPRN 308070) on what is almost an offshore islet. The remains of possible roundhouses have been observed within the interior by aerial photography.

2.1.10 The Bronze Age barrows at Porth Dafarch are overlain by a hut group (PRN 2754, NPRN 56021) of similar construction to those at Holyhead Mountain.

Roman (AD 60–410)

2.1.11 A rectangular Roman fort (NPRN 15607) established at Holyhead in either the 3rd or 4th century AD likely acted as a naval base, possibly to defend against Irish raiders.

2.1.12 A watch tower (NPRN 308080) located on the summit of Holyhead Mountain, within the Caer y Twr hillfort, was probably built to complement the naval fort. A 4th-century Roman coin horde was found in a brass vessel within the vicinity of the tower (PRN 2503).

Early medieval (AD 410–1066)

2.1.13 The Roman fort at Holyhead was later converted to ecclesiastical use. It is recorded in *The Life of St Cybi* that the fort was conveyed to ‘God and St Cybi’ by King Maelgwn in the 6th century (although the book was written *c*. 1200).

2.1.14 Two churches are located within the fort. The smaller of the two, Capel y Bedd, was an earlier church and was rebuilt in the 14th century. A stone coffin was uncovered during the demolition of the chancel, and other stone lined cists, typical of the 6th–7th centuries, were uncovered outside the walls of the fort. The stone coffin may have been a primary burial, similar to other ecclesiastical sites.

2.1.15 The current church of St Cybi was rebuilt *c.* 1480–1520 with the exception of the chancel, which was only partially rebuilt, retaining elements of a 13th-century church.

Medieval (AD 1066–1500)

2.1.16 Medieval settlements have not been identified within the immediate vicinity of the site, but examples are known further afield at Penrhos, Llanfawr and Tre’r Go, the latter of which was of some importance.

Post-medieval (AD 1500–1800)

2.1.17 The farm at Tre’r Go was inhabited by the Gwyn family in the 16th century. This included John Gwyn, who was High Sheriff of Anglesey between 1543 and 1555. The farm was joined to the Penrhos Estate at the end of the 17th century. The house was converted into labourers’ dwellings and was occupied up to 1947. The farm first appears on an estate map for 1769.

2.1.18 The Penrhos estate was owned by the Owen family from the late 16th century. Following marriage with the Stanley family of Alderley in 1763, they became a dominating influence in the area until the mid-20th century.

Modern (AD 1800–present)

2.1.19 The farm of Tre'r Go appears on estate maps from 1817 with the various names of Treyrgof, Tre'r Gof, Tre'go or Tre'rgo. By this time, the layout of fields had moved from the somewhat random layout of 1769 to a more formalised pattern which, other than some later amalgamation or boundary alterations, is largely unchanged. In 1845, a track was running north to the east side of the farm. This was moved to the west side by 1853, but subsequently moved back to its original location. The western track is visible as cropmarks and earthworks on aerial photography.

2.1.20 Much of the modern period is characterised by the development of Holyhead as the main port of departure for journeys to Ireland.

2.1.21 Although the road to Holyhead had been turnpiked in 1765, travel remained difficult, and fords and ferries were still needed to cross the tidal waters separating Holy Island and Anglesey. This was improved by the creation of Telford's London to Holyhead road (the A5). The Stanely embankment, which had been designed by Telford, was constructed 1822–3.

2.1.22 A new harbour was constructed at Holyhead to accompany the new road. Later on in the 19th century, the harbour was given improved protection, with the construction of the longest breakwater in the country.

2.1.23 Further infrastructure improvements came in 1848 with the opening of the Chester and Holyhead Railway, engineered by Robert Stephenson.

2.1.24 Defensive structures constructed during World War II include a rough line of pillboxes across the island. The line begins at the south-western end of Trearddur Bay. Behind the Trearddur Bay Hotel are two circular pillboxes (grade II listed, 20079). Another is set in the grounds of Trearddur House (grade II listed, 20080). Another is found on the south side of the Stanley Embankment, and a final pillbox is to the south (PRN 7213).

2.1.25 In the later 20th century, development largely related to the growth of Holyhead as a ferry terminal and container port. Anglesey Aluminium works was developed at this point.

2.1.26 Built between 1969 and 1970, Anglesey Aluminium works was one of the largest aluminium suppliers in the UK, with a 125,000 tonne per annum smelter. The works were linked by an underground conveyor to a jetty in the harbour, by a 132kV power line to the Wylfa nuclear power station, and to Llyn Alaw as a water supply. The A5 was rerouted at this time, to curve around the works to the north. The plant ceased operating in 2009.

2.2 Geoarchaeological background and potential

Geological and geoarchaeological context

2.2.1 Relevant background information on the superficial deposits present within the evaluation area (BGS 2024, see section 1.3), including their broad potential to preserve archaeology and palaeoenvironmental datasets, and previous discoveries of archaeological and palaeoenvironmental records associated with them, is outlined below.

Glacial till

2.2.2 Tills are poorly sorted sediments deposited directly by ice sheets and occur extensively across Anglesey. During the last (Devensian) ice age, Anglesey was completely submerged by the Devensian ice sheet, which involved ice advances from the Irish Sea. Till has a low geoarchaeological potential. Glacial till is expected to contain exotic clasts from mainland Wales, north-western England and southern Scotland.

2.2.3 Drumlins are elongated asymmetrical glacial landforms formed of glacial till orientated parallel to the direction of ice flow, with the steeper edge (stoss) being up-ice and the shallower edge (lee) being down-ice. Drumlin swarms are commonly observed on Anglesey and are orientated north-east to south-west.

2.2.4 Penial Dowyn is a Regionally Important Geodiversity Site (RIGS) on the opposite side of the Cymyran Strait that notes a 500 m long north-east to south-west orientated drumlin formed of greyish brown glacial till containing clasts of schist, tuff, limestone (likely from the Clwyd Limestone to the east), quartz and jasper alongside mafic igneous erratics from Scotland. A cross section of the drumlin suggests a lithological stratification of the glacial till, with local mica-shist inclusions generally being to base close to rockhead. Penrhos Drumlin is another RIGS that is within Penrhos Coastal Park to the east of the site, west of Traeth y Griblin that is similar to Penial Dowyn and considered part of the Anglesey Drumlin Swarm.

Glaciofluvial deposits

2.2.5 Glacial sands and gravels would have been deposited as seasonal meltwater outwash at the edge of the retreating Devensian ice sheet and occur as localised deposits with the north of the site in the vicinity of the tidal channel. It is possible the glaciofluvial deposits may be more widespread at the site, sealed by Holocene tidal deposits within the channel, and representing evidence for wasting of the ice sheets in the region. Glaciofluvial sands and gravels have a low geoarchaeological potential.

Tidal flat deposits

2.2.6 Tidal flat deposits are mapped by the BGS within a broadly north–south former tidal inlet. There is limited available ground investigation data on the composition or depth of Holocene deposits infilling the inlet, but these are likely to include fine-grained alluvial deposits forming under rising post-glacial sea-levels. Peat and other organic-rich deposits may also be preserved, representing semi-terrestrial wetland plant communities such as reedswamp and wet woodland. Peat deposits are generally viewed as being of high geoarchaeological potential, as it can contain palaeoenvironmental remains (e.g., pollen, plant macrofossils) to provide information on past vegetation cover, environmental conditions and evidence for human activity/land-use. Pollen evidence can make a considerable contribution to make to our understanding of climate change and vegetation patterns. This, in turn, informs a wide range of other areas, including farming, cultivation and crop processing,

2.2.7 Penrhos translates approximately to ‘head (*pen*) of the moors (*rhos*)’; from this it can be inferred that peat deposits associated with a moorland environment could be present within the area. The marshland is present on the 1885–1915 six-inch Ordnance Survey mapping to the east of Glan-y-Gors, with Glan-y-Gors being approximately where the northern access road and gatehouse for Anglesey Aluminium are at present.

2.2.8 There have been no recent palynological studies of this area.

Blown sands

2.2.9 Blown sands are mapped to the immediate north of the site, representing sand particles moved by wind-derived surface creep. Sand dunes form in low energy environments and typically comprise well-sorted medium to find sand particles. Dune formation can be highly intermittent and episodic, including phases of sand accumulation separated by periods of stabilisation and formation of soils/stasis horizons.

2.2.10 The blown sands mapped to the north of the site formed within the gently shelving bay surrounding Penrhos beach. In these types of settings, continuous dune barriers can form blocking off tidal influence creating freshwater back barrier lagoons within which organic deposits may form. Tidal inlets, as well as erosion and breaching of barriers, can result in a dynamic relationship between freshwater and marine environments.

Previous geoarchaeological investigations

2016: LK Consult Ltd

2.2.11 Ground investigation works were carried out as part of previous planning applications for the site. The investigations were carried out in three areas, including zones of vegetation and wetlands around the north and north-eastern boundaries of the site, and comprised numerous window sample boreholes, trial pits, cable percussion boreholes and rotary core boreholes.

2017: LK Consult Ltd

2.2.12 A survey of land contamination was carried out in 2017 and included further window sample boreholes and rotary cored boreholes to delineate hydrocarbon contamination, sample deeper groundwater, retrieve rock core samples and install groundwater monitoring wells.

2.2.13 The ground conditions beneath the site were found to generally comprise made ground underlain by superficial sandy clay, clayey gravel with localised bands of sands and gravels. The superficial deposits were predominately underlain by weathered schist which in many locations was recovered as clayey gravels or cobbles of mica schist.

2.2.14 The schist bedrock was highly micaceous and the shallow bedrock was predominately found to be highly fractured. The deeper schist bedrock showed a lesser degree of fracturing with predominately sub-horizontal fracturing noted.

3 AIMS AND OBJECTIVES

3.1 General aims

3.1.1 The general aims of the evaluation, as stated in the WSI (Wessex Archaeology 2024), were to:

- provide information about the archaeological potential of the site;
- inform either the scope and nature of any further archaeological work that may be required, or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource) or management strategy;
- provide information about the geoarchaeological potential of the site;
- consider the possible significance of any geoarchaeological evidence present, or potentially present, in the context of national and regional research priorities and agendas (e.g., English Heritage 2008, Archaeoleg 2024), and

- inform on possible requirements for further geoarchaeological work that may be required.

3.2 General objectives

- In order to achieve the above aims, the general objectives were to:
- determine the presence or absence of archaeological features, deposits, structures, artefacts or ecofacts within the specified area;
- establish, within the constraints of the evaluation, the extent, character, date, condition and quality of any surviving archaeological remains;
- place any identified archaeological remains within a wider historical and archaeological context in order to assess their significance;
- make available information about the archaeological resource within the site by reporting on the results;
- record the sequence of deposits at each borehole location;
- obtain geoarchaeological samples of relevant deposits (where possible);
- interpret the probable environments represented;
- determine the importance of the deposits with regard to their geoarchaeological potential; and
- make specific recommendations for further work, where appropriate, which may [include] palaeoenvironmental assessment and/or scientific dating.

3.3 Site-specific objectives

- Following consideration of the archaeological potential of the site and the regional research framework (Archaeoleg 2024), the site-specific objectives were to:
- examine evidence for remains of the original A5, as designed by Telford and constructed 1822–1823;
- determine the level of preservation of the original A5;
- to investigate the engineering and construction methods of the original A5; and
- to investigate the palaeoenvironmental resource of the geoarchaeology/ geoarchaeological deposits.

4 METHODS

4.1 Introduction

4.1.1 All works were undertaken in accordance with the detailed methods set out within the WSI (Wessex Archaeology 2024) and in general compliance with CIfA standards and guidance (CIfA 2023a–b). Any significant variations to these methods were agreed with the client prior to being implemented.

4.2 Evaluation trenching

General

4.2.1 The trench locations were set out using a Global Navigation Satellite System (GNSS) connected to Leica's SmartNet service, in the approximate positions proposed in the WSI.

4.2.2 Two trial trenches, each measuring 50 m in length and 2 m wide, were excavated in level spits using a 360º excavator equipped with a toothless bucket, under the constant supervision and instruction of the monitoring archaeologist. Machine excavation proceeded until either the archaeological horizon or the natural geology was exposed. Sondages were dug into both trenches to test the identification of the superficial geology.

4.2.3 Spoil from machine stripping and hand-excavated archaeological deposits was visually scanned for the purposes of finds retrieval. Material of modern date (19th century or later) was recorded on site but not retained.

4.2.4 Trenches completed to the satisfaction of the client and the Senior Planning Archaeologist advising IACC were backfilled using excavated materials in the order in which they were excavated, and left level on completion. No other reinstatement or surface treatment was undertaken.

Recording

4.2.5 All exposed archaeological deposits and features were recorded using Wessex Archaeology's pro forma recording system. A complete record of excavated features and deposits was made, including plans and sections drawn to appropriate scales (generally 1:20 or 1:50 for plans and 1:10 for sections) and tied to the Ordnance Survey (OS) National Grid.

4.2.6 A full photographic record was made using digital cameras equipped with an image sensor of not less than 16 megapixels. Digital images have been subject to managed quality control and curation processes, which has embedded appropriate metadata within the image and will ensure long term accessibility of the image set.

4.3 Geoarchaeological survey

General

4.3.1 The borehole survey comprised the excavation of a single purposive geoarchaeological borehole (WA-01) drilled to failure using a Terrier rig.

4.3.2 The auger survey comprised the excavation of a single Russian cored auger (AUG-01) and two narrow gouge cored augers (AUG-01.1 and AUG-01.2). These augers were performed within 1 m of each other.

4.3.3 The fieldwork was carried out under the supervision of an experienced specialist from Wessex Archaeology's geoarchaeological team.

Boreholes and auger survey locations

4.3.4 The geoarchaeological interventions were set out using the Leica GNSS in the positions shown in Figs 1–2. An adjustment to the borehole location proposed in the WSI was required because of its inaccessibility (heavy vegetation and fencing which the terrier rig could not navigate). The borehole was placed in the closest appropriate location respecting mapped tidal flat deposits (Figs 1–3; BGS n.d.).

4.3.5 Access to the original borehole position was again attempted and failed during the auger survey; the auger positions placed were at the closest appropriate location respecting prior marshland deposits.

Service location and other constraints

4.3.6 Before excavation began, area of the boreholes was walked over and visually inspected to identify the location of any below/above-ground services. All borehole locations were scanned before and during excavation with a Cable Avoidance Tool (CAT) to verify the absence of any live underground services.

4.3.7 A hand-dug test pit was excavated to a depth of 1.2 m below ground level (bgl) prior to drilling.

Drilling methods

4.3.8 One borehole (WA-01) was put down at the location shown in Figs 1–2.

4.3.9 The borehole was drilled to refusal at 5 m bgl. Refusal occurred due to blowing sands, with waterstrike being encountered at 2 m bgl. The casing refused at 4 m bgl. A dip taken immediately after drilling recorded an excavation depth of 5 m bgl, with a second dip performed 5 minutes later recording an excavation depth of 4.5 m bgl.

4.3.10 A percussive window sampling rig (Terrier type) was used to extract sleeved cores one metre in length and 100 mm in diameter.

4.3.11 Drilling works were carried out by experienced geotechnical engineers under the supervision of a suitably experienced member of Wessex Archaeology's geoarchaeological team.

4.3.12 The supervising geoarchaeologist recorded, described and interpreted the sequences of deposits encountered and their likely geoarchaeological potential assessed. All core lengths were retained.

4.3.13 Retained core lengths were sealed and marked with the project number, site number, borehole number and sample depth and returned to the Wessex Archaeology laboratory for retention.

4.3.14 Two 10-litre samples were retained from the inspection pit, with one 10-litre sample retained from context 102 and the other from context 103 (see Appendix 2).

Auger methods

4.3.15 Three augers (AUG-01, AUG-01.1 and AUG-01.2) were put down at the locations shown in Figs 1–2, with one sampled using a Russian corer and two sampled using a narrow gouge auger. Runs were performed in 0.5 m spits.

4.3.16 It was intended that the survey would be wholly completed using the Russian corer, but because of equipment failure the auger survey was performed using a narrow corer to ensure more complete recovery of targeted deposits. AUG-01.1 was performed adjacent to AUG-01, with AUG-01.2 performed approximately 1 m to the east.

4.3.17 AUG-01 and AUG-01.1 were performed from ground level, and AUG-01.2 was performed from 0.25 m bgl.

4.3.18 AUG-01 was terminated at 0.5 m bgl because of equipment failure, AUG-01.1 was terminated at 1 m bgl because of collapsing sides sealing the intervention prior to completion and AUG-01.2 was terminated at 2.25 m bgl because of refusal. Wet rising ('blowing') sands were noted in both AUG-01.1 and AUG-01.2, with water rising rapidly within the intervention. Waterstrike was encountered at approximately 0.5 m bgl and is associated with sand underlying Surficial Marsh deposits. Water levels rose to approximately 0.1 m bgl within 15 minutes.

4.3.19 Retained samples were stored in a 0.5 m long and 6.5 cm wide plastic sample tube lined with foil. The sample was wrapped in foil and clingfilm to retain moisture then marked with the project and intervention number. These samples were recorded and logged in-lab at Wessex Archaeology by a suitably experienced geoarchaeologist.

Sediment description

4.3.20 The boreholes were recorded using Wessex Archaeology's pro-forma digital recording system. For each stratigraphic unit descriptions and interpretations of the deposits are provided. Descriptions of deposits included information such as:

- *Depth*
- *Texture*
- *Composition*
- *Colour*
- *Inclusions*
- *Structure*
- *Shape and nature of contacts between deposits*

4.3.21 Interpretations included, where possible, probable depositional environments and formation processes.

4.3.22 A full photographic record was made using a digital camera equipped with an image sensor of not less than 10 megapixels. This recorded both the detail and the general context of the principal lithological and stratigraphic features, and the evaluation area as a whole.

4.3.23 Digital images were subject to managed quality control and curation processes which will embed appropriate metadata within the image and ensure long term accessibility of the image set. Photographs were taken of all areas, including access routes, to provide a record of conditions prior to and on completion of the borehole survey.

Sampling

4.3.24 Wessex Archaeology retained all core lengths in sleeved liners from WA-01.

4.3.25 Two 10-litre samples were retained from the inspection pit, one 10-litre sample came from context 102 and the other was taken from context 103 (see Appendix 2).

4.3.26 All arisings from AUG-01, AUG-01.1 and AUG-01.2 were retained in 0.5 m sample lengths with the stratigraphic profile *in situ*.

4.4 Survey

4.4.1 The real time kinematic (RTK) survey of the evaluation trenches, borehole and augers was carried out using a Leica GNSS connected to Leica's SmartNet service. All survey data was

recorded in OS National Grid coordinates and heights above OD (Newlyn), as defined by OSGM15 and OSTN15, with a three-dimensional accuracy of at least 50 mm.

4.5 Finds and environmental strategies

4.5.1 Strategies for the recovery, processing and assessment of finds and environmental samples were in line with those detailed in the WSI (Wessex Archaeology 2024). Guidelines for the treatment of artefacts and environmental remains were in general accordance with: *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (CIfA 2014a), *Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (English Heritage 2011), and CIfA's (n.d. a) *Toolkit for Specialist Reporting* (Type 2: Appraisal).

4.6 Monitoring

4.6.1 The Senior Planning Archaeologist monitored the evaluation on behalf of IACC (the local planning authority). Any variations to the WSI, if required to better address the project aims, were agreed in advance with the client and the Senior Planning Archaeologist.

5 EVALUATION TRENCHING RESULTS

5.1 Introduction

5.1.1 Two trenches were excavated; they were located on the projected course of Telford's London–Holyhead road and were separated by a distance of 815 m. Trench 1 lay in the north-west part of the evaluation area and was centred on NGR 226305 381114. Trench 2 was close to the south-east edge of the site and was centred on NGR 226990 380666. Contrasting deposit sequences were revealed in the two trenches, with trench 1 encountering little other than material of geological origin, whereas exposed within trench 2 was a more complex sequence, including tarmac, a probable buried soil and various made ground deposits.

5.1.2 Detailed descriptions of individual contexts are provided in the trench summary tables (Appendix 1). Figure 1 shows the locations of the trenches on the current site, and Figure 2 locates them in relation to the pre-aluminium works landscape and superficial deposits mapped by the British Geological Survey (BGS 2024).

5.2 Trench 1

5.2.1 The upper surface of the geological substrate was encountered at 0.33 m below ground level (bgl) in trench 1 (Fig. 4–5). The material was banded, with various hues of stony grey, brown and yellow silty sand (104–107) recorded to a depth of 1.10 m bgl. The material is believed to equate to the till recorded by the British Geological Survey (BGS 2024) across much of the wider area. Trench 1 was located in the area within which tidal flat deposits have been mapped by the BGS, although the deposits exposed in the trench do not appear to resemble such fine-grained clays and silts.

5.2.2 The *in situ* natural substrate was sealed by a 0.13 m-thick layer of redeposited natural (103), over which lay a 0.1 m-thick layer of made ground/imported sands and gravels (102), with the existing ground surface comprising similar but darker material (101).

5.3 Trench 2

5.3.1 The upper surface of the geological substrate (207) was exposed in two sondages dug into the base of trench 2. Within sondage 1 it was encountered at 0.6 m bgl, and at 0.77 m bgl in sondage 2 (Figs 6–7). Within both sondages it comprised a pale brownish grey sandy

gravelly clay with common angular to subrounded gravel to cobble sized psammite inclusions. This material differed to that seen in trench 1.

5.3.2 Within sondage 1 (Fig. 6), the geological substrate was sealed by a 0.22 m thick layer of greyish brown slightly silty clay (206), which resembled a buried soil horizon. This had a well-defined boundary with the overlying (and contrasting) deposit, supporting the validity of this interpretation. The overlying deposit comprised brown clay with large angular limestone inclusions, some of which were heat-affected (205, 208). Imported gravel aggregate in a dark sandy matrix made up the remainder of remainder of the deposits (209–212). Plastic piping was seen within 212 at 0.3 m bgl, confirming the recent age of this deposit.

5.3.3 A different deposit sequence overlay the natural within sondage 2, which was dug into the base of trench 2 towards its south-west end.

5.3.4 Plastic lay on the upper surface of the natural substrate (Fig. 7) indicating the entire overlying sequence was modern. This material lay at the base of 214, a 0.23 m thick layer of dirty dark grey to black clayish sandy gravel that also contained glass and preserved roots.

5.3.5 This was overlain by a 0.18 m thick layer of compact aggregate gravel in a matrix of mid-grey silty clay (213). This may have been a preparation layer for some late iteration of the pre-aluminium works A5 (to judge by its appearance and the material it sealed) but no trace of an overlying surface was apparent. Instead, the deposit above it was a compact greyish purple sandy gravel, 0.29 m thick (204). Coarse components of worked wood, rebar, geotextile and concrete were noted in 204. The uppermost two deposits recorded in sondage 2 comprised further gravel sealed beneath the concrete hardstanding that formed the modern ground surface when the evaluation trenching occurred (201, 202).

5.3.6 At the south-west end of the trench, a layer of hard tarmac was seen (203: Fig. 8). This was the location of a defunct communications cable; this part of the trench was not examined further.

6 GEOARCHAEOLOGICAL SURVEY RESULTS

6.1 Introduction

6.1.1 This section outlines the results of the geoarchaeological borehole survey, which comprised the excavation of one geoarchaeological borehole and three geoarchaeological augers. It includes summaries of the deposits identified and a review of retained samples.

6.2 Borehole survey

6.2.1 The lithostratigraphy of deposits encountered during the borehole survey is listed and summarised below. The specific lithologies and lithostratigraphic succession encountered in each intervention are outlined in Appendix 2.

6.2.2 The generalised lithostratigraphic sequence encountered during the borehole survey comprised:

- Landscaped Made Ground (Modern)
- Beach and Tidal Deposits (Holocene)

6.2.3 Neither bedrock nor glacial till were encountered during the borehole survey. Waterstrike was encountered at 2 m bgl, with the rusty orange colour of the groundwater presumed due to iron oxide.

Beach and Tidal Deposits

6.2.4 Beach and Tidal Deposits were a variably gravelly, clayish and sandy unit which was highly variable down sequence, with the dominant texture being a slightly clayish gravelly sand. Gravel was local, with quartz, psammite, pelite, mica-shist, phyllite and possible shale and slate identified. Clasts were generally fine gravel to moderate gravel sized and subangular to rounded, with platy habit lithological components generally being subtabular in morphology (shale to shist metamorphic series). The lithological composition of the clasts of the Beach and Tidal Deposits was consistent throughout the unit.

6.2.5 Whilst glaciofluvial deposits described as sands and gravels are mapped in the area, as the lithological profile does not change from a local one it is presumed that the entire sequence is a Holocene tidal deposit; exotic clasts such as granite, greywacke, diorite, quartzite and New Red Sandstone would be expected in a glaciogenic unit (BGS n.d., University of Sheffield 2017).

6.2.6 Units of sands and gravel were noted between 1.52 and 1.82 m bgl, 2.49 and 2.59 m bgl and 2.69 and 2.72 m bgl. Sorting was generally noted to be moderate to moderate poor. Sand coarseness was also variable, with sand generally being coarser when units were gravellier and vice-versa.

6.2.7 The recovery of the unit was poor, especially after waterstrike.

6.2.8 Clay, when present, was generally localised within lenses, rather than being distributed evenly throughout the unit. This is likely because of flocculation, which is commonly encountered in the coastal zone, with flocculation often occurring at the transition zone between freshwater and saline environments because of the higher ionic strength of saline water. Clay lenses are distributed throughout the unit, with the base of the unit between 4.5 and 5 m bgl being noted to contain leaf-shaped clay lenses.

6.2.9 The matrix colour of the unit is generally greyish brown, with this colour gradually becoming darker with depth, being described as a moderately dark greyish brown by 4.5 m bgl.

6.2.10 The Beach and Tidal Deposits are associated with Traeth Penrhos, a sandy beach with shingle fringed by bedrock outcrops (Careg Hanner-trai to the west, Brynglas to the east), which lay less than 200 m to the north of WA-01. Photographs of the beach in winter suggest that shingle accumulates at the back of the beach in stormy conditions; the variability of gravel abundance down the unit is associated with variability of wave energy or a variability of the position of the coastline.

6.2.11 As the unit base was not encountered, it is uncertain if the underlying unit will be a glaciogenic unit, bedrock or an organic deposit associated with the Lower Peat as seen in the auger survey (see below). The auger survey does suggest that peat could be underlying or interbedded within a tidal unit, however, the Lower Peat was encountered by 1 m bgl in AUG-01.1 and AUG-01.2. No marshland is mapped at surface on the 1888–1915 six-inch OS mapping, though an irrigation channel associated with the marshland is mapped immediately north of the position of WA-01.

Landscaped Made Ground

6.2.12 Landscaped Made Ground was the topmost unit underlying topsoil and was encountered from 0.5 m to 1.1 m bgl, consisting of a loose to firm friable greyish brown slightly clayish slightly gravelly silty sand with poorly sorted common angular to subangular frequently subtabular fine to coarse gravel of psammite and pelite. The unit was matrix supported, with the matrix containing infrequent orangey brown mottling associated with oxidation of iron.

6.2.13 The unit when encountered was generally dry despite heavy rainfall the night before the geoarchaeological borehole survey and is presumed well drained.

6.2.14 Landscaped Made Ground is associated with groundworks to level off the area adjacent to London Road (A5), which WA-01 was near (Fig. 1). As the route of the modern A5 is known to have been modified during the construction of the aluminium works around 1970, the Landscaped Made Ground is presumed to be of a similar age, if not younger.

6.3 Auger survey

6.3.1 The lithostratigraphy of deposits encountered during the auger survey is listed and summarised below. The specific lithologies and lithostratigraphic succession encountered in each intervention are outlined in Appendix 2.

6.3.2 The generalised lithostratigraphic sequence encountered during the auger survey comprised:

- Surficial Marsh (Holocene)
- Peaty Clay (Holocene)
- Well-sorted Fine Sands (Holocene)
    - Peaty Sands
- Lower Peat (Holocene, ?Mesolithic)
- Slightly Gravelly Clay (?Holocene)

6.3.3 Bedrock was not encountered during the auger survey. Water was seen on the surface adjacent to the auger positions, with waterstrike encountered in all augers once encountering Well-sorted Fine Sands. Groundwater was clear at the auger positions.

6.3.4 The deposits, their lithostratigraphic relationship and their distribution are described below.

Slightly Gravelly Clay

6.3.5 Slightly Gravelly Clay was encountered in AUG-01.2 only from 2.05 m bgl on one side of the retained sample and 2.15 m bgl on the other. The boundary between the overlying Lower Peat and this unit was sharply angled (<70°) and presumably forced by bioturbation, as fibrous hollow monocot stems were seen at the boundary between the peat and the Slightly Gravelly Clay. This zone was also sandier than both the Lower Peat and Slightly Gravelly Clay.

6.3.6 Slightly Gravelly Clay was observed as a soft damp greenish brownish grey slightly gravelly clay, with gravel being fine angular to subrounded quartz, psammite, pelite, mica-schist, phyllite and possible shale and slate. Lithology within the unit was indistinct because of the small quantity of the unit retained in sample. Gravel was noted as containing a subtabular trend, with this trend presumed forced by the lithological components having a platy habit; members of the slate to schist regional metamorphic series foliate respecting a micaceous

cleavage habit, with lower grade members cleaving across lamination and bedding planes. Quartz gravel was noted to be more ovoid, with quartz containing no cleavages.

6.3.7 The depositional environment of the Slightly Gravelly Clay is unclear, with the deposit possibility being a glacial till or a tidal flat deposit. However, since the clast lithology suggests that the clasts are wholly local (New Harbour Group and South Stack Formation), as opposed to exotic clasts from western England or southern Scotland, it is presumed that the deposit is a tidal flat rather than a glacial till. Glacial tills in Anglesey generally contain erratics from Dumfries and Galloway, Snowdonia and the Mercia Mudstone (BGS n.d., University of Sheffield 2017). Erratics from Ireland would not be expected because of the orientation of the drumlins in Anglesey being strongly north-east to south-west (University of Sheffield 2017).

6.3.8 Due to the sampling method of AUG-01.2 it is possible that the clast sizes of the deposit are more disparate than observed; coarse gravels would not have been sampled because of the restricted width of the narrow gouge. Sorting was not determined within the Slightly Gravelly Clay.

6.3.9 The area of the site where tidal flats are mapped by the BGS is in an inlet associated with Traeth Penrhos, with the mica-shist, pelite and pssamite outcrop only being present on the headland at the edges of the beach (Careg Hanner-trai and Brynglas). As rockhead was not encountered in either the borehole or auger survey, it is presumed that the rockhead within the inlet is lower, with the inlet itself forming along the weakness of the fault line that bisects the site.

Lower Peat

6.3.10 Lower Peat was observed in AUG-01.2 and possibly within AUG-01.1, with the unit being more prominent in AUG-01.2. Lower Peat is differentiated from Surficial Marsh Deposits by underlying Aeolian Beach Dune Sand, having a pseudofibrous texture, being darker in colour and containing sub-horizontally orientated partially decomposed organic inclusions as opposed to subvertical rootlets.

6.3.11 The Peat is a very soft brownish black peat with a psuedoamorphous matrix with pervasive fibrous organic inclusions orientated weakly to sub-horizontally. Inclusions were waterlogged, fragmentary and generally woody, with leafy inclusions noted from 1.55 m bgl in AUG-01.2. Organic inclusions were generally blackened or blanched in colour. The unit was noted to have a weak organic odour and a dark brown smearing streak.

6.3.12 Contamination of the Lower Peat with sand from the well-sorted Fine Sand was noted in AUG-01.2 from 0.75 to 1.25 m bgl, with the contamination surficial only from 0.75 to 1 m bgl and endemic from 1 to 1.25 m bgl. This contamination is associated with the rapidly rising water level following waterstrike, with the contaminating sands being ‘washed’ out of the sides of the excavation into the standing water.

6.3.13 The recovery of peat was significantly better in AUG-01.2 than in AUG-01.1, with possible Lower Peat in AUG-01.1 recovered as lenses within sand as opposed to a continuous unit of peat (see Peaty Sands). As the recovery of Lower Peat within AUG-01.2 did not become continuous until 1.25 m bgl it is likely that the Lower Peat is present below the depth of excavation in AUG-01.1.

6.3.14 The Lower Peat is associated with either a marsh or a bog environment, with the water likely coming from the coast along the inlet.

Well-sorted Fine Sand

6.3.15 Well-sorted Fine Sand was observed in all three augers underlying Surficial Marsh. It was a very well-sorted greyish brown fine sand with rare coarse sand sized inclusions. Sand grains were rounded to well-rounded. Well-sorted Fine Sand was identified between 0.39 m bgl and base in AUG-01, between 0.41 and 0.66 m bgl in AUG-01.1 and between 0.45 and 0.75 m bgl in AUG-01.2.

6.3.16 The sands are tentatively associated with an aeolian rather than alluvial environment because of the high degree of roundedness and fine particulate size; Beach and Tidal Deposits recorded in WA-01 have a notable gravel component, which was not observed in Well-sorted Fine Sand. No crossbedding or other dune associated sedimentary structures were noted in the well-sorted Fine Sand. No fragmentary shell was noted within the well-sorted Fine Sand.

6.3.17 The Well-sorted Fine Sands are associated with a coastal environment and are presumed to be a distal coastal dune deposit which became vegetated; vegetated coastal dunes are commonly referred to as ‘grey dunes’ because of their distinctive colour forced by humification of organic material. However, the possibility of the unit being a fluvial tidal deposit should not be discounted, with tidal sand deposits generally associated with tidal channels or sand flats.

6.3.18 The Well-sorted Fine Sands were notably wet and loose during the auger survey. It is presumed during initial deposition that the general area was drier, allowing for aeolian processes to dominate, but the deposit then became waterlogged, either by climatic or coastal forcings, making it an area ideal for marshland fauna. The sands are presumed sourced from the north, with the prevalent wind coming from the coastline at Traeth Penrhos.

6.3.19 As the unit is thin it is possible that the Well-sorted Fine Sand was deposited in a single event, with deposited sands overlying an extant marsh/bog, choking the vegetation.

Peaty Sands

6.3.20 Peaty Sands were seen in AUG-01 between 0.33 and 0.39 m bgl, in AUG-01.1 between 0.41 m and 0.86 m and in AUG-01.2 between 0.3 and 0.45 m bgl. This unit was a very soft to loose greyish brown slightly clayish sand with small (<3 cm) lenses of peat. The sand component of the Peaty Sands is identical to that seen in the Well-sorted Fine Sands, with fine to medium fine, rounded to well-rounded sand grains.

6.3.21 Peaty Sands are possibly not a discrete depositional environment, the unit is feasibly Well-sorted Fine Sand contaminated by drop from the Surficial Marsh or Peaty Clays. It also possible that the Peaty Sands are a transitional zone from the Well-sorted Fine Sands to the units above as part of the succession from a marshland to a tidally dominated environment.

Peaty Clay

6.3.22 Peaty Clay was identified in AUG-01 from 0.2 m to 0.39 m bgl and from 0.2 to 0.41 m bgl in AUG-01.1. Peaty Clays were variable in composition but are generally described as a variably sandy soft brownish or greenish grey clay, with orangey brown subvertical mottling noted in AUG-01 and AUG-01.1. The mottling is presumed associated with rooting oxidation. Frequent <5 cm lenses of psuedoamorphous peat were noted within the unit between 0.2 m and 0.3 m bgl in AUG-01.1 and between 0.33 m and 0.39 m in AUG-01.

6.3.23 Peaty Clays are tentatively associated with a productive tidal flat environment, with the possible aeolian coastal dune environment being succeeded by a tidally dominated environment. This succession may have been forced by the covering of the wetland associated with the Lower Peat by the Well-sorted Fine Sand.

6.3.24 Peaty Clay is absent in AUG-01.2, which has Peaty Sands at the depth expected for Peaty Clay.

Surficial Marsh

6.3.25 Surficial Marsh is the uppermost unit encountered during the auger survey in all interventions, encountered from ground level to 0.2 m bgl in AUG-01, from ground level to 0.2 m bgl in AUG-01.1, and from 0.25 m (the top of the intervention) to 0.3 m bgl in AUG-01.2. Surficial Marsh was noted in AUG-01.2 from ground level during the excavation of the pit for the intervention.

6.3.26 Surficial Marsh was described as a very soft dark brown slightly sandy pseudoamorphous peat with very abundant fine pale subvertical rootlets at top, becoming less rooted and greyer with depth.

6.3.27 Surficial Marsh varies from Lower Peat by being more distinguishably stratified, for having a grainy pedding habit, for containing *in situ* rootlets, and for having a humic odour as opposed to an organic one. Surficial Marsh resembles a peaty topsoil.

6.3.28 Inundated ridges and furrows were evident in the present marshland on the surface (Fig. 9), as were straight irrigation ditches; the modern marshland has been altered by humans. The irrigation ditches are present on the 1888–1915 six-inch Ordnance Survey map.

6.4 Archaeological remains

6.4.1 No archaeological remains were encountered during the geoarchaeological borehole survey.

6.5 Retained samples

6.5.1 All core lengths were retained from WA-01, with four retained 1 m-long core lengths from 1.2 m bgl to 5 m bgl. Two 10-litre samples were retained from the inspection pit, one from context 102 and the other from 103 (see Appendix 2). No sample was taken from context 101 as it was suspected of being made ground.

6.5.2 All samples were retained from AUG-01, AUG-01.1 and AUG-01.2, comprising 0.5 m-long stratified auger lengths in a hard plastic sleeve lined with foil to retain moisture. The samples were then wrapped in foil and clingfilm.

7 FINDS EVIDENCE

7.1 General

7.1.1 No finds were collected during the evaluation or borehole survey.

8 ENVIRONMENTAL EVIDENCE

8.1 General

8.1.1 No deposits meeting the criteria for bulk environmental soil sampling set out in the WSI were encountered.

9 CONCLUSIONS

9.1 Archaeological discussion

Telford's road

9.1.1 No evidence of Telford's London–Holyhead road was noted within the trenches. Tarmac 203 at the south-west end of trench 2 may have been the surface of the final iteration of the road's original course, but it extended into the trench for only a short distance, coincided with a defunct communications cable and was not examined further. It would appear that more of the later road lies to the immediate south-west of trench 2. This would accord with the historical mapping evidence (Fig. 2), although trench 2 had been positioned to intercept the road. Inaccuracies in the georeferencing of historical mapping may account for either the incorrect placement of the trench in relation to the true course of the road, or alternatively, an erroneous impression (Fig. 2) of the course of the road in relation to the location of trench 2.

9.1.2 Plastic and preserved organics at the base of the deposit sequence in sondage 2 in trench 2 rule out the possibility that the material above formed part of the earliest road, but it is possible that some of the overlying deposits, particularly compacted aggregate 213, formed a subbase course within the roadbed at some point in the 20th century. No road surface overlying this deposit was noted, however.

9.1.3 Alternatively, it is possible that, other than 203, all of the non-natural deposits in trench 2 are some form of 'made ground' relating to landscaping associated with the construction, use and decommissioning of the aluminium works. The surface of the natural deposits was around 0.5 m higher at the south-west end of trench 2 (Fig. 8) than in sondage 2, around 7 m away, indicating a degree of truncation of the local topography, which may support this suggestion.

9.1.4 Trench 1 was entirely devoid of any archaeological remains, either related to the road or of any other origin.

9.1.5 It has not therefore been possible to contribute to the site-specific objectives relating to the original (19th-century) version of the A5, as no traces of it were seen.

Other

9.1.6 No remains of archaeological potential were recorded in either of the trenches. No artefacts were seen.

9.2 Geoarchaeological discussion

Sedimentary sequences and depositional environments

9.2.1 The borehole and auger survey has successfully characterised the Quaternary deposits present within the site and recovered samples suitable for assessing the geoarchaeological resource.

9.2.2 The captured sedimentary sequence of the area suggests a continuous coastal and near coastal environment, with gravelly beach and tidal deposits captured in WA-01 to the north and a sequence of peat deposits overlying possible tidal flats overlain in turn by tidal deposits and possible coastal aeolian deposits captured in the auger survey. Modern maintained marshland was recorded at the top of sequence in AUG-01, AUG-01.1 and AUG-01.2, where it overlay coastal deposits.

9.2.3 The auger positions were slightly lower lying than WA-01, approximately 2.35 m OD on average in comparison to WA-01 at 3.64 m OD, suggesting that the organic deposits and lower peat deposits are associated with a marshland environment, likely brackish, whereas the surficial peat is associated with a marshland environment that is currently being actively maintained, with irrigation ditches and ridge and furrow present on the surface. Two drains associated with the aluminium works are known to underlie the modern marsh to the east and west of the final auger positions.

9.2.4 The area of the site is in a known inlet formed along a fault plane, with rockhead in the surveyed area of site being lower than elsewhere in the nearby area; a rock outcrop of the New Harbour Group is visible on the coastline near Traeth Penrhos at Brynglas and Careg Hanner-trai. Devensian glacial till is known on the site outside the inlet, although this was not encountered during the geoarchaeological works (BGS n.d.).

9.2.5 The base of the beach and tidal deposits was not encountered in borehole WA-01.

9.3 Geoarchaeological resource and retained samples

9.3.1 All samples have been retained from the borehole and auger survey, with arisings from WA-01 being retained in two 10-litre samples (0–1.2 m bgl) and four 1 m-long plastic liners (1.2–5 m) and samples from the auger survey being retained as 0.5 m-long sleeved arisings (Table 1).

9.3.2 The lower peat deposit (0.75-2.25m bgl) has the highest geoarchaeological potential. The surficial marsh deposits are likely to be relatively modern and have a moderate geoarchaeological potential. However, it was not possible to access the coring locations with the drilling rig to recover window samples. The Russian corer recovered deposits of the surficial marsh, but could not penetrate the underlying sands, with samples of the underlying lower peat only accessible through the use of a narrow barrelled gouge auger. These samples are not suitable for palaeoenvironmental assessment or scientific dating due to the potential for contamination, but they have provided the opportunity to assess the potential of the deposit sequence as a whole.

9.3.3 In the event the marsh deposits are impacted by development proposals, it is recommended that suitable access is afforded to recover a window sample borehole from this location, with radiocarbon dating and palaeoenvironmental assessment of the peat. Particle size analysis of the finely sorted sands separating the lower peat and upper marsh deposits would help to determine if these deposits are aeolian in nature and represent the landward progradation and potential subsequent deflation of a former sand dune system.

Table 1 Summary of retained auger and borehole samples

Intervention ID	Depth (m OD)	Retained as	Contains	Geoarchaeological Potential	Palaeoenvironmental and dating potential
AUG-01	0–0.5	Russian auger	Surficial Marsh, Peaty Clay, Well-rounded Fine Sand	Moderate (Surficial Marsh)	Moderate
AUG-01.1	0–0.5	Narrow gouge	Surficial Marsh, Peaty Clay, Well-rounded Fine Sand	Moderate (Surficial Marsh)	Moderate
AUG-01.1	0.5–1	Narrow gouge	Well-rounded Fine Sand, Peaty Sand	Moderate (Peaty Sand)	Moderate
AUG-01.2	0.25–0.75	Narrow gouge	Surficial Marsh, Peaty Sand, Well-rounded Fine Sand	Moderate (Peaty Sand)	High

Intervention ID	Depth (m OD)	Retained as	Contains	Geoarchaeological Potential	Palaeoenvironmental and dating potential
AUG-01.2	0.75–1.25	Narrow gouge	Lower Peat, Peaty Sand	High (Lower Peat)	High
AUG-01.2	1.25–1.75	Narrow gouge	Lower Peat	High (Lower Peat)	High
AUG-01.2	1.75–2.25	Narrow gouge	Lower Peat, Slightly Gravelly Clay	High (Lower Peat)	High
WA-01	0.5–1.1	10L sample	Landscaped Made Ground	Negligible	Negligible
WA-01	1.1–1.2	10L sample	Beach and Tidal Deposit	Low	Low
WA-01	1.2–2	1 m WS liner	Beach and Tidal Deposit	Low	Low
WA-01	2–3	1 m WS liner	Beach and Tidal Deposit	Low	Low
WA-01	3–4	1 m WS liner	Beach and Tidal Deposit	Low	Low
WA-01	4–5	1 m WS liner	Beach and Tidal Deposit	Low	Low

9.4 Geoarchaeological conclusions and recommendations

9.4.1 A targeted geoarchaeological borehole and auger survey has helped to refine understanding of the nature and distribution of the Quaternary geological deposits at the site.

9.4.2 The sequence comprises Holocene coastal deposits at the north of the site, with marshland peat deposits identified during the auger survey underlying coastal alluvial and aeolian deposits within a maintained zone of marshland. At least two discrete phases of marshland accumulation were identified, with tidal and possible coastal dune deposits separating the two phases. The age of the two peat deposits is unknown. The organic deposits were identified during the auger survey with no organic deposits identified during the preceding borehole survey to the west.

9.4.3 No deposits of geoarchaeological interest were noted within either of the archaeological evaluation trenches, with trench 1 consisting of stratified made ground overlying probable reworked glacial till and trench 2 consisting of stratified aggregate gravels overlying probable reworked glacial till.

9.4.4 Access issues prevented the recovery of sleeved samples from the marshland using a terrier rig, while attempts to collect samples with a Russian auger refused on the fine sands. A hand auger survey using a gouge auger was possible and samples of the deposits, including a Lower Peat were recovered. However, these samples have a high probability of contamination because of the open-face of the auger and are not suitable for further palaeoenvironmental assessment and scientific dating.

9.4.5 Although the samples recovered in the hand augers are not suitable for further assessment, the overall potential of the deposits has been summarised in Table 1 to help guide the need for and scope of further works, if required. Depending on the development proposals for the site, further fieldwork with suitable access for a drilling rig should be considered to recover sleeved cores through the sedimentary sequence, with a targeted program of palaeoenvironmental assessment and scientific dating undertaken on retained samples.

10 ARCHIVE STORAGE AND CURATION

10.1 Museum

10.1.1 The archive is currently held at the offices of Wessex Archaeology in Sheffield. The documentary and digital archive will be deposited with the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) on completion of the project. The fieldwork did not generate a finds archive.

10.2 Preparation of the archive

Physical archive

10.2.1 The physical archive will be prepared following the standard conditions for the acceptance of excavated archaeological material by RCAHMW, and in general following nationally recommended guidelines (Brown 2011; CIfA 2014b; SMA 1995).

10.2.2 All archive elements are marked with the site/accession code, and a full index will be prepared. The physical archive currently comprises the following:

- 1 file of paper records and A3/A4 graphics

Documentary archive

10.2.3 The physical archive currently includes paper records (site registers only) and graphics. Born digital data include site records, finds and environmental data, photographs, survey data and reports. Physical and digital records will be prepared following the standard conditions for the acceptance of excavated archaeological material by RCAHMW and in general following nationally recommended guidelines (Brown 2011; CIfA 2014b; NPAAW 2017; SMA 1995).

10.3 Selection strategy

10.3.1 It is widely accepted that not all the records and materials (artefacts and ecofacts) collected or created during an archaeological project require preservation in perpetuity. These records and materials will be subject to selection to establish what will be retained for long-term curation, with the aim of ensuring that all elements selected for retention are appropriate to establish the significance of the project and support future research, outreach, engagement, display and learning activities (i.e., the retained archive should fulfil the requirements of both future researchers and the receiving museum).

10.3.2 The selection strategy, which details the project-specific selection process, is underpinned by national guidelines on selection and retention (Brown 2011, section 4) and generic selection policies (SMA 1993; Wessex Archaeology's internal selection policy) and follows CIfA's (n.d. b) *Toolkit for Selecting Archaeological Archives*. It should be agreed by all stakeholders (e.g., Wessex Archaeology's specialists, external specialists, local authority, museum) and fully documented in the project archive.

10.3.3 Project-specific proposals for selection are presented below. The proposals are based on recommendations by Wessex Archaeology's specialists and will be updated in line with any further comment by other stakeholders (e.g., museum, local authority), prior to deposition of the archive. Any material not selected for retention may be used for teaching or reference collections by Wessex Archaeology.

Palaeoenvironmental material

10.3.4 Recommendations have been made in section 9.3 to recover a purposive geoarchaeological borehole from the location of AUG-01.2 in the event that development proposals are likely to impact these deposits.

10.3.5 Existing samples have limited potential for further assessment. Samples through the lower peat could only be recovered with a hand auger and have a high potential for contamination and are not suitable for scientific dating or palaeoenvironmental assessment. A Russian core sample was recovered through the surficial marsh (AUG-01, 0-0.5m) and should be retained along with borehole WA-01 while development proposals for the site are established.

Documentary records

10.3.6 Paper records comprise site registers (other pro-forma site records are digital), drawings and reports (written scheme of investigation, client report). All will be retained and deposited with the project archive.

Digital data

10.3.7 The digital data comprise site records (tablet-recorded on site) in spreadsheet format; finds records in spreadsheet format; survey data; photographs; reports. All will be deposited, although site photographs will be subject to selection to eliminate poor quality and duplicated images, and any others that are not directly relevant to the archaeology of the site.

Summary

10.3.8 The table below summarises the recommended selection and deposition strategy.

Table 2 Archive selection and deposition strategy

Class	Element	Quantification	Depository	Format
Physical archive	Paper records	1 A4 file	RCAHMW	N/A
Digital archive	Report	1 (50 MB)	RCAHMW	.pdf
	Digital recording sheets	16 (5 MB)	RCAHMW	.pdf
	Images	c. 110 (1.5 GB)	RCAHMW	.jpg
	Survey	1 MB	RCAHMW	.dxf (vector graphics)

10.4 Security copy

10.4.1 In line with current best practice (e.g., Brown 2011), on completion of the project, a security copy of the written records will be prepared, in the form of a digital PDF/A file.

11 COPYRIGHT

11.1 Archive and report copyright

11.1.1 The full copyright of the written/illustrative/digital archive relating to the project will be retained by Wessex Archaeology under the *Copyright, Designs and Patents Act 1988* with all rights reserved. The client will be licenced to use each report for the purposes that it was produced in relation to the project as described in the specification. The museum, however, will be granted an exclusive licence for the use of the archive for educational purposes,

including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations 2003*.

11.1.2 Information relating to the project will be deposited with the Historic Environment Record (HER) in accordance with the *Guidance for the Submission of Data to the Welsh Historic Environment Records* (Welsh Archaeological Trusts 2022), where it can be freely copied without reference to Wessex Archaeology for the purposes of archaeological research or development control within the planning process.

11.2 Third party data copyright

11.2.1 This document and the project archive may contain material that is non-Wessex Archaeology copyright (e.g., Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the *Copyright, Designs and Patents Act 1988* with regard to multiple copying and electronic dissemination of such material.

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APPENDICES

Appendix 1 Trench summaries

Depth bgl = m below ground level

Trench No 1	Length 50 m	Width 2 m	Depth 0.60 m
Context Number	**Interpretative Category**	**Description**	**Depth BGL**
1001	Made ground	Mid greyish brown silty sand, common 20% angular fine/medium sand, abundant 50% angular medium/course gravel, well sorted	0.00–0.10
1002	Made ground	Light yellowish grey sandy silt, common 25% angular fine/medium sand, abundant 40% angular fine–coarse gravel, well sorted	0.10–0.20
1003	Redeposited natural	Mid reddish brown silty sand abundant 50% angular fine/medium sand, common 25% angular medium/coarse gravel moderately well sorted	0.20–0.33
1004	Natural	Light yellowish grey sandy silt, common 25%angular medium/coarse gravel, well sorted	0.33–.0.38
1005	Natural	Mid reddish brown silty sand abundant 50% fine/medium sand, moderate 15% angular media/coarse gravel moderately well sorted	0.38–0.46
1006	Natural	Mid reddish yellow sandy silt, abundant 50% fine/medium sand, moderate 15% angular medium/coarse gravel, moderately well sorted	0.46–0.80
1007	Natural	Mid yellowish grey silty sand abundant 50% fine/medium sand, common 20% medium/coarse gravel & cobbles, moderately well sorted	0.80–1.10

Trench No 2	Length 30 m	Width 2.50 m	Depth 1.10 m
Context Number	**Interpretative Category**	**Description**	**Depth BGL**
201	Hard standing	Mid light grey concrete with frequent aggregate and rubble,	0–0.09
202	Made ground	Mid brownish grey silty sandy gravel with frequent angular to cobble sized inclusions	0.09–0.2
203	Surface	Hard tarmacadam covering comms cable at south-west end of trench Not excavated.	0.2+
204	Road	Mid greyish purple gravel with frequent angular gravel and aggregate	0.2–0.35
205	Made ground	Somewhat firm pinkish greyish brown slightly silty slightly sandy gravelly clay with abundant very angular to angular fine gravel to small boulder sized burnt stone limestone psammite pelite. Sharp boundary to (208)	0.3–0.45

206	Buried soil	Disturbed natural. Possibly associated with prior marsh. Slightly soft orangey greyish brown slightly silty clay with rare sub-rounded gravel to coarse gravel sized psammite pelite. Black amorphous organic inclusions, discontinuous, weak sulphurous odour. Playdough texture. Changes colour abruptly at 0.67 to be same chroma but lighter. Sharp to (207).	0.55–0.77
207	Natural	Light brownish grey sandy gravel clay with common angular to sub-rounded gravel to cobble sized psammite	0.77+
208	Made ground	Slightly soft reddish brown silty clay with uncommon coarse components of charcoal, CBM and uncommon gravel of pelite limestone slate. Sharp to (206).	0.45–0.55
209	Made ground	Semi compact pinkish grey friable sandy gravel of aggregate. Sharp to (210).	0–0.05
210	Made ground	Compacted dark grey sandy gravel of aggregate. Sharp to (211).	0.05–0.12
211	Made ground	Dark greyish brown sandy gravel of aggregate. Sharp to (211).	0.12–0.2
212	Made ground	Compact friable dark blueish grey sandy gravel of aggregate and building materials (generally brick). Plastic pipe at 0.3. Sharp, slightly undulating boundary to (205). Possibly same as (204).	0.2–0.3
213	Made ground	Mid grey compact silty clay gravel with frequent aggregate gravel	0.35–0.52
214	Made ground	Dark grey to black clayish sandy gravel	0.52–0.75

Appendix 2 Geoarchaeological intervention summaries

Site Code: 298160	**Site Name:** Penrhos	**GeoTech Tr ID:** WA-01
Coordinates (NGR) X: 226061.9646	**Coordinates (NGR) Y:** 381421.963	**Level (top):** 3.6472 m OD
Length: n/a	**Width:** n/a	**Depth:** 5 m

Context Number	Description	Interpretation	Depth m BGL	Depth m aOD	Samples
101	Loose mid dark greyish orangey brown slightly gravelly silty SAND with poorly sorted gravel of FG to CG A to R pssammite and metasst. Weak fine pale rootlets. Indistinct boundary with (102).	Topsoil	0-0.5	3.6472 - 3.1472	
102	Loose to firm friable mid greyish brown weakly mottled orangey brown slightly clayish slightly gravelly silty SAND with gravel being common poorly sorted A to SA FG to CG sized pssamite metasst. Clay is generally localised in lenses/clumps. Sand is fine. Indistinct boundary with (103) due to pit sides.	Landscaped made ground	0.5-?1.1	3.1472 - 2.5472	
103	Soft to loose damp friable brownish grey slightly clayish silty SAND with rare FG to CG SA qtz pssam metasst gravel. Sand is v fine to fine. Sharp boundary with (104).	Beach and Tidal Deposits	?1.1-1.52	2.5472 - 2.1272	
104	Loose matrix supported greyish brown SAND AND GRAVEL with gravel being moderately sorted FG to G sized SA to SR.pssam sst slte/shle qtz ?slst . possible frag shell, may also be mica or shale. Sand is medium coarse. Sharp boundary with (105).	Beach and Tidal Deposits	1.52-1.82	2.1272 - 1.8272	
105	Loose to very soft mid brownish grey slightly clayish slightly gravelly SAND with gravel being FG SA to SR pssam qtz shle/slte. Poss frag shell poss mica or shale. Sand is fine. Clasts subspheroid to tabular. Sharp to gradual boundary with (106).	Beach and Tidal Deposits	1.82-2	1.8272 - 1.6472	

106	Loose to somewhat soft very wet in sample (drying overnight) greyish brown very slightly clayish slightly silty gravelly SAND with gravel being SA to SR FG to G sized pssam metasst qrtz ?chalc ?slst ?shle/?slte. Moderate poor sort. Sand is fine. Clasts subspheroid to tabular. Sharp to gradual with (107).	Beach and Tidal Deposits	2-2.3	1.6472 - 1.3472	
107	Loose to somewhat firm very gravelly SAND, with gravel being CS to FG sized sized SA to R. Lithology indistinct due to fine gravel size, all stiff to hard, dark grey, orangey brown and pale orange, presumed pssam, slte/shle, qtz as seen in (106) . Sand and gravel poorly differentiated, sand is coarse. Platey liths (eg. shle) notably fluvially rounded. Clasts subspheroid to tabular. Sharp shallowly angled boundary with (108).	Beach and Tidal Deposits	2.3-2.38	1.34-72-1.2672	
108	Soft to loose greyish brown slightly gravelly SAND with gravel being uncommon FG SA to R qtz pssam ?shle/slte. Platey liths (eg. shle) notably fluvially rounded.Sand is v fine to medium fine. Sand clumping in places into CG sized lumps ?flocculated. Clasts subspheroid to tabular. Sharp shallowly angled boundary with (109).	Beach and Tidal Deposits	2.38-2.49	1.2672 - 1.1572	
109	Loose clast supported greyish brown friable SAND AND GRAVEL with gravel being moderately well sorted FG to G sized SA to R qtz slte/shle pssam ?chalc. Apparent weak reverse sort, fining downwards. Sand is medium coarse. Clasts subspheroid to tabular. Sharp slightly undulate boundary with (110).	Beach and Tidal Deposits	2.49-2.59	1.1572 - 1.0572	

110	Loose to somewhat firm slightly gravelly SAND with gravel being FG to CG sized VA to SA psamm (dark grey with white qtz veins) qtz ?bslt. Gravel trends A CG, pssam is more angular. No apparent sort. Sand is v fine to fine. Matrix supported. CLess tabular clasts than aurrounding units. Sharp to slightly gradual to (111).	Beach and Tidal Deposits	2.59-2.69	1.0572 - 0.9572	
111	As (109) - loose clast supported greyish brown friable SAND AND GRAVEL with gravel being moderately well sorted FG to G sized SA to R qtz slte/shle pssam ?chalc. Sand is medium coarse. Clasts subspheroid to tabular. Possible continuation of reverse sort with (110). Sharp boundary with (112).	Beach and Tidal Deposits	2.69-2.72	0.9572 - 0.9272	
112	Friable but firm greyish brown very slightly clayish gravelly SAND with abundant SA to SR FG to CG gravel of psamm qtz ?shle/slte. Sand is v fine and well adhered. Clasts subspheroid to tabular. Sharp boundary with 113.	Beach and Tidal Deposits	2.72-2.78	0.9272 - 0.8672	
113	Loose to soft damp friable greyish brown slightly gravelly SAND with FG to G SA to SR gravel of psamm qtz shle/slte ?chalc ?bslt. Slightly variably gravelly but no seen sedimentary structures, moderately sorted. Sand is medium fine. Matrix supported. Clasts subspheroid to tabular.	Beach and Tidal Deposits	2.78-3	0.8672 - 0.6472	
114	NO RECOVERY	No recovery	3-3.3	0.6472 - 0.3472	
115	Loose to very soft damp friable brownish grey medium to medium coarse SAND. Generally massive, sparse FG sized SA to SR gravel starting from 3.5, slte/shle qtz pssam ?bslt. Subovoid to tabular clasts. Gradual to diffuse boundary with (116).	Beach and Tidal Deposits; possible blowing sand.	3.3-3.62	0.3472 - 0.0272	

116	Loose to slightly firm friable gravelly SAND with common FG to CG sized SA to R qtz pssam shle/slte moderate sort no apparent grade. Sand is medium fine. Sub spheroid to tabular clasts, notable trend to subtabular. Sharp boundary with (117).	Beach and Tidal Deposits	3.62-3.74	0.0272 - - 0.0928	
117	Slightly soft greyish orangey brown slightly silty SAND with rare FG R weak subtabular shle hard qtz gravel. Sand is fine to medium fine. 1 cm band at top boundary that resembles (118), much finer sand. Sharp boundary with (118).	Beach and Tidal Deposits	3.74-3.8	- 0.0928 - - 0.1528	
118	Slightly firm friable greyish yellowish brown slightly silty very fine SAND with no observed gravel. Band of greyish orangey brown medium find sand 3.83-3.84. Sharp to (119). Very similar to 119, but this unit is coarser and yellower.	Beach and Tidal Deposits	3.8-3.88	- 0.1528 - - 0.2328	
119	Slightly firm friable greyish yellowish orangey brown slightly silty very fine SAND with no observed gravel. Finer and more silty than (118) and more orangey in colour. Sharp to (120).	Beach and Tidal Deposits	3.88-3.95	- 0.2328 - - 0.3028	
120	Loose to very soft damp mid dark orangey greyish brown slightly gravelly SAND with common FG A to SR gravel of qtz shle/slte pssam moderate sort subovoid to tabular. One subovoid CG sized A clast of qrtz at top boundary. Sand is medium fine. Unit has poor recovery, less than half width of liner.	Beach and Tidal Deposits	3.95-4	- 0.3028 -- 0.3528	
121	NO RECOVERY	No recovery	4-4.5	- 0.3528 - - 0.8528	

122	Loose to very soft damp friable mid dark orangey greyish brown SAND with rare FG A to SR gravel of qtz shle/slte pssam subovoid to tabular. Slightly sandy clay lenses CG sized leaf shaped sticky soft pale brownish grey seen 4.7-4.8. Clay lenses continue to base but are rare and smaller (G sized). Sand is medium fine. Unit has poor recovery improving with depth - may have poured to base of liner during recovery.	Beach and Tidal Deposits	4.5-5	-0.8528 - -1.3528	

Site Code: 298160	**Site Name:** Penrhos	**GeoTech Tr ID:** AUG-01
Coordinates (NGR) X: 226232.6961	**Coordinates (NGR) Y:** 381324.2256	**Level (top):** 2.3704 m OD
Length: n/a	**Width:** n/a	**Depth:** 0.50 m

Context Number	Description	Interpretation	Depth m BGL	Depth m aOD	Samples
10101	Very soft damp dark brown pseudoamorphous very slightly sandy PEAT with no seen coarse components with very abundant subverical pale rootlets and FG sized fibrous includions. Musty (mouldy) odour. Brown dirty streak. Quite topsoily in composition. Sand is v fine and vitreous. Alpine style succulents growing on surface. Grainy pedding habit. Sharp to abrupt with (10102).	Surficial Marsh ?modified in modern	0-0.05	2.3704 - 2.3204	
10102	Very soft slightly damp slightly crumbly dark orangey brown pseudoamorphous to amorphous very slightly sandy PEAT with common subvertical rootlets. No seen coarse components. Sand is very fine. Grainy pedding habit. Lighter in colour than (10101) and (10102). Abrupt slightly undulate to (10103).	Surficial Marsh Possible transitional surface	0.05-0.13	2.3204 - 2.2404	

10103	Very soft dark brown crumbly slightly damp very slightly sandy slightly silty pseudoamorphous PEAT with no seen gravel but frequent pale rootlets. Dirty streak. Similar to (10101), quite topsoily in composition. Sand is v fine. Grainy pedding habit. Sharp to (10104).	Surficial Marsh	0.13-0.2	2.2404 - 2.1704	
10104	Very soft mid brownish greenish grey with weak orangey brown mottling sandy CLAY with no seen gravel. Uncommon subvertical rootkets in top 4 cm of unit. Mottling appears to have weak subvertical alignment, indistinct, ?oxidizing via bioturb pathway. Becoming sandier with depth. Sand is fine. Gradual boundary with (10105).	Peaty Clay	0.2-0.33	2.1704 - 2.0404	
10105	Very soft friable mid brownish greenish grey SAND CLAY with no seen gravel but occasional CG sized ovoid lenses of organic dark brown sandy pseudoamorphous peat with a mouldy/musty odour and common rootlets. Sand is fine. Abrupt to gradual boundary with (10106).	Peaty Clay	0.33-0.39	2.0404 - 1.9804	
10106	Very soft to loose friable damp mid pale greyish yellowish brown fine to medium fine SAND with SR to WR grains. Occasional MCS sized SA ?qtz ?musc mica grains (prob from pssam, tabulate), but generally well sorted. Possible frag shell noted.	Well-sorted Fine Sand ?aeolian	0.39-0.45	1.9804 - 1.9204	
10107	NO RECOVERY	No recovery - loose sands of (10106) falling out of sample	0.45-0.5	1.9204 - 1.8704	

Site Code: 298160	**Site Name:** Penrhos	**GeoTech Tr ID:** AUG-01.1
Coordinates (NGR) X: 226233.1011	**Coordinates (NGR) Y:** 381323.81	**Level (top):** 2.3905 m OD
Length: n/a	**Width:** n/a	**Depth:** 1 m

Context Number	Description	Interpretation	Depth m BGL	Depth m aOD	Samples
11101	Very soft damp dark brown very slightly silty pseudoamorphous PEAT with very abundant pale subvertical rootlets. Quite topsoily in composition. No seen gravel. Dirty brown streak. Grainy pedding habit. Indistinct boundary with 11101.	Surficial Marsh poss disturbed	0-0.1	2.3905 - 2.2905	
11102	Very soft dark greyish brown very slightly silty very slightly sandy pseudoamorphous PEAT with very rare A FG sized qtz gravel and abundant discontinuous pale rootlets. Weak dirty streak. Grainy pedding habit. Slightly lighter than 11101. Indistinct boundary with 11103, presumed sharp.	Surficial Marsh	0.1-0.2	2.2905 - 2.1905	
11103	Very soft damp mid dark brownish greenish grey slightly silty CLAY with frequent ?lenses of dark brown pseudoamorphous peat and common pale rootlets. Resembles 11102 on one half of sample and 11104 on other - ?transitional unit, ?recovery method issues. ?Gradual to 11104.	?Peaty Clay	0.2-0.27	2.1905 - 2.1205	
11104	Very soft damp mid greenish brownish grey CLAY with no seen gravel but rare CS to FG sized patches of orangey brown more compact material. Occasional pale rootlets. Gradual boundary with 11105.	Peaty Clay	0.27-0.36	2.1205 - 2.0305	

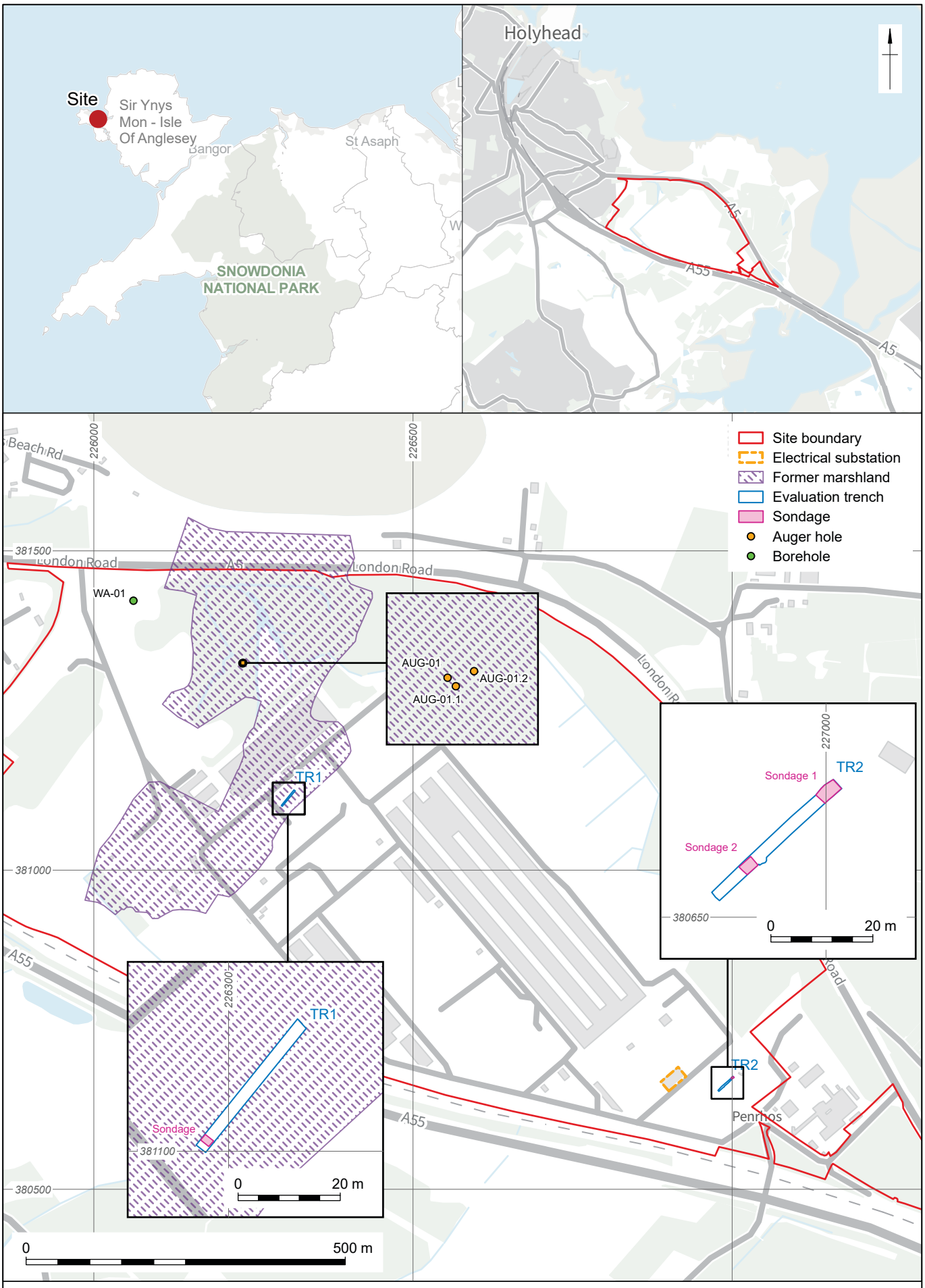
11105	Very soft damp mid greenish brownish sandy CLAY with no seen gravel but infrequent FG to G sized lenses of pseudoamorphous dark brown peat. Sand is fine SR to WR. Becoming sandier with depth. Gradual boundary with 11106.	Peaty Clay	0.36-0.41	2.0305 - 1.9805	
11106	Very soft friable damp mid greenish yellowish greyish brown slightly clayish fine SAND with no seen coarse components. Sand is SR to WR well sorted. Common organic inclusions, dark brown peaty lenses FG to G sized.	Well-rounded Fine Sand	0.41-0.45	1.9805 - 1.9405	
11107	NO RECOVERY	No recovery	0.45-0.5	1.9405 - 1.8905	
11108	As (11106) generally - Very soft friable damp mid yellowish greyish brown slightly clayish fine SAND with no seen coarse components. One lens of sandy dark brown pseudomorphious peat 0.57-0.58. Sand is SR to WR well sorted. Sand becoming coarser with depth, medium fine by base. Browner than (11106). Abrupt to 11109.	Well-rounded Fine Sand	0.5-0.66	1.8905 - 1.7305	
11109	Very soft to loose friable mid dark brown slightly organic slightly clayish SAND with no seen gravel but common fibrous organic material. No notable smell. Abrupt to 11110.	Peaty Sand ?Contaminated Lower Peat	0.66-0.73	1.7305 - 1.6605	
11110	As (11108) generally but slightly more generally organic- Very soft friable damp mid yellowish greyish brown slightly clayish fine SAND with no seen coarse components. FG sized lens of dark brown pseudoamorphous peat at 0.83.	Peaty Sand ?Contaminated Lower Peat	0.73-0.86	1.6605 - 1.5305	
11111	NO RECOVERY, WET SANDS	No recovery	0.86-1	1.5305 - 1.3905	

Site Code: 298160	**Site Name:** Penrhos	**GeoTech Tr ID:** AUG-01.2
Coordinates (NGR) X: 226233.9935	**Coordinates (NGR) Y:** 381324.5468	**Level (top):** 2.3167 m OD
Length: n/a	**Width:** n/a	**Depth:** 2.25 m

Context Number	Description	Interpretation	Depth m BGL	Depth m aOD	Samples
11201	Very soft dark brown damp slightly sandy pseudoamorphous PEAT with no gravel but abundant pale and orange rootlets. No apparent smell. Sand is v fine. Dirty brown streak. Contaminated by surface vegetation. Sharp to gradual boundary with 11202.	Surficial Marsh	0.25-0.3	2.0667 - 2.0167	
11202	Very soft damp mid greyish greenish brown clayish fine SAND with no gravel but occasional pale ?subvertical rootlets. Variably clayish. Sand is well sorted SR to WR. Becoming more consistently sandy with depth. Gradual indistinct boundary with 11203.	Transitional interface unit	0.3-0.45	2.0167 - 1.8667	
11203	Very soft to loose friable damp mid greyish greenish brown weakly marbled greyish brown v fine to fine SAND with rare to sparse S to CS sized SR to R gravel of indistinct lithology dark grey and greenish offwhite presumed qtz and psamm/plte/slte derived. Well sorted, sand is R to WR. Rare discontinuous organic rootlet material. Boundary with 11203 not seen.	Well-sorted Fine Sand ?aeolian	0.45-?0.75	1.8667 - 1.5667	

11204	Very soft dark brownish black damp weakly pseudofibrous PEAT, with pervasive fibrous inclusions in a more amorphous matrix with a dirty streak. Organic inclusions are orientated weakly subhorizontally and are FG sized, waterlogged and trend orange in colour. Weak organic odour. Sample in auger core coated in blown sands like 11203 but centre generally clean. Indistinct boundary with 11205 - appears sharp but may be a change forced by compromised recovery.	Lower Peat	?0.75-1	1.5667 - 1.3167	
11205	Very soft damp friable mid dark greyish greenish brown fine gravelless SAND with pervasive lenses of blackish brown weakly pseudofibrous PEAT. Peat is as 11204 (pervasive fibrous inclusions in a more amorphous matrix with a dirty streak. Organic inclusions are orientated weakly subhorizontally and are FG sized, waterlogged and trend orange in colour. Weak organic odour). Rare FG SR pssam gravel at 1.25 only. Sand and peat at about a 50:50 ratio in this portion of the sample, with peat generally being contained within the sand.	Lower Peat Contaminated by Well-rounded Fine Sands	1-1.25	1.3167 - 1.0667	

11206	Very soft dark brownish black damp weakly pseudofibrous PEAT, with pervasive waterlogged fibrous inclusions in a more amorphous matrix with a dirty streak. Organics are generally a drained green colour or blackened. Becoming more fibrous with depth. Inclusions are generally woody/rootlets, with leafy inclusions also noted and becoming more abundant from 1.55. Weak organic odour. Coated in fine sand ala 11205 and 11206 until 1.5. Some lenses of sand from 1.75 to base, ?contaminated blown sands. Sharp apparently sharply angled boundary with 11207 - boundary at 2.05 but peat from this unit present until 2.15. Possible bioturb channel, see 11207.	Lower Peat Lower boundary depths variable due to steeply angled boundary in arising	1.25-2.05/2.15	1.0667 - 0.2667 /0.1667	
11207	Soft damp greenish brownish grey very slightly silty slightly gravelly CLAY with uncommon to common A to SR CS to FG sized subspheroid to subtabular gravel of qtz ?pssam ?plte ?slte/shle. Matrix supported. No apparent sort or orientation of gravel. No apparent odour. Large fibrous organic flora inclusions (≤4cm) at lower boundary with 11206 from 2.15-2.2. Mid brown soft ?stringy hollow stalks approx 5 mm in diameter. Organic fine sandy clay in area near these stalks only - ?bioturb channel.	Slightly Gravelly Clay ?Tidal Flat ?Glacial Till	2.05/2.15-2.25	0.2667 /0.1667 - 0.0667	



Coordinate system: OSGB 1936 British National Grid

Date: 03/10/2024	Created by: ND	Revision: 0	Scale: 1:8,000 at A4

Figure 1: Site location with evaluation trenches and geoarchaeological bore/auger holes

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226000
226500
227000
381000
380500

WA-01
Auger holes
TR1
TR2

Penrhos
Penrhos-Bradwen
Cowman's Lodge
Bridge Lodge
Spring
Tyddyn-llwch
TCB

0 200 m

Site boundary
Evaluation trench
Auger hole
Borehole

BGS Mapping Units
Till, Devensian - Diamicton
Tidal Flat Deposits - Clay and Silt
Blown Sand - Sand
Glacial Fluvial Deposits, Devensian - Sand and Gravel

Coordinate system: OSGB 1936 British National Grid

Date: 03/10/2024 | Created by: ND
Scale: 1:4,000 at A3 | Revision: 0

Figure 2: Location of evaluation trenches and geoarchaeological bore/auger holes against superficial geology and 1963 Ordnance Survey mapping

Figure 3: Excavation of borehole WA-01, view from south-east

Figure 4: Trench 1, view from south-west, 2 x 1 m scales

Figure 5: Trench 1 sondage, view from north-west, 1 m scale

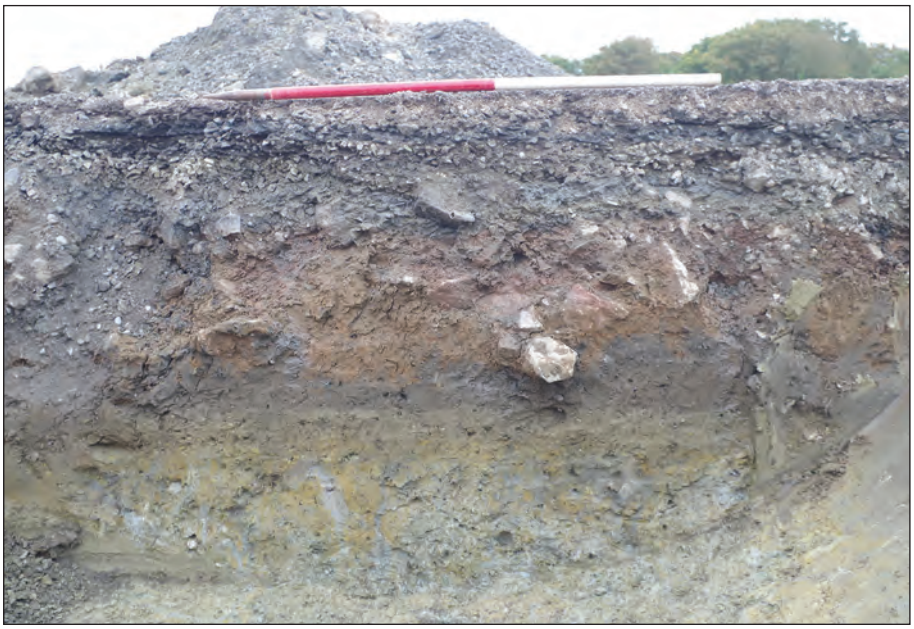

Figure 6: Trench 2, sondage 1, view from north-west, 1 m scale

Figure 7: Trench 2, sondage 2, with plastic circled, view from north-west, 1 m scale

Figure 8: Trench 2 (prior to sondage excavation), tarmac 203 in foreground, view from south-west, 2 x 1 m scales

Figure 9: Ridge and furrow earthworks seen from the auger locations, view from east

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