

DYNAMIC DUNESCAPES, PEMBREY BURROWS: ARCHAEOLOGICAL WATCHING BRIEF 2022



Prepared by DAT Archaeological Services
For: Natural Resources Wales



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**DYNAMIC DUNESCAPES, PEMBREY BURROWS:
ARCHAEOLOGICAL WATCHING BRIEF 2022**

By

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**DYNAMIC DUNESCAPES, PEMBREY BURROWS: ARCHAEOLOGICAL
WATCHING BRIEF 2022**

Client	Natural Resources Wales
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Event Record No 129710

Report No	2022-49
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**DYNAMIC DUNESCAPES, PEMBREY BURROWS: ARCHAEOLOGICAL
WATCHING BRIEF 2022**

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DYNAMIC DUNESCAPES, PEMBREY BURROWS ARCHAEOLOGICAL WATCHING BRIEF 2022

EXECUTIVE SUMMARY

DAT Archaeological Services were commissioned by Natural Resources Wales to undertake an archaeological watching brief during the removal of Sea Buckthorn in two areas of Pembrey Burrows.

The archaeological potential of Area 1 was considered low, and no archaeological evidence was observed during the watching brief.

Area 2 had high potential for archaeological remains relating to World War II to be revealed as it was known to contain several historic assets of that date. The condition of these was recorded during the watching brief. In addition, several previously unrecorded concrete fence posts were observed which may relate to wartime coastal defences.

CRYNODEB GWEITHEREDOL

Comisiynwyd Gwasanaethau Archaeolegol YAD gan Cyfoeth Naturiol Cymru i gynnal brîff gwyllo archeolegol yn ystod yr diswyddiad Helygen y Môr mewn dwy ardal yn Nhwyni Pen-bre.

Ystyriwyd bod potensial archeolegol Ardal 1 yn isel, ac ni welwyd unrhyw dystiolaeth archeolegol yn ystod y brîff gwyllo.

Roedd gan Ardal 2 botensial uchel i olion archeolegol yn ymwneud â'r Ail Ryfel Byd gael eu datgelu gan y gwyddys ei bod yn cynnwys nifer o asedau hanesyddol o'r dyddiad hwnnw. Cofnodwyd cyflwr y rhain yn ystod y brîff gwyllo. Yn ogystal, gwelwyd sawl postyn ffens goncrit heb cofnodwyd o'r blaen a allai fod yn cysylltu i'r amddiffynfeydd arfordirol rhyfel.

1. INTRODUCTION

1.1 Project Commission

- 1.1.1 DAT Archaeological Services were commissioned by Natural Resources Wales to provide an archaeological watching brief during the removal of the non-native invasive shrub sea buckthorn (*Hippophae rhamnoides*) at two locations on Pembrey Burrows which form the southwestern fringe of Pembrey Country Park and Pembrey Forest, Carmarthenshire (Figures 1 and 2). Area 1 centred on SS 4087 9954 and Area 2 centred on SN3689 0365. These are areas of dune grassland habitat; however, this has now become shaded out by sea buckthorn and scrub. Dune grassland habitat should recover if the sea buckthorn is cleared. Area 1 comprises approximately 1.6 hectares of mature sea buckthorn. Area 2 comprises approximately 8.3ha of mainly low-lying sea buckthorn of less density and with some scattered young growth. This work forms part of the HLF funded Dynamic Dunescapes project.
- 1.1.2 Following discussions with the archaeological curators at Dyfed Archaeological Trust's Heritage Management section, it has been recommended that an archaeological watching brief be carried out during the sea buckthorn removal, as the proposed clearance areas are located within archaeologically sensitive areas of the Burrows.

1.2 Scope of the Project

- 1.2.1 A written scheme of investigation (WSI) for a watching brief was prepared by DAT Archaeological Services before the commencement of the works and was approved by Dyfed Archaeological Trust – Heritage Management (DAT-HM) in their capacity as advisors to the local authority, before the commencement of the works (Appendix I). The project objectives were:
- Provision of a written scheme of investigation to outline the methodology by which DAT Archaeological Services will undertake the archaeological watching brief.
 - To monitor groundworks in order to identify the presence/absence of any archaeological deposits.
 - To establish the character, extent and date range for any archaeological deposits to be affected by the proposed groundworks.
 - To appropriately investigate and record any archaeological deposits to be affected by the groundworks.
 - To produce an archive and report of any results.
- 1.2.2 The overall work was summarised as: *Archaeological attendance and recording during the mechanical removal of sea buckthorn at Pembrey Burrows, Pembrey, Carmarthenshire.*

1.3 Report Outline

- 1.3.1 This report describes the location of the clearance works along with their archaeological background and provides a summary and discussion of the archaeological watching brief and its results.

1.4 Abbreviations

- 1.4.1 Sites recorded on the regional Historic Environment Record (HER) are identified by their Primary Record Number (PRN) and located by their National Grid Reference (NGR). Sites recorded on the National Monument Record (NMR) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) are identified by their National Primary Record Number (NPRN). Scheduled Monument (SM). Altitude is expressed to Ordnance Datum (OD). References to cartographic and documentary evidence and published sources will be given in brackets throughout the text, with full details listed in the sources section at the rear of the report.

1.5 Illustrations

- 1.5.1 Photographic images are to be found within the report. Printed map extracts are not necessarily reproduced to their original scale.

1.6 Timeline

- 1.6.1 The following timeline is used within this report to give date ranges for the various archaeological periods that may be mentioned within the text.

Table 1: Archaeological and historical timeline for Wales

Period	Approximate date	
Palaeolithic –	c.450,000 – 10,000 BC	Prehistoric
Mesolithic –	c. 10,000 – 4400 BC	
Neolithic –	c.4400 – 2300 BC	
Bronze Age –	c.2300 – 700 BC	
Iron Age –	c.700 BC – AD 43	
Roman (Romano-British) Period –	AD 43 – c. AD 410	Historic
Post-Roman / Early Medieval Period –	c. AD 410 – AD 1086	
Medieval Period –	1086 – 1536	
Post-medieval Period ¹ –	1536 – 1750	
Industrial Period –	1750 – 1899	
Modern –	20 th century onwards	

¹ The post-medieval and industrial periods are combined as the post-medieval period on the Regional Historic Environment Record as held by Dyfed Archaeological Trust



Figure 1: Location map showing the two areas proposed for sea buckthorn removal (outlined in red)

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Figure 2: Aerial photograph (© Google) showing Area 1 proposed for sea buckthorn removal (red outline).



Figure 3: Aerial photograph (© Google) showing Area 2 proposed for sea buckthorn removal (red outline).

2. SITE LOCATION AND TOPOGRAPHY

- 2.1 The Pembrey Burrows dune system is located at the southern side of the Gwendraeth Estuary in the eastern part of Carmarthen Bay. The dunes commence in the north at Tywyn Point and extend c.1.25km southwards along the coast, terminating at the town of Burry Port. Pembrey Airfield (opened in March 1939) is located approximately 2km to the east of the Burrows. Pembrey Forest is immediately south-west of the airfield while Pembrey Country Park is at the south-eastern end of the dunes. A swathe of non-native sea buckthorn has colonised the entire dune system running parallel with Cefn Sidan Sands (Figure 2). Natural Resources Wales (NRW) intends to remove the sea buckthorn to enable the regeneration of the dunes to grassland habitat.
- 2.2 Pembrey Forest is owned and managed by NRW and is bordered to the north-west by the MOD Pembrey Sands Firing Range and to the south-east by Pembrey Country Park. The dunes in the latter area are owned by Carmarthenshire County Council.
- 2.3 The northern and southernmost ends of the Pembrey Burrows dune system fall within the Carmarthen Bay Dunes Special Area of Conservation (SAC), and the entire system is encompassed by the Pembrey Coast SSSI (ref 509). In 2014, Pembrey Burrows was subject to a geomorphological appraisal undertaken on behalf of Natural Resources Wales (Pye & Blott 2014). The morphology of the beach at Tywyn Point and the south-eastern end of the Pembrey dunes has been closely monitored since 1998. The monitoring data have revealed up to 170m of frontal dune erosion between 1998 and 2013 at Tywyn Point, but no net change near the Air Weapons Range control tower. However, the study has also revealed around 40m of dune erosion immediately south of the rock armour at the control tower since 1998. Furthermore, the study notes the vulnerability of the dunes to storm erosion, citing between 5m and 15m of erosion of the dune frontage, and consequent dune cliffing, following the winter storms of 2013/14 (Pye and Blott 2014, 7–8).
- 2.4 The underlying solid geology of the area is the Bishopstone Mudstone Formation; sedimentary mudstone, siltstone and sandstone bedrock formed approximately 313 to 326 million years ago during the Carboniferous period. The superficial geology is windblown sand (BGS online). The recent geomorphological assessment notes that the Pembrey Dune system formed over the last 12,000 years, during the Late Flandrian (Post-glacial) period. However, the core area of the dune system is less than 500 years old, whilst the major dune-capped barrier spits at either end of the system have developed within the past 130 years (Pye & Blott 2014, 5–8).
- 2.5 Following late nineteenth-century efforts to control blowing sand and dune migration, large scale planting of conifers on the dunes was initiated by the Forestry Commission. Planting began in 1929 and continued until 1954. The conifers (Pembrey Forest) occupy the centre of the dune system whilst the northern and southern ends of the dune system have experienced encroachment by scrub, grasses and sea buckthorn, the latter also introduced by the Forestry Commission. Where active sand accretion exists, largely at the terminal ends of the dune system, it is possible to find areas of bare sand and mobile dunes (Pye and Blott 2014, 8–11).

3. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 Historical Background

(After Bell 2016)

- 3.1.1 The area of Pembrey Burrows occupies that part of Pembrey (or 'Towyn') Burrows which is not planted with coniferous forest, i.e., a narrow strip averaging c.150m wide on the seaward side of Pembrey Forest. The Burrows developed at the mouth of the Gwendraeth Fawr over a long period, alongside a series of reclamations around an initial nucleus formed by a tongue of dry land at the foot of Mynydd Penbre. The dune system at The Burrows has developed since at least the 17th century, but is not thought to date from earlier than Medieval period. Its seaward development continues. The area was incorporated into the system of Second World War defences around Pembrey Airfield and Ordnance Factory.
- 3.1.2 Work on the construction of the RAF Pembrey Airfield and Pembrey Sands Air Weapons Range began in 1937. The Range opened as the "No. 1 Bombing and Gunnery School" in 1939 before being succeeded in 1941 by the "No.1 Air Gunnery School". Upon the outbreak of the Second World War the Range became integrated into the Carmarthen Stop Line, and several anti-invasion defences were constructed along the coastline and further inland in defence of the airfield. The wartime boundary of the range extended from the north at Tywyn Point to approximately 2.5km south of the present southern border, and accommodated numerous structures and targets along the length of the coast. These included Wing Marker Shelters, Searchlight platforms and the original Bombing Range Control Tower.

3.2 Recorded Archaeological Sites

- 3.2.1 Pembrey Burrows encompasses an area of archaeologically and historically significant Second World War anti-invasion defences along with later infrastructure relating to an RAF air weapons range located at Tywyn Point. The dune system at Pembrey was densely defended and constituted an integral part of the Carmarthen Stop Line. This stop line was one of a number established throughout the Western Command and comprised coordinated anti-invasion defences stretching between the Ceredigion and Carmarthenshire coastlines. Whilst the archaeological significance of this area has long been acknowledged, the true extent and nature of the archaeology remains somewhat ambiguous and underrepresented in both the regional Historic Environment Record (HER) and the National Monument Record (NMR).
- 3.2.2 Jonathan Berry's unpublished PhD thesis on Second World War anti-invasion defences in south and south-west Wales revealed a significant number of sites within the Pembrey area, the majority of which were previously unrecorded (Berry 2016). At present, not all the remains highlighted by Berry are recorded on the Dyfed Historic Environment Record nor the National Monument Record.
- 3.2.3 Consultation of various documentary sources, particularly historic photography, during a recent archaeological assessment identified several features of archaeological interest within the Pembrey Burrows area (Bell, 2020). However, despite some general concordance between these sources there remained significant ambiguity regarding the distribution and nature of the archaeology,

particularly regarding the precise locations, and consequently, features were often attributed multiple grid references between sources. Much of the study area was inaccessible owing to the density of the sea buckthorn and therefore areas of archaeological interest could not be verified. Conversely, previously unrecorded archaeological structures were discovered in more accessible areas.

- 3.2.4 Area 2 of the present study was located within an area of medium archaeological potential and contains known sites of archaeological interest, all of which have been the subject of recent observation (Pyper 2013; Berry 2016; Bell 2020; Enright 2021). None of these sites has any designated status. Site details are presented in Table 2, and site locations mapped in Figure 4. Area 1 was situated within an area of less archaeological potential and contains no known archaeological sites.

Table 2: Historic assets within, or close to, Area 2 (mapped in Figure 4).

PRN	REF	NAME	TYPE	SUMMARY	EVIDENCE	NGR
31414		Wing Marker Shelter No 2.	Wing marker shelter	Wing Marker Shelter No 2. A small concrete rectangular plan shelter with a turf covered concrete roof.	A Pyper site visit; M. Bell site visit	SN 37053 03516
31415		Main Marker Shelter	Gun emplacement	A concrete rectangular plan shelter with a turf covered concrete roof.	A Pyper site visit; M. Bell site visit	SN 37240 03260
112367		Tywyn Burrows 4 inch Beach Defence Gun House	Gun emplacement	A Second World War gun emplacement overlooking Cefn Sidan beach.	A Pyper site visit; M. Bell site visit	SN 37069 03532
118045		Pillbox	Pillbox (variant)	A pillbox constructed in brick with a shuttered concrete roof.	A Pyper site visit; M. Bell site visit	SN 37138 03408
	J Berry 2016	6-pdr Gun emplacement	Gun emplacement		J Berry plotted from secondary source	SN 36955 03492



Figure 4: Historic assets recorded within, or close to, Area 2 (aerial photography © Google).

4. WATCHING BRIEF METHODOLOGY

4.1 Fieldwork

- 4.1.1 The watching brief was undertaken in accordance with the Chartered Institute of Archaeologists' (CIfA) *Standard and guidance for an archaeological watching brief* (CIfA 2014). The work took place over 7 days between December 5th and 13th 2022. The weather was dry, mostly sunny and extremely cold.
- 4.1.2 A Written Scheme of Investigation (Appendix I) was prepared by DAT Archaeological Services detailing the proposed archaeological works.
- 4.1.3 Recording of all archaeological features or deposits conformed to best current professional practice and was carried out following the Recording Manual² used by DAT Archaeological Services. A photographic record was maintained throughout this watching brief, a summary of which is presented in the Project Archive.
- 4.1.4 An Unexploded Ordnance (UXO) Risk Assessment undertaken by RPS concluded that the risk of UXO at Pembrey Burrows was sufficient to necessitate that the archaeological watching brief was undertaken under the conditions of a UXO watching brief (RPS, 2020). The risk assessment concluded that the main sources of UXO contamination at Pembrey Burrows are:
- Ordnance associated with the Ministry of Supply Pen-clawdd Experimental Testing and Proofing Area;
 - Ordnance associated with the First World War His Majesty's Explosive Factory/Royal Ordnance Factory, Pembrey and the associated National Filling Factory 18;
 - Ordnance associated with Pembrey Air Weapons Range; and
 - Marine Migrated Ordnance.
- 4.1.5 Cutting of sea buckthorn took place at ground level with no ground penetration due to UXO risk. In Area 1, large dense stands of buckthorn were removed using 9 tonne, 360° mechanical excavators, each equipped with a tree shear attachment. The shears cut the plant at ground level leaving the roots and stump. Once removed, the plants were mulched into the trailer of an articulated lorry for removal from the site. In Area 2, large dense stands of buckthorn were removed in the same way, while low-lying/medium to smaller stands were mulched using a tracked tractor with mulching attachment and a 9 tonne, 360° mechanical excavator with mulching attachment. In both areas, the stumps were subsequently sprayed to prevent regrowth.

4.2 Post-Fieldwork Reporting and Archiving

- 4.2.1 All data recovered during the fieldwork were collated into a site archive structured following specifications in *Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation* (Brown 2011), and procedures recommended by the National Monuments Record, Aberystwyth.

² DAT Archaeological Services have adopted the Recording Manual developed by English Heritage Centre for Archaeology. A copy will be available on-site for inspection if required.

- 4.2.2 The results of the fieldwork have been assessed in their local, regional and wider contexts. The report includes a desk-based research element to ensure that the site is placed within its wider archaeological context.

5. RESULTS

5.1 Area 1

- 5.1.1 The density of sea buckthorn to be removed in Area 1 prevented a walkover survey of the site before the mechanical excavators moved in (Photo 1).
- 5.1.2 The buckthorn was removed using mechanical excavators equipped with tree shear attachment (Photo 2). The plants were cut at ground level leaving the roots and stumps. The arisings were removed to a nearby car park for mulching using a tracked telehandler with a grabbing attachment.
- 5.1.3 As areas were cleared of buckthorn it was possible to carry out a walkover survey. Although some detritus was left behind (Photo 3) any upstanding archaeological remains should have been visible.
- 5.1.4 No archaeological remains were observed post-clearance in Area 1 (Photo 4).
- 5.1.5 While observing the mulching of arisings from a footpath overlooking the car park, a number of archaeological features were seen in the dunes (Photos 5–6). A pair of rectangular concrete blocks, with the remains of iron fixings at each end, and a pair of iron bars set into concrete plinths represent the remains of possible WW2 defensive structures. These were recorded in the Dyfed HER (PRNs 129713 & 129714).



Photo 1: Area 1, looking south-west with sea buckthorn removal just getting underway



Photo 2: A mechanical excavator equipped with a tree shear attachment (photo by C. Enright, 2021).



Photo 3: Dune habitat in Area 1, looking south-west following sea buckthorn removal.



Photo 4: Overview of Area 1 following sea buckthorn removal and showing arisings being mulched in the car park. Looking south-west.



Photo 5: Concrete structure (PRN 129713) recorded adjacent to the footpath near the fisherman's car park. Looking south-east, 1m scale.



Photo 6: One of a pair of former metal posts (PRN 129714) set into concrete, recorded adjacent to the footpath overlooking the fisherman's car park. Looking south, 1m scale.

5.2 Area 2

- 5.2.1 During the watching brief in Area 2 PRNs 31414, 118045 and 112367 were all observed. PRN 31415 was also seen but it was located just beyond the eastern boundary of the area (Photo 7). A 6pdr Gun Emplacement recorded by Berry (2016) was not seen. The location of each historic asset observed is shown in Figure 3. Photos 7–10 show the condition of each asset at the time of the watching brief. PRNs 31414 and 31415 were clear of buckthorn and other vegetation growth. Both are exposed to the elements but are currently a good and stable condition.
- 5.2.2 The brick pillbox (PRN 118045) is as described by Enright (2021), i.e., largely obscured from view by vegetation and the build-up of sand around it (Photo 8). It was not possible to get close to the structure, but it did appear to be in a stable condition.
- 5.2.3 Tywyn Burrows 4" Beach Defence Gun House (PRN 112367) remained surrounded by low-lying stands of hawthorn and scrub following removal of stands of buckthorn. Nonetheless it was possible to get close to the structure, which appears in a good and stable condition (Photos 9–10).
- 5.2.4 Following the removal of buckthorn in Area 2, a line, or possibly two lines, of concrete fence posts was visible roughly parallel with the shore line (Figure 5 and Photos 11–12). These had not previously been observed. Their positions were recorded using GPS surveying equipment and a record of them created on the regional HER (PRN 129715). The easternmost fence post had a visible height of c.1.2m and bore the letters GPO (General Post Office) ; the remainder were taller, c.1.3m, and thinner, with no lettering. At the time of the watching brief, some of the fence posts were still intact and upright, some were recumbent and some broken. In three locations, a pair of fence posts was located either side of a path through the dunes.



Photo 7: Main Marker Station PRN 31415, just to the east of Area 2.
Looking east, 1m scale.



Photo 8: Pillbox PRN 118045 looking north-east, no scale.



Photo 9: Wing Marker Shelter No. 2 (PRN 31414) with PRN 112367 visible to the rear. Looking north-east, 1m scale.



Photo 10: Tywyn Burrows 4" Beach Defence Gun House (PRN 112367). Looking north-east, 1m scale.



Figure 5: Showing the locations of fence posts (blue dots) observed following removal of buckthorn in Area 2 (red outline) (aerial photography © Google).



Photo 11: Concrete fence post bearing the letters GPO. Looking north, 1m scale.



Photo 12: One of a line of concrete fence posts observed in the dune system between Pembrey Forest and the beach. PRN 118045 visible to the rear. Looking north-west, 1m scale.



Photo 13: Area 2 looking west after almost all the buckthorn had been removed.

6. CONCLUSIONS

- 6.1 The watching brief has monitored the removal of sea buckthorn in two areas of Pembrey Dunes, totalling an area of approximately 10ha.
- 6.2 It was considered that Area 1 had low potential for archaeological remains and was inaccessible before the watching brief. No archaeological remains were recorded in Area 1 during the watching brief. However, a number of previously unrecorded archaeological features (now PRNs 129713 & 120714) were observed adjacent to the footpath above the car park where arisings were mulched. Images of these have been forwarded to an expert on military archaeology, for identification.
- 6.3 In Area 2 archaeological remains associated with World War II were observed. Each of these had been previously recorded in the regional HER (PRNs 31414, 118045 and 112367).
- 6.4 A line of previously undiscovered concrete fence posts was recorded during the watching brief in Area 2. These are likely to be mid-twentieth century in origin and associated with the WW2 defences. The fence, or possibly pair of fences, that they represent was probably intended to prevent access to the bombing range (PRN 30076) from the beach, and the GPO example associated with communication to/between the defensive structures along the burrows.
- 6.5 A 6pdr gun emplacement recorded by Berry (2016) was not revealed by the works. There are two possible reasons for this, one of which is that the record is a duplicate of PRN 112367 – Tywyn Burrows 4" Beach Defence Gun House (Photo 6). The other possibility is that the site recorded by Berry (2016) from a secondary source is buried within the dune system just above the beach. Removal of the sea buckthorn will allow the dunes to return to a more dynamic state; along with coastal erosion, this raises the possibility that previously unrecorded archaeological features to be revealed in the area.
- 6.6 Overall, the removal of sea buckthorn does not appear to have had an impact on the historic assets and except for some of the fence posts, all those observed currently appear to be in a good and stable condition. However, they are exposed to the elements and over time their condition will likely deteriorate.

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Database

- Dyfed Archaeological Trust Historic Environment Record, held by Dyfed Archaeological Trust in The Corner House, Llandeilo, Carmarthenshire, SA19 6AE

APPENDIX I:

DYNAMIC DUNESCAPES, PEMBREY, ARCHAEOLOGICAL WATCHING BRIEF 2022 WRITTEN SCHEME OF INVESTIGATION

1 INTRODUCTION

- 1.1 This Written Scheme of Investigation (WSI or specification) has been prepared by DAT Archaeological Services (the contracting arm of Dyfed Archaeological Trust) to provide a methodology for an archaeological watching brief during the removal of the non-native invasive shrub sea buckthorn (*Hippophae rhamnoides*) within two areas at Pembrey Burrows centred on Area 1) SS4076 9959 and Area 2) SN3682 0373 (Figures 1 and 2) which forms the southwestern fringe of Pembrey Country Park in Carmarthenshire. This WSI has been commissioned by Natural Resources Wales.
- 1.2 These areas have dune grassland habitat; however, this has now become shaded out by sea buckthorn and scrub. Dune grassland habitat should recover if the sea buckthorn and scrub is cleared and arisings are collected and disposed of offsite. Area 1 comprises approximately 1.6 hectares of mature sea buckthorn. Area 2 comprises approximately 8.3ha of mainly low-lying sea buckthorn of less density and with some scattered young growth.
- 1.3 Pembrey Burrows are located at the southern side of the Gwendraeth Estuary in the eastern part of Carmarthen Bay. The Pembrey Burrows dune system commences in the north at Tywyn Point and extends southwards along the coast before terminating at the town of Burry Port. Pembrey Airfield is located around 2km to the east of the Burrows with Pembrey Forest located immediately adjacent and Pembrey Country Park located at the southern end of the dunes. A swathe of sea buckthorn has colonised the entire dune system running parallel with Cefn Sidan Sands. NRW intends to remove the sea buckthorn to enable a regeneration of the dunes to a grassland habitat. This work forms part of the HLF funded Dynamic Dunescapes project.
- 1.4 Pembrey forest is owned and managed by Natural Resources Wales and is bordered by the MOD Pembrey Sands Firing Range in the northwest and the Country Park at its southern end. The sand dunes at this end fall within the ownership of Carmarthenshire County Council.
- 1.5 Pembrey Burrows encompasses an area of archaeological and historically significant Second World War anti-invasion defences along with later infrastructure relating to the Air Weapons Range located at the northern most extent of the burrows at Tywyn Point. The archaeological significance of the area was highlighted in an unpublished PhD thesis undertaken by Jonathon Berry, Senior Inspector at Cadw in 2016³ and in subsequent archaeological assessments undertaken by Dyfed Archaeological Trust in 2016⁴ and specifically of the Burrows in 2020⁵, and demonstrated that the dune systems

³ Berry, J. 2016: Second World War anti-invasion defences in south and south-west Wales: A comparative case study area based approach.

⁴ Bell, M. 2016: *Pembrey Sands Air Weapons Range: Archaeological Survey in Advance of Sea Buckthorn Removal*. Dyfed Archaeological Trust

⁵ Bell, M. 2020: *Pembrey Burrows: Archaeological Survey in Advance of Sea Buckthorn Removal*. Dyfed Archaeological Trust

at Pembrey were densely defended and constituted an integral part of the Carmarthen Stop Line. This stop line was one of a number established throughout the Western Command and comprised co-ordinated anti-invasion defences stretching between the Ceredigion and Carmarthenshire coastlines.

- 1.6 Cutting in Area 1 will only be at ground level with no ground penetration due to UXO risk. The clearance will be undertaken under the conditions of an Unexploded Ordnance (UXO) watching brief following the findings of a detailed UXO Risk Assessment undertaken by RSP. The assessment concluded that the main sources of UXO contamination at Pembrey Burrows are:
- Ordnance associated with the Ministry of Supply Pen-clawdd Experimental Testing and Proofing Area,
 - Ordnance associated with the First World War His Majesty's Explosive Factory/Royal Ordnance Factory Pembrey and the associated National Filling Factory 18.
 - Ordnance associated with Pembrey Air Weapons Range,
 - Marine Migrated Ordnance.
- 1.7 The UXO risk mitigation strategy is detailed in the "UXO Mitigation Report (Stage 3) Dynamic Dunescapes – Pembrey Burrows⁶" prepared by RPS for NRW.
- 1.8 Following discussions with the archaeological curators at Dyfed Archaeological Trust's Heritage Management section, it has been recommended that an archaeological watching brief is carried out during the sea buckthorn removal, as the proposed clearance areas are located with archaeologically sensitive areas of the Burrows.
- 1.9 The following written scheme of investigation outlines the methodology through which DAT Archaeological Services will undertake an archaeological watching brief, in accordance with the conditions of the UXO mitigation constraints, during the removal of the sea buckthorn which may potentially expose, damage or destroy archaeological remains. Should any significant archaeological features be revealed, then a programme of further mitigation can be formulated and potentially implemented prior to any further clearance.
- 1.10 This written scheme of investigation (WSI) has been prepared in accordance with the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Archaeological Watching Briefs (CIfA 2014). A copy will be sent to the archaeological curator for their approval.
- 1.11 DAT Archaeological Services has considerable experience of this type of project and always operates to best professional practice. DAT Archaeological Services is the contractual arm of Dyfed Archaeological Trust that has its own Health and Safety Policy, and all works are covered by appropriate Employer's Liability and Public Liability Insurances. Copies of all are available on request.
- 1.12 **Dyfed Archaeological Trust is a CIfA Registered Organisation and all permanent staff are CSCS registered.**

⁶ RPS, 2020. *UXO Mitigation Report (Stage 3) Dynamic Dunescapes – Pembrey Burrows. Report Number EES1135 R-10-02. RPS Explosives Engineering Services*

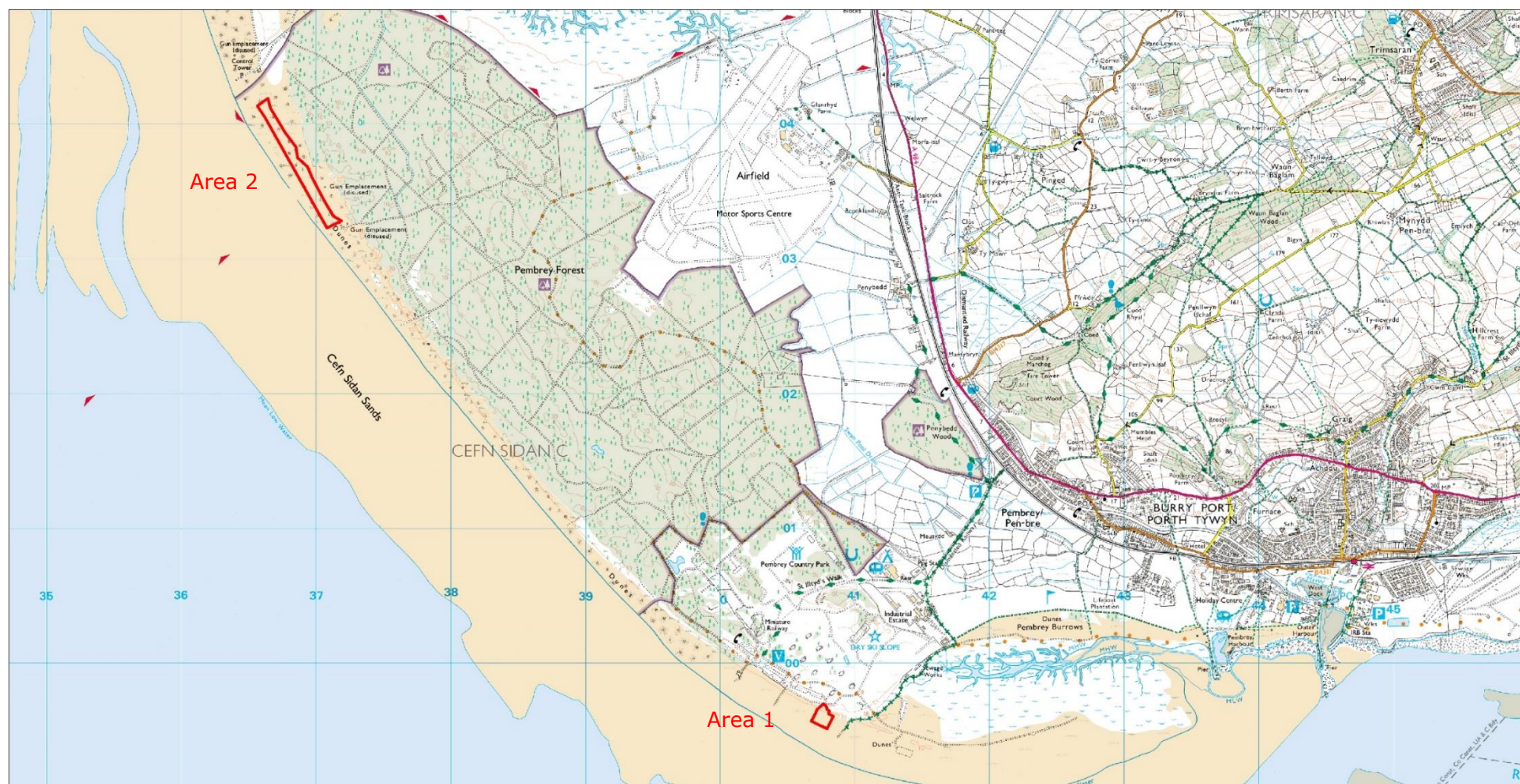


Figure 1: Location map showing the two areas where it is proposed to remove sea buckthorn that has colonised the dune system (outlined in red)

Reproduced from the Ordnance Survey 1:25,000 scale Landranger Map with the permission of The Controller of Her Majesty's Stationery Office, © Crown Copyright Dyfed Archaeological Trust. The Corner House, 6 Carmarthen Street, Llandeilo, Carmarthenshire SA19 6AE. Licence No 100020930

2 HISTORICAL BACKGROUND

(After Bell 2016)

- 2.1 The area of Pembrey Burrows occupies that part of Pembrey (or 'Towyn') Burrows which is not planted with coniferous forest, i.e. a narrow strip averaging some 150 m wide on the seaward side of Pembrey Forest. The Burrows developed at the mouth of the River Gwendraeth Fawr over a long period, alongside a series of reclamations around an initial nucleus formed by a tongue of dry land at the foot of Mynydd Penbre. The Burrows have developed since the 17th century at least but, are not thought to be earlier than the Medieval period. Their seaward development continues, and that part occupied by this area has only developed since 1830. The area was incorporated into the system of Second World War defences around Pembrey Airfield and Ordnance Factory.
- 2.2 Work began on the construction of the RAF Pembrey Airfield and Pembrey Sands Air Weapons Range in 1937. The Range opened as the "No. 1 Bombing and Gunnery School" in 1939 before being succeeded in 1941 by the "No.1 Air Gunnery School". During the outbreak of the Second World War the Range became integrated into the Carmarthen Stop Line and a number of anti-invasion defenses were constructed along the coastline and further inland in defence of the airfield. The wartime boundary of the range extended from the north at Tywyn Point to approximately 2.5km south of the present southern border and accommodated numerous structures and targets along the length of the coast. These included Wing Marker Shelters, Searchlight platforms and the location of the Original Bombing Range control Tower.

3 SEA BUCKTHORN REMOVAL AND UXO WATCHING BRIEF

- 3.1 The removal of the sea buckthorn will be undertaken by A J Butler Contracting (AJB) and the UXO watching brief is being conducted by RPS Explosives Engineering Services.
- 3.2 AJB have prepared a method statement for the sea buckthorn clearance (09/09/2021). That states:
 - These areas have dune grassland habitat; however, this has now become shaded out by sea buckthorn and scrub. Dune grassland habitat should recover if the sea buckthorn and scrub is cleared, and arisings are collected and disposed of offsite.
 - The scrub in Area 1 consists mainly of mature sea buckthorn. There is approximately 1.5 hectares of scrub to be cleared. Area 2 mainly consists of low-lying sea buckthorn of less density and with some scattered young growth.
 - The ground conditions consist of undulating sand dunes and sometimes steep gradients and drops, particularly near the beach.
 - The following method of clearance has been outlined by the clearance contractors AJB:
 - **AREA 1** - Larger dense stands must be removed using a mechanical excavator equipped with a tree shear attachment, the shear will cut the plant at ground level leaving the roots and stump remaining. The arisings will be removed with a telehandler and grab to the old fisherman's car park for processing. The material will be chipped directly into a walking floor lorry and removed from site and delivered to western Bioenergy in Margam. A matt of arisings must be avoided as this will impede new dune grassland growth and add unwanted nutrients to the habitat.

- Due to this area being very close to public rights of way and public eye in general, it is proposed that a circa 10metre swath of scrub is left next to the car park which will act as a natural screen. A single point of entry from the car park will be used to access the work area. The excavators will work towards the sea in a narrow strip (circa 10 metres). Once at the far end of the work area they will work backwards in small blocks using the scrub as a natural screen/barrier with heras fencing/banksman bolstering security at the car park end of the site.
 - **AREA 2** - Low-lying/medium to smaller stands will be mulched using a tracked tractor and mulching attachment and remote controlled mower (for steeper or reduced access situations). On smaller scrub a heavy-duty mower collector will be used which will be more efficient. The arisings are to be raked into piles with an excavator, transported with a tracked dumper or telehandler and placed in a chosen sacrificial area or buried as agreed with NRW representatives
- 3.3 The UXO contractor RPS has stated that all persons involved in the project should attend a toolbox talk prior to the commencement of any works and that they ought to be aware of the emergency procedures in the event of encountering a suspected item of UXO.
- 3.4 RPS recommends that an UXO consultant is present during any excavation work, to act as a UXO banksman. The UXO consultant will conduct an enhanced visual inspection, with a magnetometer, prior to each removal and confirm the identity of any suspicious objects noted during the clearance. The UXO consultant will maintain a visual overwatch of the clearance as detailed in Figure 3, for the duration of the work.

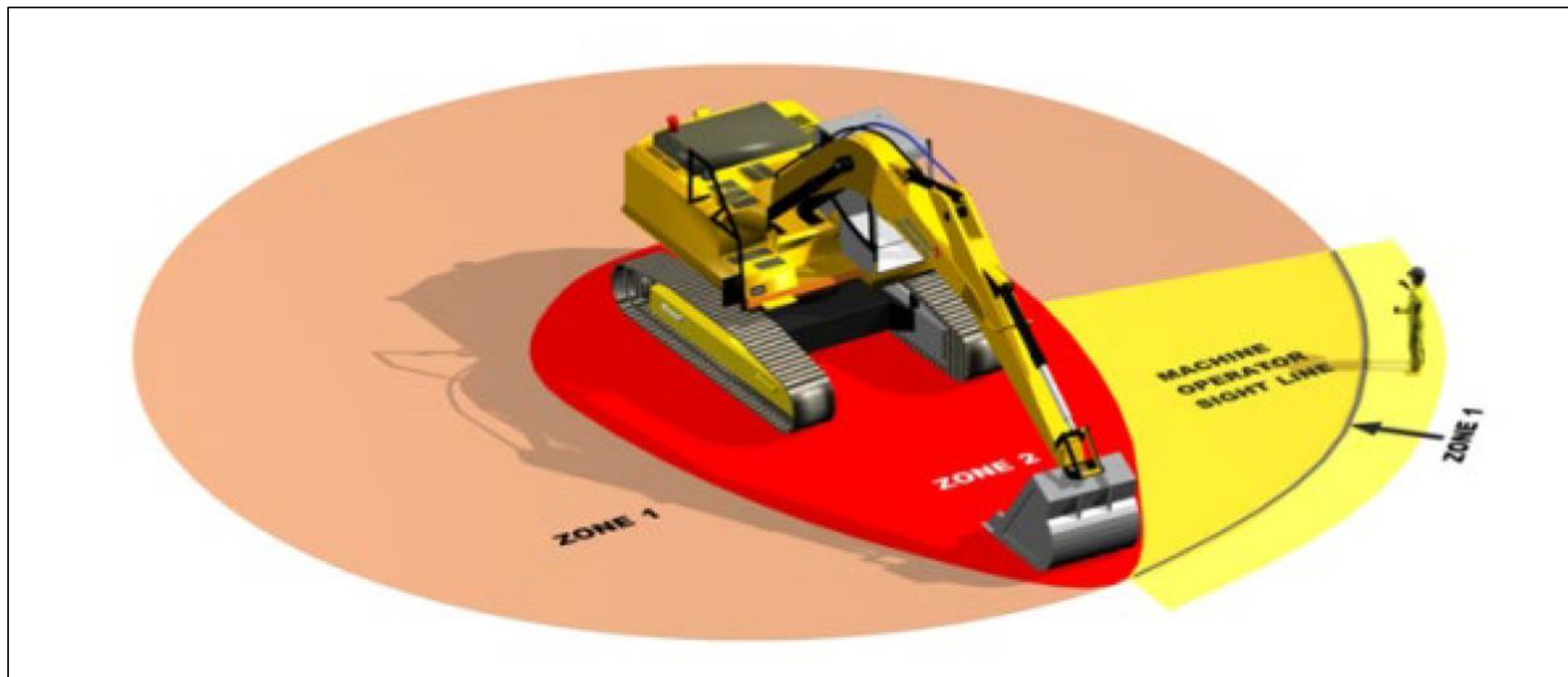


Figure 3: Hazard Zones when conducting UXO banksman duties.

4. RECORDED ARCHAEOLOGICAL SITES

- 4.1 Pembrey Burrows encompasses an area of archaeological and historically significant Second World War anti-invasion defences along with later infrastructure relating to the RAF air weapons range located at the northern most extent of the burrows at Tywyn Point. The dune system at Pembrey was densely defended and constituted an integral part of the Carmarthen Stop Line. This stop line was one of a number established throughout the Western Command and comprised co-ordinated anti-invasion defences stretching between the Ceredigion and Carmarthenshire coastlines. Whilst the archaeological significance of this area has long been acknowledged, the true extent and nature of the archaeology remains somewhat ambiguous and underrepresented in the regional Historic Environment Record (HER) held at Dyfed Archaeological Trust, and the RCAHMW National Monument Record.
- 4.2 Jonathan Berry's (Cadw Senior Inspector) 2016 unpublished thesis on the study of Second World War anti-invasion defences in south and southwest Wales revealed a significant number of sites within the Pembrey area, the majority of which were previously unrecorded sites. At present the remains highlighted by Berry are not yet recorded on the Dyfed Historic Environment Record or the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) National Monument Record (NMR).
- 4.3 Consultation of various documentary sources, particularly historic photography, during the 2020 archaeological assessment (Bell, 2020) identified several features of archaeological interest within the Pembrey Burrows area. However, despite some general concordance between these sources there remained significant ambiguity regarding the distribution and nature of the archaeology, particularly regarding the precise locations and consequently features were often attributed with multiple grid references. Much of the study area was inaccessible owing to the density of the sea buckthorn and therefore areas of archaeological interest could not be verified. Conversely, previously unrecorded archaeological structures were discovered in more accessible areas.
- 4.4 Area 2 is located within an area of medium archaeological potential and contains known archaeological sites of interest. None of the sites within Area 2 have designated status. These sites are presented in Table 1 and shown in Figure 4. Area 1 is situated within an area of less archaeological potential and does not contain any known archaeological sites.

Table 1: Known archaeological assets within and in the vicinity of the Area 2 (locations shown in Figure 4).

PRN	REF	NAME	TYPE	SUMMARY	EVIDENCE	NGR
31414		Wing Marker Shelter No 2.	Wing marker shelter	Wing Marker Shelter No 2. A small concrete rectangular plan shelter with a turf covered concrete roof.	A Pyper site visit.	SN 37053 03516
112367			Gun emplacement	A Second World War gun emplacement overlooking Cefn Sidan beach.	A Pyper site visit.	SN 37069 03532
118045			Pillbox (variant)	A pillbox constructed in brick with a shuttered concrete roof.	A Pyper site visit.	SN 37138 03408
	J Berry 2016	Wing Marker Shelter No 2.	Wing marker shelter	Duplication of PRN 31414	J Berry site visit	
	J Berry 2016	Tywyn Burrows 4 inch beach defence gun house	Gun emplacement	Duplication of PRN 112367	J Berry site visit	SN 37068 03531
	J Berry 2016	Military structure	Coastal defences	Duplication of PRN 118045	J Berry site visit	SN 37139 03404

	J Berry 2016	6-pdr Gun emplacement	Gun emplacement		J Berry site visit	SN 36955 03492
	J Berry 2016	Pembrey anti-landing obstacle	Anti-landing obstacle		J Berry site visit	SN 36531 04028



Figure 4: Known archaeological assets within or near to Area 2.

5 WATCHING BRIEF

5.1 The definition of archaeological watching brief, taken from the Chartered Institute for Archaeologists Standards and Guidance: for Archaeological Watching Briefs (CIfA S&G: AWB 2014) is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

5.2 The purpose of a watching brief, as laid down in the CIfA S&G AWB is:

to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works;

to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment.

5.1 This document provides a scheme of works for:

Archaeological attendance and recording during the mechanical removal of sea buckthorn at Pembrey Burrows, Pembrey, Carmarthenshire.

6 PROJECT OBJECTIVES

- 6.1 Provision of a written scheme of investigation to outline the methodology by which DAT Archaeological Services will undertake the archaeological watching brief.
- 6.2 To monitor groundworks in order to identify the presence/absence of any archaeological deposits.
- 6.3 To establish the character, extent and date range for any archaeological deposits to be affected by the proposed groundworks.
- 6.4 To appropriately investigate and record any archaeological deposits to be affected by the groundworks.
- 6.5 To produce an archive and report of any results.

7 ARCHAEOLOGICAL WATCHING BRIEF METHODOLOGY

- 7.1 The watching brief will entail an archaeologist being present during all stages of the sea buckthorn removal where there is a potential for archaeological remains to be exposed, damaged or destroyed.
- 7.2 It is essential that coordination between the site contractors and archaeologist is established at the outset to avoid any potential disturbance to the monument without an archaeologist being present, or unnecessary visits to the site when works are being carried out that do not require the presence of an archaeologist.
- 7.3 Adequate time must be made available to the visiting archaeologist to ensure that appropriate recording can be undertaken of any archaeological features or deposits exposed during ground works.
- 7.4 Recording of all archaeological features or deposits will conform to best current professional practice. Significant archaeological features or deposits will be drawn at a suitable scale (no less than 1:20) and photographed in an appropriate format.
- 7.5 All archaeologically significant finds (if found) will be retained and, where possible, related to the contexts from which they derived. All finds, except those deemed to be Treasure, will remain the property of the landowner.
- 7.6 Under the 1996 Treasure Act, "treasure" can be summarised as:
 - Any object other than a coin containing at least 10% gold or silver and at least 300 years old;
 - Any prehistoric assemblage of base metal;
 - Coins found together which contain 10% gold or silver (but no single coins) and groups of at least 10 coins of other metals, provided they are at least 300 years old;
 - Any object found associated with treasure except unworked natural objects; and

- Any object which would have been Treasure Trove before the 1996 Act but not covered above.
- 7.7 In the event that unforeseen archaeological discoveries are made during the development, or that archaeological remains of high significance are exposed, the appointed Archaeological Contractor shall have the power to halt any ground works and shall inform the site agent/project manager and prepare a written statement with plan detailing the archaeological evidence. Following assessment of the archaeological remains and consultation the archaeological curator at Dyfed Archaeological Trust's Heritage Management section, the appointed Archaeological Contractor shall, if required, implement on behalf of the Client a contingency scheme for salvage excavation of affected archaeological features.
- 7.8 In the very unlikely event that human remains are encountered, the District Coroner's Office and the Police will be notified immediately. All human remains will, where possible, be left *in situ*. If preservation *in situ* is not possible all statutory permissions will be obtained in writing before removal begins.

8 POST-FIELDWORK REPORTING AND ARCHIVING

- 8.1 An archive will be prepared if it meets the requirements of the Dyfed Archaeological Trust archive retention policy (2018). If it does, then data recovered during the evaluation will be collated into a site archive structured in accordance with the specifications in Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation (Brown 2011), and the procedures recommended by the National Monuments Record, Aberystwyth. The National Standards for Wales for Collecting and Depositing Archaeological Archives produced by the Federation of Museums and Art Galleries of Wales will also be adhered to. Digital archives will be collated using the Royal Commission on the Ancient and Historical Monuments of Wales systems (2015) and deposited with the RCAHMW. The Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs) shall be followed.
- 8.2 The results of the fieldwork will be assessed in local, regional and wider contexts.
- 8.3 The results will be used to inform subsequent design considerations of the proposed development so that they can aim to avoid impacts upon any archaeological remains or that further archaeological mitigation can be implemented before such remains are disturbed.
- 8.4 The project archive, including all significant artefacts and ecofacts (excepting those which may be deemed to be Treasure) will be deposited with an appropriate body following agreement with the landowner (if retained and containing more than just digital information).
- 8.5 DAT Archaeological Services will arrange for the deposition of finds, and ascertain the costs of storage and deposition, with an approved body before the project commences and inform DAT-HM of the arrangement which has been made.
- 8.6 A summary of the project results, excluding any confidential information, may be prepared for wider dissemination (e.g. Archaeology in Wales and special interest and period-specific journals).
- 8.7 The report will be prepared to follow the Standard and Guidance for Archaeological Watching Briefs (CIfA S&G: AWB 2014).

8.8 Digital copies of the report will be provided to the client, as well as the regional HER and DAT-HM.

8.9 Appropriate specialists to be used by DAT Archaeological Services include:

- **Industrial Archaeology** – Jennifer Protheroe-Jones, Principal Curator – Industry, National Waterfront Museum, Swansea
- **Post-medieval / medieval pottery** – Dee Brennan (local independent specialist)
- **Prehistoric Pottery** – Dr Alex Gibson (formerly of University of Bradford / now Independent pottery specialist)
- **Prehistoric Flint** – Dr Andrew David (formerly of English Heritage, now independent lithics specialist)
- **Radiocarbon dating** – Beta Analytic
- **Animal Bones** – Worcester Archaeology
- **Fish bones** – Jennifer Browning (University of Leicester Archaeological Services)
- **Environmental / Pollen analysis** – Worcester Archaeology

9 STAFF

9.1 The project will be managed by Fran Murphy, Head of DAT Archaeological Services.

9.2 The on-site works will be undertaken by experienced archaeologists, from DAT Archaeological Services.

10 QUALITY ASSURANCE

10.1 DAT Archaeological Services has considerable experience of undertaking all categories of archaeological fieldwork and always operates to best professional practice; adhering to CIfA guidelines where appropriate. The Trust is a Registered Organisation with CIfA and all staff abide by their code of conduct and adhere to their relevant standards and guidance.

10.2 DAT Archaeological Services operate robust internal monitoring procedures that ensure that the standard of each project is maintained from commencement to completion.

11 MONITORING

11.1 The watching brief may require monitoring by the archaeological curator at Dyfed Archaeological Trust's Heritage Management, section who should be told of the commencement of the works. The fieldwork may also need to be monitored by the Head of DAT Archaeological Services.

11.2 All parties should be provided with free access to the site at any time during the watching brief works.

12 HEALTH AND SAFETY

12.1 All permanent DAT Archaeological Services staff are CSCS⁷ registered.

12.2 DAT Archaeological Services will carry out a health and safety risk assessment to ensure that all potential risks are minimised. The Watching Brief will be undertaken in accordance with the safety constraints of the UXO mitigation strategy.

⁷ Construction Skills Certification Scheme (Health and Safety Tested)

- 12.3 All known health and safety risk and the presence of any services etc must be made known to the attending archaeologist at the start of any ground works by the client/site contractor.
- 12.4 All relevant health and safety regulations must be followed, including compliance with Welsh Government guidelines on working practices during the current Covid-19 Pandemic, and guidance issued by CIfA.
- 12.5 CIfA advise that Registered Organisations should ensure they are familiar with the latest *Site Operating Procedures*, published by the Construction Leadership Council (Version 4, updated 18th May 2020) and the latest *Covid-19 Working Advice Ver.1.1*, published by Prospect (5th May 2020), which addresses potential issues relating to archaeological site work. These procedures will be attached to the project risk assessment. If the site cannot operate in line with this guidance then the project archaeologist will not be allowed to attend.
- 12.6 The project risk assessment details the precautions put in place to reduce the spread of Covid-19 Coronavirus during fieldwork.
- 12.7 All site inductions, H&S procedures and site rules of the site contractor will be made known to DAT Archaeological Services staff prior to them commencing work on-site. The attending archaeologist will also attend a toolbox talk with the UXO and removal contractors.
- 12.8 Safety helmets, high visibility vests and boots are to be used by all site personnel as necessary. The site contractors will make all archaeological staff aware of any other PPE⁸ that may be required and provide them. Archaeological staff must not enter any area where there is a considered to be a health and safety risk that has not or is not being appropriately mitigated against.
- 12.9 DAT Archaeological Services staff must ensure that their presence on site is communicated to all relevant site staff, especially machine operators.
- 12.10 Working with machinery: all staff must ensure that their presence on site is communicated to all relevant site contractor staff, especially the machine operator. The archaeologist observing the excavation of trenches by machine will establish a safe working procedure with the machine operator at the start of work. This will include explaining the purpose of the works itself and the method by which the trenches shall be machined. This will include ensuring that the machine driver is aware that topsoil is stripped carefully to avoid disturbing archaeology. This will also include discussing the methodology for safe working, ensuring that no machining is done without an archaeologist being present.

13 ARBITRATION

- 13.1 Any dispute or disagreement arising out of a contract in relation to this work shall be referred for a decision to the Chartered Institute of Archaeologist's arbitration scheme.

⁸ *Personal Protection Equipment*

