

**RSPB WEST CANVEY**

**ARCHAEOLOGICAL HAND AUGER SURVEY**

**ISSUE 1**



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**Field Archaeology Unit**

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# RSPB WEST CANVEY

## ARCHAEOLOGICAL HAND AUGER SURVEY

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*Front cover shows augering taking place at West Canvey*



# RSPB WEST CANVEY

## ARCHAEOLOGICAL HAND AUGER SURVEY

Client: RSPB

FAU Project No: 1972

NGR: TQ772849

Site Code: WCM 08

Local Authority: Castle Point

Date of work: October 2008

### **SUMMARY**

*Archaeological hand auger survey was carried out at West Canvey for the RSPB, in advance of the creation of a nature reserve that will involve the excavation of scrapes and construction of wind pumps. Previous desk-based and walkover survey in 2006, along with other studies, indicated the area was one with multi-period archaeological potential, and as such a programme of archaeological works was required. Hand auger survey was the first phase of these works and was carried out in accordance with a brief of works prepared by ECC HEM.*

*The purpose of the survey was to better understand the underlying stratigraphy of the site, establish the presence or absence of significant archaeological horizons and utilise the results, along with those of the earlier studies, to consider the archaeological potential of the site in order to inform the development of an appropriate programme of archaeological monitoring. Hand auger points were excavated in the proposed locations of each scrape and the windpumps, in addition to two extant earthworks initially interpreted as being the remains of salt-working sites.*

*The hand auger survey confirmed the key stratigraphic units at West Canvey are consistent with those mapped by the BGS: clays, and silt deposits of marine origin. Deposits comprised clays; an upper blocky horizon which may be a result of soil ripening following 17<sup>th</sup> century embankment and softer clays below, probably resulting from the accretion of deposits in developing salt marsh. The clays were generally 2.1-2.4m thick, and overlay blue-grey sands and silts. No identifiable archaeological horizons, or peat / peat-like deposits were located in any of the trial holes*

*The majority of the extant remains, including stetch, underdrainage, anti –landing ditches are of post-medieval date but the potential for earlier, below ground, remains cannot be completely*

*discounted. The auger points through the two earthworks identified no deposits typical of red hills which would suggest they may not be monuments of this type, and may in one case be associated with a former cattle pen.*

*The main areas of impact associated with the RSPB proposals are the scrapes and windpumps. The RSPB have utilised the previous survey to ensure they are situated in locations where there are no known historic environment features, and this would seem to be supported by the results of the auger survey. Any requirement for further archaeological works is likely to be limited to monitoring during selected groundworks, the scope of which would need to be agreed with the LPAs archaeological advisors.*



## 1.0 INTRODUCTION

### 1.1 Project Background

- 1.1.1 This report describes the results of an archaeological hand auger survey carried out at West Canvey, for the Royal Society for the Protection of Birds (RSPB). The RSPB has purchased some 256 hectares of land comprising an area of grazing marsh and the largest green space on the island. This site is to become a nature reserve, one of a series planned along the Thames in south Essex (Fig. 1). The creation of this nature reserve will involve the excavation of 'scrapes' to attract water-birds (and provide materials for earthworks) and the construction of wind pumps – as set out in planning application CPT/429/08/FUL.
- 1.1.2 As part of the strategic development of the South Essex Reserves the RSPB commissioned an archaeological desk-based assessment and walkover survey (Medlycott and Gascoyne 2006) in order to investigate their historic environment, to inform the development of their planning, design and creation. This assessment, along with other studies (e.g. Cracknell 1959), indicated that West Canvey has “ ... a significant multi-period archaeological potential, elements of which are likely to survive in good condition” (Connell 2008). Given this known archaeological potential a planning condition was recommended by ECC HEM in line with guidance presented in PPG 16 (Planning and Archaeology),  
*'No development or preliminary groundworks of any kind shall take place until the applicant has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation which has been submitted by the applicant and approved by the planning authority'.*
- 1.1.3 The current phase of programme of archaeological works comprises hand auger (borehole) survey in advance of groundworks and the assessment of the results. Further works may comprise archaeological monitoring during groundworks, the extents of which are to be agreed with ECC HEM based on the results of the auger survey.
- 1.1.3 This assessment has been carried out in accordance with a brief of works prepared by ECC Historic Environment Management (Connell 2008) and the ALGAO *Standards for Archaeological Fieldwork in the East of England* (Gurney 2003).

## 1.2 Report layout

1.2.1 This report is organised in the following way:

- Non-technical summary
- Background information (Introduction, Location and Description)
- Aims and Objectives
- Methodology
- Results
- Conclusions

Illustrations can be found at the rear of the report.

## 1.3 Abbreviations used in the report

1.3.1 **BGS** (British Geological Survey), **BP** (before present – 1950), **DGPS** (Differential Global Positioning System), **DOE** (Department of Environment), **ECC** (Essex County Council), **EHER** (Essex Historic Environment Record), **ERO** (Essex Record Office), **FAU** (Field Archaeology Unit), **HLM** (Historic Landscape Management), **IFA** (Institute of Field Archaeologists), **KCC** (Kent County Council), **NGR** (National Grid Reference), **MVP** (Mardyke Valley Project), **OS** (Ordnance Survey), **OD** (Ordnance datum), **PSL** (present surface level), **VCH** (Victoria County History).

## 2.0 BACKGROUND

### 2.1 Location (Fig 1 and 2)

2.1.1 Canvey Island is a low-lying island, the majority below sea level (generally c. 2m OD), around 4 miles long and two miles wide. It is separated from the mainland by a series of creeks and rivers, all of which are tidal; Holehaven and East Haven Creeks to the west, Benfleet Creek and Hadleigh Ray to the north and the River Thames itself to the south. Access to the island is via a bridge over Benfleet Creek dating to 1931 (formerly also the site of a ford / ferry) and along the A130, which crosses East Haven Creek.

2.1.2 The modern landscape is to some degree dominated by the massive sea walls that protect the island, and the industrial area along the south west frontage which takes advantage of the proximity of a deep water channel. To the east of the A130 (Canvey Way) much of the island is now built up. In contrast the western side of the island is rural in character, comprising grazing land crossed by sinuous flets and ditches, little changed through the centuries. It is this area which is proposed as a nature reserve.

## 2.2 Geological, Historical and Archaeological Background

### **Geology**

- 2.2.1 Canvey Island comprises coastal marshland which has built up through millennia, in effect a series of islands divided by fleets, subsequently enclosed by sea walls to protect against flooding. The known geology of the island, as mapped by the BGS, reflects this topography, and comprises clay sand and silt deposits of Marine origin that are up to 30-50m thick (BGS 'Britain Beneath Our Feet'; <http://www.bgs.ac.uk/britainbeneath/guide.html> ) overlying London Clay.

### **Archaeological and Historical Background**

- 2.2.2 The archaeology and history of Canvey Island has been collated in a number of studies (e.g. Cracknell 1959, Yearsley 2000, Medlycott 2000 and Medlycott and Gascoyne 2006). The following is summarised from these sources to place the work at West Canvey in its wider context.
- 2.2.3 There has been little evidence of remains pre-dating the Late Iron Age/ Roman periods on Canvey Island; some middle Iron Age pottery has been found on the island (Crowe, Southend Museum, per comm.) along with other chance finds of prehistoric date. Up to the Roman period Canvey may well have been linked to the mainland, separating as sea-levels rose to become a group of marshland islands separated by creeks.
- 2.2.4 The Late Iron Age and Roman periods are well represented in the archaeological record on Canvey, particularly at Leigh Beck on the eastern tip of the island, where archaeological investigations identified a fish-processing sites, shell middens, a probable settlement/wharf site and cremations. In addition, a salt-working complex, known as a 'red-hill', was also identified. It is these monuments that dominate the archaeological record on Canvey, several are located along the southern shore of the island. A scheduled example is located close to Great Russell Farm, alongside a former fleet (National Monument No 32424). In addition to salt manufacture and exploitation of the natural resources of the coastal zone the island was probably also used as pasture, with sheep/goat been recovered from the faunal assemblages of excavated sites.
- 2.2.5 Evidence from a number of the red hill sites would suggest that sea level had risen in the mid-Roman period as the red hills were capped with a thick layer of alluvium (e.g. Medlycott and Gascoyne 2006, 99).

- 2.2.6 As with the Roman period, the most intensive activity on the island in the Saxon period would appear to be at Leigh Beck and Thorney Bay, on the southern shoreline. By the end of this period Canvey was sub-divided between several mainland parishes, sharing out the valuable marshland grazing, a use which continued through to the medieval and post-medieval periods.
- 2.2.7 Unlike other extensive tracts of grazing marsh in south Essex, for example Rainham marsh (now an RSPB reserve), Canvey marshes were not extensively embanked in the medieval period, perhaps reflecting the complexity of land ownership which may have made embankment uneconomic as well as impractical. There are however references to attempts to embank those portions of the marshes within Southchurch parish in the mid 15<sup>th</sup> century. Essentially what is now an island surrounded by a single wall would have been a series of islands separated by channels /fleets, described in 1577 as “ ... Canwaie Iles, which some call marshes’ dissected by ‘...salt rilles’ (William Harrison, quoted in Smith 1970, 27). These are illustrated by a number of geographers, for example Norden (1594) and Saxton (Fig. 3). The islands were regularly inundated, ‘.... Often it is all overflown, except for the higher hillocks, on which there is safe retreat for sheep’ (Camden 1607, quoted in Smith 1970, 27). These sheep would have been grazed on the marshland, with their milk utilised in dairy , products, particularly cheese. Human habitation was probably limited to shepherds and perhaps fishermen.
- 2.2.8 The early 17<sup>th</sup> century saw dramatic changes to the landscape, with the construction of a sea wall around much of the island. This was instigated by a 1622 agreement between Sir Henry Appleton and Joas Croppenburg, a Dutchman, to build and maintain a sea wall, in return for a third of the lands enclosed (eg. Chapman and Andre 1777, Fig 3). Following this first phase of embankment additional areas were enclosed through to the 19<sup>th</sup> century.
- 2.2.9 By the 19<sup>th</sup> century the tithe award indicated that there was a more mixed economy, with both arable and pasture. The increased plough up in this period reflects technological and economic drivers; the development of drainage technology and raising grain prices (e.g. Heppell 2004, 107). Some of the arable may have reverted to pasture in the late 19<sup>th</sup> nad early 20<sup>th</sup> century agricultural depression.
- 2.2.10 The development of Canvey took off in the early part of the 20<sup>th</sup> century, initially as a seaside resort for Londoners. Despite the failure of this plan the population continued to

increase, with development focussed on the eastern half of the island. Industrial development was focussed in the area around Holehaven, particularly oil and gas from the 1950s onwards.

2.2.11 The 'Great Tide', the 1953 floods, had a devastating effect on the island resulting in the loss of 58 lives and extensive flooding. Following this sea walls were raised and improved, with those constructed in 1970s and 80s made of concrete and steel. Access to the island has also been improved with the construction of a bridge to South Benfleet and, later, the A130 to Sadlers Farm which crosses the West Canvey reserve.

### ***Historic Environment Baseline***

2.2.12 In 2006 the RSPB commissioned a desk and field based assessment of the historic environment within their proposed South Essex Reserves, including West Canvey. This survey comprised a desk-based survey of known resource, utilising the EHER and historic mapping. This was supported by a walkover survey which considered the presence and condition of the known resource and aimed to identify previously unrecorded features.

2.2.13 The desk-based assessment identified the following historic environment features in those fields where the excavation of scrapes is proposed (as identified on Fig 5, Medlycott and Gascoyne 2006):

- EHER 18283 (WCM 32): World War II anti-landing ditches
- EHER 45793 (WCM 32): Cattle pen of 1<sup>st</sup> Edition Ordnance Survey
- EHER 14732 (WCM 30 –31): World War II anti-landing ditches

[WCM 31 etc. are the unique plot numbers assigned to each field during the 2006 survey. Their locations are illustrated on Fig. 6.]

2.2.14 The walkover survey identified the following features (Fig 81, Medlycott and Gascoyne 2006):

- 38 (WCM33): WW II Bomb crater
- 36 (WCM 32): Stetch
- 37 (WCM 32): Possible saltern
- 32 (WCM 30): Stetch
- 33 (WCM 30): Anti- landing ditch
- 34 (WCM 31): Saltern
- 35 (WCM 31): Stetch

### **3.0 SCHEME PROPOSALS**

- 3.1 The following information on the scheme proposals is summarised from the *West Canvey Marsh; Planning Statement* (July 2008), prepared by the RSPB for submission to Castle Point Borough Council.
- 3.2 The RSPB nature reserve will build on the existing conservation interest of the marshes, and develop their potential. The existing network of man-made and natural creeks and ditches will be retained as they are an integral part of the historic and natural environment. Higher areas of land will also be retained. In order to increase the amount of wet-edge habitat some of the anti landing ditches will be dug out. Other works will include the excavation of 'scrapes' to attract water birds (Fig 2), and provide material for earthwork construction elsewhere, for example bunding/damming parts of the main fleet to create a reservoir.

### **4.0 AIMS AND OBJECTIVES**

- 4.1 The aim of the archaeological hand auger survey will be to better understand the stratigraphy of the wetland, particularly the areas of the scrapes and windpumps. The data from this work will complement the earlier studies (e.g. Medlycott and Gascoyne 2006) and enable an appropriate programme of archaeological monitoring to be defined.
- 4.2 The specific objectives of the investigation are to:
- Establish the stratigraphy in the area of the new wetland areas which will enhance the understanding of potential archaeological impacts of the works
  - Create a preliminary interpretation of the vegetational and aquatic conditions if possible
  - Establish if peat or peat-like deposits are present in those areas investigated
  - To consider the potential for the presence of archaeological remains in the areas of the scrapes and windpump locations (the areas of likely disturbance) in order to inform the development of an appropriate programme of archaeological monitoring
- 4.3 The results of this will contribute to the development of an appropriate mitigation strategy in conjunction with the appropriate authorities.

## **5.0 METHOD**

- 5.1 The archaeological hand auger points were situated within the main areas of likely disturbance; the wetland scrapes and windpump locations. Each scrape was investigated by up to four auger points, depending on size. Additional auger points were situated on known earthworks in order to provide further information from which to characterise them. The locations of the auger positions was determined by the use of DGPS (to the National Grid) and each point was checked for unexploded ordnance prior to excavation.
- 5.2 In order to allow comparison of data from each of the auger points, and for future use, the present ground level at each point was recorded. For this purpose an Ordnance Survey spot height on the eastern carriageway of the A130 was transferred onto the marshes to allow an approximate Ordnance Datum (OD) height to be obtained for each auger point.
- 5.3 Hand augerings were taken using a gouge auger. They were excavated to a depth of c 2.2-2.5m below the existing ground surface level unless ground conditions (for example ground compaction or water-logging) made this impossible. The results of each borehole were recorded; the record including a numerical identifier, location (NGR), OD at present surface level and a description of deposits. It should be noted that no environmental samples for specialist assessment have been taken as part of these works as they have focussed on establishing the deposit sequence and considering impacts/potential only.

## **6.0 RESULTS**

- 6.1 The following reports on the result of the walkover and hand auger survey. These are divided by plot number for easy reference to the earlier surveys and are described from west to east. The results are discussed below and the detailed results of the auger survey (in tabular form) can be found in Appendix 1. Illustrations can be found to the rear of the report .

### ***WCM 35***

- 6.2 This field is currently under grass, bounded by a straight field ditch to the west and the remainder by dry creeks (Fig 6). The surface is undulating; aerial photographs and LiDAR show deep drainage, orientated northeast to south east, around 15-19m apart. On the ground stretch is visible, orientated roughly north to south, with the furrows around 3m apart. Traces of the earlier landscape, the sinuous marsh creeks, are also visible on the field surface.

6.3 Three hand auger points were excavated in this field, AP 4, 5 and 6. These were excavated through the grass into a compact mat of intertwined grass on a thin band of topsoil. This merged with a very dry and compact brownish grey blocky clay, which gradually becomes smoother and greyer with depth (from c. 1.5m below the present surface level). Blue grey fine sands and silts were encountered at 2.2m – 2.42m below PSL, at c. –0.71m to –1.23m OD. This would indicate that these deposits, like the field surface, slope down towards the dry creek boundaries.

### **WCM 33**

6.4 This field is also currently under grass, bounded by the main fleet to the south and straight field ditches around the remainder (Fig 6). In contrast to WCM 35 the surface of this field is relatively flat, although traces of stetch are visible, with the furrows c. 2m apart, orientated north-south. Deep drainage is visible on LiDAR and aerial photographs, orientated west to east.

6.5 Three hand auger points were excavated in this field, AP 1, 2 and 3. These were excavated through the grass into a compact mat of intertwined grass on a thin band of topsoil. This merged with a very dry and compact brownish grey blocky clay, which gradually becomes smoother and greyer (at approximately 1.3 to 1.75m below PSL), with an increased sandy component towards its base at 2.1 – 2.25m below PSL. Blue-grey fine sands and silts were encountered at the base, at c.-0.68 to – 0.83m OD.

### **WCM 32**

6.6 This field is currently under grass, bounded by the main fleet to the south, a dry creek to the north and straight boundaries to the west and east (Fig 7). The surface of the field is undulating and traces of the relict marsh creeks are visible, as is stetch. The furrows of the latter are roughly 3.5-4m apart, orientated roughly north-south. In contrast to WCM 33 and 35, no regular deep drainage is visible on aerial photographs or LiDAR, although the former do show some more-irregular features, largely orientated west-east. This range of earthworks make it difficult to pick out the remains of the anti-landing ditches on the ground.

6.7 The walkover identified a sub-rectangular mound in this field, which was interpreted as possibly being the remains of "... a salt production site (37), although no evidence for red earth can be seen." (Medlycott and Gascoyne 2006, 237). This feature is approximately 0.5m higher than the surrounding ground surface, with the top at around 1.92m OD. An auger point (RH 2) was excavated through the feature to ascertain if any archaeological



deposits were present, particularly red burnt clay which is typical of late Iron Age/ Roman saltworking sites. The sequence of deposits encountered grass and topsoil, overlying brownish grey clay, onto blue grey sandy silts. These were encountered at a depth of 2.15 m below PSL, or approximately  $-0.23\text{mOD}$ . This would suggest that the earthwork is not a 'red hill'.

- 6.8 The same sequence was noted in auger points 7, 8, 9 and 10 and Water Pump site 1; with the blue-grey sandy silts occurring at between 2.05 to 2.39m below PSL,  $-0.54$  to  $-0.73\text{m OD}$ ,
- 6.9 An extra point was excavated in this field, AP E 1, adjacent to the main fleet ditch. In this area thin vegetation and topsoil directly overlie soft grey silty clays and fine blue grey silts and sands.

### **WCM 30 and 31**

- 6.10 These two fields are under grass, bounded to the south by the main fleet, and the north by a former creek, the west by a straight field ditch and the east by the A130 Canvey Road (Fig. 9). Like WCM 32, the field surface is undulating, with traces of former marsh creeks, stetch and other irregular earthworks. No regular deep drainage is visible on aerial photographs or LiDAR. The most extensive historic environment features in this field comprise numerous anti-landing ditches, some of which are visible in the field.
- 6.11 The desk-based assessment and walkover identified a sub-circular earthwork mound in this field, identified as a 'red hill' in the EHER (EHER 7233). Field observations showed that the stetch cultivation covers this feature.
- 6.12 An auger point was excavated through this mound to ascertain if archaeological horizons, particularly 'red hill' deposits were present. The top of the mound is at around  $2.25\text{mOD}$ ,  $0.7\text{m}$  higher than the surrounding field surface. The stratigraphic sequence encountered was the same as that encountered elsewhere, consisting of brownish grey clays, becoming softer towards their base and overlying blue-grey silty sands,  $3.4\text{m PSL}$ , at  $-0.75\text{m OD}$ .
- 6.13 The same sequence was encountered in the other six auger points excavated in this field (AP 12-17). The blue-grey silty sands were encountered at c.  $2.10 - 2.20\text{ m below PSL}$ . -  $0.55\text{m to } - 0.66\text{mOD}$ ,

## **7.0 ASSESSMENT OF RESULTS**

- 7.1 The results of the archaeological hand auger survey have confirmed that the key stratigraphic units at West Canvey are consistent with that mapped by the BGS; principally clays, sand and silt deposits of marine origin that are likely to be Flandrian in date.
- 7.2 The upper clays encountered in each of the auger points are likely to be the result of the development of pioneer marsh and eventually upper salt marsh. This takes place through accretion of fine sediments, which are further stabilised by marine organisms (e.g. algae) and foreshore vegetation. This allows mudflat to build up vertically, and for salting vegetation to become established, allowing continued upward growth. This eventually becomes coarse pasture, only inundated at the highest tides.
- 7.3 Although no distinct horizons were identifiable in the upper clays it was noticeable that the material in the top of each point had a more blocky appearance. This may perhaps be a more ripened sediment horizon, resulting from drying out following embankment in the early 17<sup>th</sup> century. No peat or peat-like horizons were encountered.
- 7.4 Reference to the results of excavations of a red hill '3km west of Canvey Point' suggests that during the late Iron Age / Roman period the top of a blue clay formed the land surface, subsequently buried by 2m of alluvium (Wilkinson and Murphy 1995, 183). The former may be the equivalent of the lower deposits in the West Canvey sequence, namely the blue-grey fine sandy-silts.
- 7.5 Although the results of the hand-auger survey did not locate any identifiable archaeological horizons, consideration of historical documentation, walkover survey and general field observation can provide a general land-use history. The West Canvey marshes are located within the area embanked by the Dutch in the early 17<sup>th</sup> century. Prior to this transformation the natural resources of the coastal zone would have been exploited, for example through fisheries, grazing and salt production. The extent of settlement in the Saxon and medieval periods is difficult to establish given the complexities of land ownership, but it would seem reasonable to suggest it is likely to have been sparse given the regular inundation which took place. Relicts of this natural marshland landscape survive at West Canvey, for example the main fleet ditch and many of the extant field boundaries that comprise sinuous former creeks where the natural channels have been utilised as drains. Even in fields which have been cultivated, for example WCM 32, the infilled creeks and rills are visible below the stetch.

- 7.6 Following embankment it would seem likely that there would have been an increased proportion of arable, It is known that there were conflicts between the Dutch enclave on the island and English inhabitants over the conflicting requirements of pasture and arable agriculture (e.g. Medlycott and Gascoyne 2006, 101). By the mid 19<sup>th</sup> century the tithe maps and their associated awards show that part of the West Canvey Marshes were under arable cultivation (WCM 32 and WCM 34 within the scope of this study). The date at which they were first placed under cultivation is difficult to confirm, presumably it post-dates embankment. It would also perhaps post-date the development of hollow or under-draining which took place in the late 18<sup>th</sup> century (Medlycott and Gascoyne 2006, 17) and increasingly affordable due to tax breaks in the early 19<sup>th</sup> century. This period also saw increasing demand from an expanding population, war conditions leading to uncertainty in foreign supply, and a rise in grain prices (Heppell 2004, 107).
- 7.7 On other coastal marshland islands, for example Wallasea, arable land reverted to pasture during the agricultural depression of the late 19<sup>th</sup> century; on Canvey this was probably exacerbated by the effects of the 'Black Monday' floods of 1897. Crops were still poor in 1899 and landowners were subject to increased levies to finance sea wall repair, many began to sell up. The Third Acre lands, which were subject to a greater financial burden, failed to sell, and remained undeveloped, in some case through to the present (Yearsley 2000, 21). The arable fields at West Canvey may well have reverted to pasture at this time.
- 7.8 Later phases of ploughing up pasture for arable may have occurred in World War I, the early 1930s (the passage of the Wheat Act of 1932 placed quotas on imported wheat and guaranteed prices for home production) and World War II.
- 7.9 The archaeological features associated with post-medieval and modern agriculture comprise stretch. This is found in all the fields subject to hand auger survey. It is most likely to be associated with arable production. The technique was both common and long-lived, in widespread use until the mid 20<sup>th</sup> century (Martin and Satchell 2008, 33-34) which makes dating the Camvey examples difficult.
- 7.10 Both aerial photographs and LiDAR show parallel linear features in a number of fields, which are not on the same alignment as the stretch, although they are, in some cases, visible on the ground. These are presumably the remains of some form of deeper

drainage. Although undated it has been noted that there is a correlation between the fields with these features and those in arable cultivation at the time of the commutation of tithes.

- 7.11 Two archaeological sites were located during the 2006 walkover, earthworks in WCM 32 and WCM 30/31. An auger point was excavated through each of these and in both cases no deposits typical of red hills (late Iron Age and Roman salt-working sites) were found which would suggest that they are not monuments of this type. While they may possibly be the remains of salt-working of a later date, in the case of the earthwork in WCM 32 it is perhaps notable that it is located in close proximity to a cattle pen marked on the 1<sup>st</sup> Edition Ordnance Survey (Fig 10). Both sites would also appear to pre-date the stretch.
- 7.12 Other earthworks comprise the World War II remains of anti landing ditches and bomb craters.
- 7.13 The archaeological remains present in the area of the proposals primarily date to the period post-dating embankment and many of them are visible in the present landscape. The presence of earlier remains cannot be completely discounted and, if present, they would perhaps be most likely to be located in the vicinity of the main fleet, as such a feature would have been one of the main forms of communication prior to embankment.
- 7.14 There is likely to have been some disturbance in the post-medieval and modern periods, which may have impacted on any earlier below ground remains, if present, as a result of arable cultivation / agricultural drainage, and the excavation of the extensive network of anti landing ditches.
- 7.15 The main areas of impact associated with the RSPB proposals are the scrapes, which will be excavated to a maximum depth of 1.5m below PSL and the wind pumps, which will require deep pits. The RSPB design has utilised the earlier survey (Medlycott and Gascoyne 2006) to situate these feature in areas where they will not impact on extant historic environment features and this would appear to be supported by the results of the hand auger survey.
- 7.16 Any requirement for further archaeological works is limited to monitoring during selected groundworks, the scope of which would need to be agreed with ECC HEM, the LPAs archaeological advisors.

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**APPENDIX 1:**

Auger Point data

	Top of Auger point (m OD)	TS / Clay (below PSL)	Top of softer brown grey clay (below PSL)	Top BGC Reduced Level (M OD)	Top of Blue grey fine sands and silts (below PSL)	Top of sands Reduced Level(M OD)	Base (below PSL)	Base - Reduced Level(M OD)
AP 17	1.44	0.00	1.50	-0.06	2.10	-0.66	2.25	-0.81
AP 16	1.36	0.00	1.15	0.21	2.00	-0.64	2.50	-1.14
AP 15	1.58	0.00	1.10	0.48	2.10	-0.52	2.25	-0.67
RH 1	2.25	0.00	1.40	0.85	3.00	-0.75	3.40	-1.15
AP 14	1.35	0.00	1.10	0.25	1.90	-0.55	2.25	-0.90
AP 13	1.52	0.00	1.50	0.02	2.10	-0.58	2.25	-0.73
AP 12	1.49	0.00	1.50	-0.01	2.10	-0.61	2.40	-0.91
AP 11	1.65	0.00	0.70	0.95	2.20	-0.55	2.45	-0.80
AP E 1	-0.24	0.00	0.10	-0.34	2.30	-2.54	2.50	-2.74
AP 10	1.57	0.00	1.10	0.47	2.30	-0.73	2.40	-0.83
AP 9	1.51	0.00	1.30	0.21	2.05	-0.54	2.45	-0.94
WP 2	1.49	0.00	0.80	0.69	2.13	-0.64	2.50	-1.01
RH 2	1.92	0.00	1.05	0.87	2.15	-0.23	2.50	-0.58
AP 8	1.53	0.00	1.30	0.23	2.20	-0.67	2.45	-0.92
AP 7	1.70	0.00	1.25	0.45	2.39	-0.69	2.50	-0.80
AP 3	1.42	0.00	1.30	0.12	2.10	-0.68	2.50	-1.08
AP 2	1.39	0.00	1.50	-0.11	2.25	-0.86	2.50	-1.11
AP 1	1.42	0.00	2.00	-0.58	2.25	-0.83	2.50	-1.08
AP 4	1.49	0.00	1.20	0.29	2.20	-0.71	2.50	-1.01
AP 6	1.07	0.00	1.20	-0.13	2.30	-1.23	2.50	-1.43
AP 5	1.35	0.00	1.20	0.15	2.42	-1.07	2.50	-1.15