

**RSPB BOWERS MARSH WETLAND NATURE RESERVE
BASILDON
ESSEX**

**TIDAL EXCHANGE STRUCTURE
ARCHAEOLOGICAL MONITORING**



Essex County Council

FIELD ARCHAEOLOGY UNIT

October 2011

**RSPB BOWERS MARSH WETLAND NATURE RESERVE
BASILDON, ESSEX**

**TIDAL EXCHANGE STRUCTURE
ARCHAEOLOGICAL MONITORING**

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RSPB BOWERS MARSH WETLAND NATURE RESERVE, ESSEX

TIDAL EXCHANGE STRUCTURE

ARCHAEOLOGICAL MONITORING

Client: Haskoning UK Ltd, acting for the RSPB

Planning Application: 09/01179/FULL

NGR: TQ 76421 85796

Site Code: BABM 09

Oasis No.: essexcou1-111311

Dates of Fieldwork: September 2011

SUMMARY

Archaeological monitoring was carried out during the construction of a tidal exchange structure at the RSPB Bowers Marsh Reserve. The structure is located on the eastern side of the reserve and links a saline lagoon with Easthaven Creek, allowing regulated exchange of seawater between the lagoon and the creek. Prior to monitoring, that part of the exchange structure contained within the built-up bank of the lagoon had been constructed and the area of works subject to monitoring was focussed on the extant sea wall (to the east of the lagoon) and the saltmarsh between it and the creek.

The construction of the tidal exchange structure was carried out by removing the vegetation and the top 200-300mm of soil from the footprint of a temporary bund (on the saltmarsh) and the removal of a section of the seawall, with the material from the seawall used to build the bund. A channel between this temporary bund and the lagoon was excavated and lined with scour matting, the temporary bund then was removed and the channel extended to Easthaven Creek.

The archaeological monitoring did not identify any archaeological features other than the extant seawall (EHER 45783), which predates 1777. The removal of part of the wall allowed a section through it to be recorded, showing that it comprised a simple clay embankment which had been heightened in the past, presumably in response to the threat of overtopping.

1.0 INTRODUCTION

This report describes the results of a programme of archaeological monitoring undertaken during groundworks associated with the construction of a tidal exchange structure, part of extensive works to create a new nature reserve at Bowers Marsh. The fieldwork was carried out by the Essex County Council Field Archaeology Unit (ECC FAU) for Haskoning UK Ltd., acting on the behalf of the Royal Society for the Protection of Birds (RSPB).

The site archive will be deposited in Southend Museum. A digital version of this report will be submitted, along with a project summary, to the Online Access to the Index of Archaeological Investigations (OASIS) (<http://ads.ahds.ac.uk/project/oasis>).

2.0 BACKGROUND

2.1 Location, Topography and Geology

Bowers Marsh consists of 270ha of low lying agricultural land (centred on TQ 75960 85916 Fig. 1) which will become part of a network of new reserves in south Essex that are being created by the RSPB. It will comprise a variety of wetland habitats including newly created intertidal, reedbed and coastal wet grasslands with a network of public access facilities. The outline habitat creation scheme proposes the construction of 20 hectares of intertidal habitat in the eastern part of the site, adjacent to Easthaven Creek, including 10 hectares of saltmarsh and a 10 hectare tidal-exchange saline lagoon (at TQ 7641 8585). The tidal exchange structure is located on the eastern side of the tidal-exchange saline lagoon, linking it to the tidal creek. In addition, approximately 20 acres of reedbed will be created that will act as a reservoir to supply water to two large coastal wet grassland units, along with two large ponds, a network of new ditches and scrapes and a visitor car park with approximately 70 to 100 spaces.

The geology of Bowers Marsh is mapped by the British Geological Survey (BGS) as Tidal Flat deposits of “consolidated soft silty clay with layers of sand, gravel and peat” above London Clay (BGS Lexicon of Rock Units, www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=TFD). A geotechnical survey of the near-surface geology recorded sub-tidal deposits of dark bluish grey clay (c. 1.4m+) below inter/supra tidal deposits of compact brown clay (c. 0.2m to 1.4m) and agricultural soil (c. 0 to 0.2m), representing a gradual transition from a marine to a terrestrial environment (Green and Young 2009).

2.2 Reasons for the Project

The archaeological monitoring was carried out upon the recommendation of English Heritage and monitored by Essex County Council Historic Environment Management team, as a condition on planning application No. 09/01179/FULL, as the proposed works present a potential threat to the preservation of buried archaeological remains.

2.3 Archaeological and Historical Background

The current phase of archaeological work was preceded by walkover surveys (Medlycott and Gascoyne 2006), a desk-based assessment (Heppell 2009), geotechnical survey (Green and Young 2009) and archaeological trial trenching and test pitting (Germany 2009). The following background is summarised from those studies.

Geotechnical studies indicate that during prehistory much of Bowers Marsh would have been a complex of inter or supra tidal mud and sand flats. Test-pits across the marsh have not revealed any prehistoric land-surfaces or peat-beds, although it is possible that the former survive along the dry land edge, in areas not investigated as part of the scheme.

The degree of prehistoric exploitation of this landscape is unknown. Depending on the tidal regime it may have been used for foraging or perhaps grazing, activities which leave few archaeological traces. Elsewhere around the Essex coast evidence of utilisation has included the presence of, for example, Bronze Age wattle or broom trackways (e.g. Wilkinson and Murphy 1995; Heppell and Brown 2004).

Salt-making has been a significant industry around the Essex coast for millennia, utilising tidal waters. The earliest known examples in the county have been found in the intertidal zone of the River Crouch and date to the Bronze Age. More typical are salterns known locally as 'red-hills'. Whilst in use they would have been situated on the edge of the high tide line and manufactured salt through the evaporation of seawater. They are generally considered to be Late Iron Age and Early Roman in date, although it should be noted that recent investigations at two sites have indicated Middle Iron Age and early, middle and late Roman activity (OAU South 2009).

A probable saltern (or an industrial area in close proximity to salt-production) was recently investigated during the evaluation and excavation works conducted by ECC FAU in the area of the proposed new car park for the nature reserve. The post-excavation assessment process has yet to be completed but pottery recovered from the site ranges in date from the Late Iron Age to Late Roman (report forthcoming).

In the Saxon and medieval periods the site of the proposed Bowers Marsh reserve was divided between a number of parishes; principally, Pitsea, Bowers Gifford, Laindon and Vange. The Domesday Book records landholdings in these parishes in 1066 and 1086 and, while geographically non-specific, entries that relate to 'Pasture for xxx Sheep' are likely to have been on the marshlands. This land was a valuable asset, hence its division between numerous parishes, but while utilised it is unlikely that the area would have been embanked at this early date, the landscape being exploited rather than transformed.

The geoarchaeological assessment has indicated that prior to embankment the landscape was one of mud and sand flats, with uniform conditions of deposition across the site. In some places, even within 0.2m of the present ground surface there were the remains of *Scrobicularia* (marine bivalves), which typically occur in tidal flat environments. Presumably, as the marshes were grazed in the early part of the medieval period, the flats must have been supra-tidal rather than inter-tidal; that is submerged at exceptional tides or storm surges and flood events. Thus grazing would be possible but the presence of marine molluscs explained. As with other areas close by, particularly Canvey Island, if earlier earthworks were present they may have been reused as refuges in high tides and sites for shepherd shelters. By the mid 16th century the area appears to have been embanked and settled at least in part, with the earliest reference to *Southstynkneys* in 1549, suggesting that the farmstead, now below the nearby landfill site, was extant at this date (Medlycott and Gascoyne 2006, 77). During the Second World War the marsh was criss-crossed by a network of anti-glider ditches.

3.0 AIMS AND OBJECTIVES

3.1 General aims

The main aim of the archaeological work was to investigate and record any surviving archaeological remains which were to be impacted on during construction groundworks. Construction works also provided a rare opportunity to investigate the extant sea wall, with the potential of better understanding its construction and date.

3.2 Research objectives

This report aims to place the results in context with the research objectives laid out in the relevant regional research frameworks; the *Greater Thames Estuary Historic Environment Research Framework* (GTASC 2010) and *Research and Archaeology: a Framework for the Eastern Counties, 2. research agenda and strategy* (Brown and Glazebrook 2000). A

consideration of the contribution that the results have made to regional objectives can be found in Section 7.0.

4.0 METHOD

The tidal-exchange structure comprises a sluice/pipe system which can be controlled to allow the regulated exchange of seawater between Easthaven Creek and the saline lagoon. The system comprises a scour mat on the inside of the lagoon, inlet/outlet pipes through the embankment, a concrete lined spillway and a channel linking to Easthaven Creek.

Bowers Marsh is protected from inundation by an earthwork seawall. In the vicinity of the tidal exchange structure the seawall is at a height of c. 4.1-4.2m OD, on the outside of which lays an area of saltmarsh (c.2.8-3m OD) and Easthaven Creek. To the west of the wall lies the saline lagoon, former agricultural land (c. 1.65-2.15m OD) which in advance of these works, had been surrounded by a large embankment approximately 40m wide at the base (Fig.1). The inflow/outflow pipes for the lagoon run through this new embankment opening onto a concrete lined spillway, constructed on the interior of the seawall (Fig. 2, Plate 1). New embankments to the north and south of this link the lagoon embankment to the seawall.

Groundworks were required in order to link the inflow/outflow channel to Easthaven Creek. These comprised:

- The removal of vegetation and 0.2-0.3m of soil around the footprint of a temporary bund
- Removal of a c. 55m length of seawall between the new embankments to the north and south of the channel (Plate 2)
- Construction of a temporary bund on the saltmarsh using material excavated from the seawall (Fig. 2)
- Excavation of a channel, between the temporary bund and concrete spillway, with a flat 4m wide base, sloping up for 6m on either side. The westernmost 14m of the channel is lined with armourflex matting (Fig. 3, Plate 4 and 5)
- Excavation of a channel outside the temporary bund which gradually widens out as it meets Easthaven Creek (Fig. 3, cover plate)
- Removal of the temporary bund and excavation below it to link the two sections of channel (Plate 6)
- Landscaping

Archaeological monitoring was carried out when significant groundworks were taking place, particularly during the removal of the seawall.

All work was carried out in accordance with IfA (Institute for Archaeologists) by-laws and guidelines and complied with Standards for Field Archaeology in the East of England (Gurney 2003). Standard ECC FAU excavation, artefact collection and recording methodologies were employed throughout.

5.0 FIELDWORK RESULTS

The archaeological monitoring of the groundworks associated with the construction of the tidal exchange structure did not identify any archaeological features other than the extant seawall (EHER 45783). The archaeological desk-based assessment carried out in advance of the development (Heppell 2009) noted that the date of the embankment of Bowers Marsh was elusive and the most definitive statement to be made was that it predated 1777 when it was depicted on the Chapman and Andre map. It was considered most likely that the embankment took place in the 17th century, like that on nearby Canvey, although an earlier date for construction cannot be discounted. The removal of the seawall allowed a rare opportunity to examine the construction of one of these features, a section through which is illustrated on Fig. 4 and Plate 3. The seawall comprised a simple clay embankment, consisting of vegetation and topsoil (250) over a layer of compact blocky brown clay (251) over brown silty clay (252) and a slightly softer silty clay (252). These latter deposits may perhaps represent an initial phase of construction with 251 being added to build up the height of the wall in response to the wall being overtopped or the threat of that occurring. Such events are well attested in the historic record, for example significant floods occurred in 1736, 1897 and 1953 (eg. Grieve 1953).

The bank overlay natural deposits comprising an orangey brown clay (254), of variable thickness that gradually merged down onto very soft blue grey silty clays (255), which were laminated with bands of dark grey/black sands. These deposits extended beyond the maximum depth of excavation, approximately 2.2-2.4m below the surface of the saltmarsh. The same sequence of deposits was noted in the channel excavated outside the seawall. This is consistent with the lithology noted in the Geoarchaeological assessment (Green and Young 2009).

6.0 FINDS REPORT

No finds other than other than occasional fragments of unstratified, brick and tile were noted during the recording works. None of the material has been retained.

7.0 DISCUSSION

Seawalls are the most extensive monuments around Essex, now protecting some 440km of the coast, some of which were established by at least the medieval period (e.g. Smith 1970, Crump 1981). Although the archaeological monitoring at Bowers Marsh did not enable the postulated 16th century date of the construction of an embankment around the marsh to be confirmed it did provide the opportunity to record the construction methods used in embankment, identified as a research objective in the Greater Thames Research Framework (GTEASC 2010, 44; 3B.SO2; <http://archaeologydataservice.ac.uk/archives/view/gtrf>).

The work at Bowers Marsh is one of only a limited number of seawall breaches in Essex that have been subject to archaeological monitoring (eg, Orplands Managed Realignment, Abbots Hall, and Deveraux Farm) and it is therefore difficult to draw out typological differences/similarities. There are few early sources which illustrate how sea walls were constructed but it would seem reasonable to suggest that there was little alteration in the techniques until the development of modern machinery and concrete. A methodology for the construction of walls was described by a land agent/ surveyor, Wiggins, in 1867. Construction would begin with the preparation of the ground; the removal of vegetation and the infilling of creeks and rills. Two clay banks would be constructed, moving towards the lowest point, using material from the borrow or soke dyke (the ditch to the landward side of the wall) and sometimes from the outside of the wall. The gap would then be filled at a suitably low tide. The external wall was probably faced with cut vegetation, or brushwood whilst natural vegetation cover became established (Gramolt 1960, 231).

All the breaches subject to archaeological monitoring have been constructed with clay and in most cases there is possible evidence for the height of the wall being increased at a later date. Reference to historical documents, such as the minute books of the Commissioners of Sewers, Drainage Boards and River Catchment Boards, often refer to the need for walls to be raised and their profile altered (e.g. Gramolt 1960). Timber elements have been noted at Deveraux Farm where the first phase of the wall, established between 1777 and 1876, had timber stakes/posts along the frontage, which would have protected the seaward 'toe' of the wall from undercutting and help hold any facing material in place, and at Rolls Farm where a timber core of a length of abandoned wall, possibly pre 1777 in date, crosses the mudflats.

No structural timber elements were noted in the examples at Orplands or Abbots Hall (both pre 1876, possibly pre 1777). The variation in construction, particularly in the use of timber, may reflect a number of factors such as localised topography/hydrology, the nature of the clay from which the walls were constructed (which is locally variable) and perhaps their date of construction.

The wall at Bowers Marsh is consistent with both the historical description of construction techniques and the some of the previously investigated examples in that the simple clay bank shows evidence of having been raised at some point in the past. It would seem likely that in this case timber has not been used as the salt/grazing marsh on which it was built was not crossed by large creeks which would destabilise the structure, as observed during the construction of the temporary bund during these works. Similarly a wooden 'toe' may not have been needed as the saltmarsh outside the wall provided protection from wave action.

8.0 ASSESSMENT OF RESULTS

With the exception of the existing seawall, no features of archaeological interest were noted during the monitoring work associated with the construction of the tidal exchange structure, suggesting that the development has had a limited impact upon the archaeological record. This impact has been effectively mitigated through the preservation by record of a section through the seawall that otherwise would have been destroyed by the development. The wall at Bowers Marsh is consistent with both the historical description of construction techniques and with some of the previously investigated examples from elsewhere in the county and while it was not possible to obtain a precise date for its construction the monitoring works provided the opportunity to record the construction methods used, which has been identified as a research objective in the Greater Thames Research Framework.

ACKNOWLEDGEMENTS

ECC FAU would like to thank Jackie Lavender of Haskoning UK Ltd and the David Hedges of the RSPB for commissioning the work. The archaeological fieldwork was undertaken by Ellen Heppell of the ECC Field Archaeology Unit. The project was managed by Adrian Scruby and monitored on behalf of the Local Planning Authority by Richard Havis of ECC HEM.

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APPENDIX 1 CONTENTS OF ARCHIVE

SITE NAME: RSPB Bowers Marsh – Tidal Exchange Structure
SITE CODE: BABM 09

Index to Archive:

1. Research Archive

1.1 Client Report

2. Site Archive

2.1 Context Register

2.2 Context Sheets (x 6)

2.3 Photographic Register

2.4 Site Photographic Record

2.5 Miscellaneous notes/plans

3. Digital Archive (CD)

3.1 Client Report (PDF)

3.2 Photographic Register

3.3 Digital Photographs

Not in File

N/A

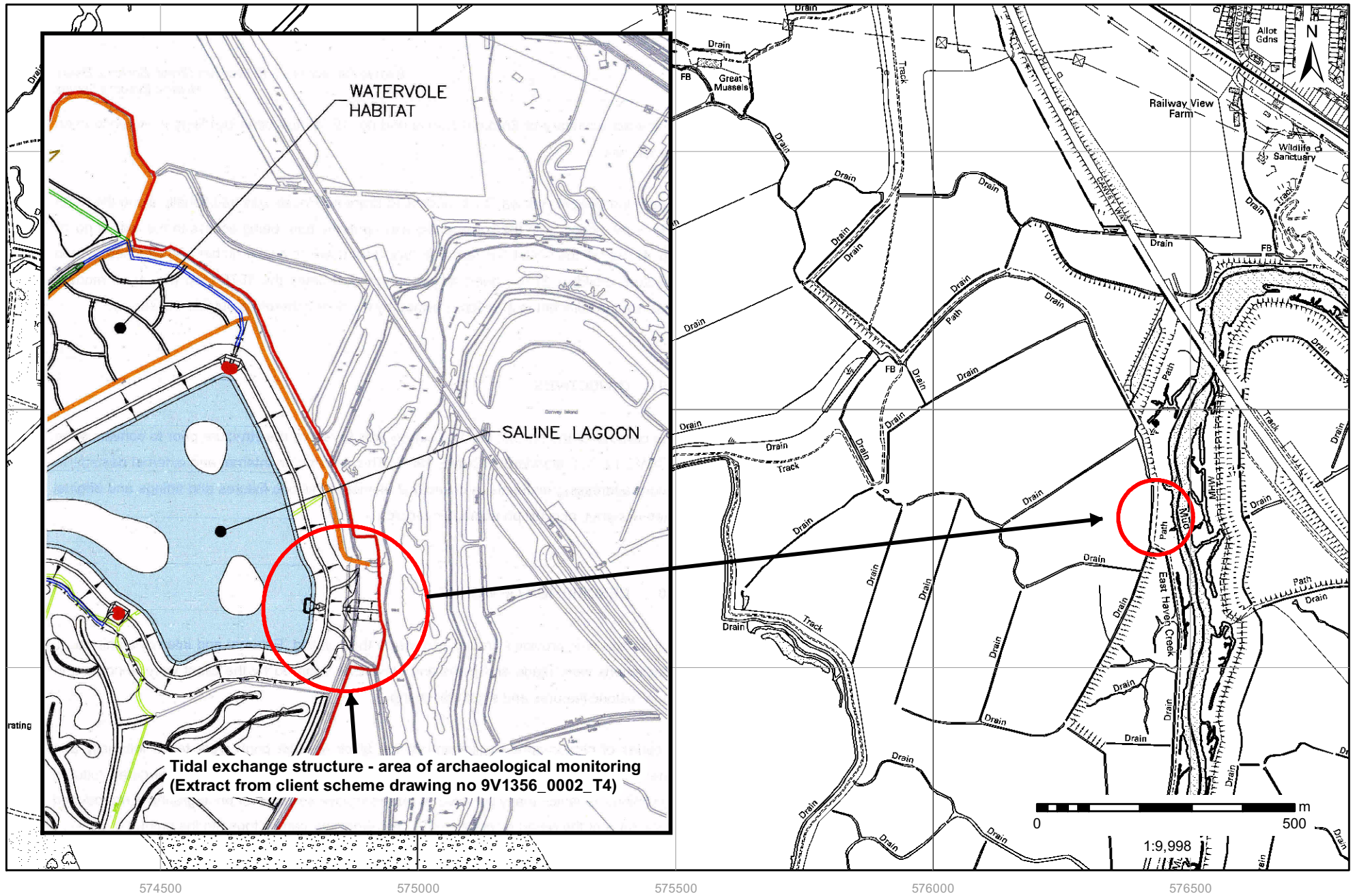
Finds

No finds retained

APPENDIX 2: EHER SUMMARY SHEET

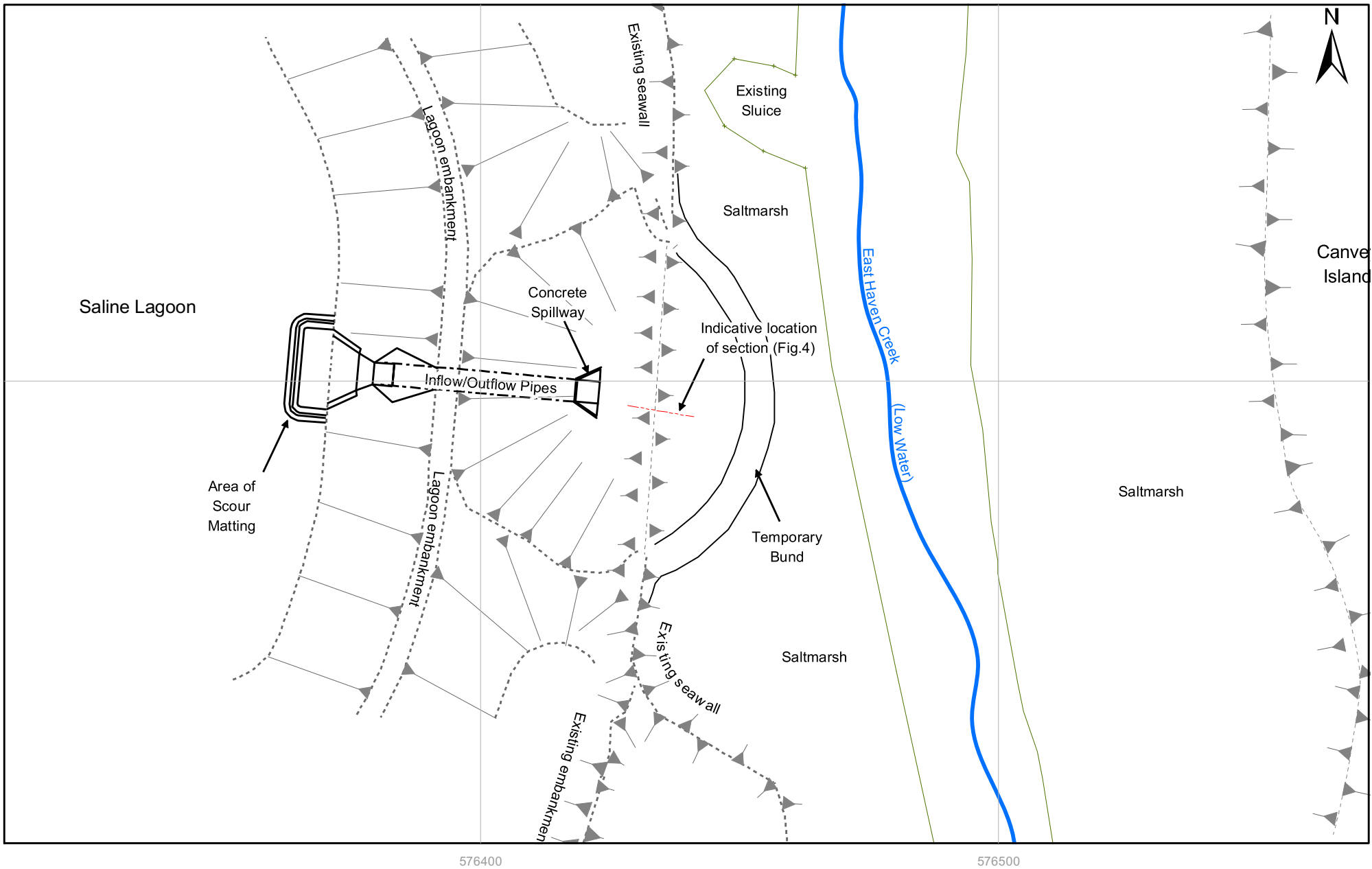
Site name/Address: RSPB Bowers Marsh – Tidal Exchange Structure	
Parishes: Bowers Gifford	District: Basildon
NGR: TQ 76421 85796	Site Code: BABM 09
Type of Work: Archaeological Monitoring	Site Director/Group: Ellen Heppell, ECC Field Archaeology Unit
Dates of Work: September 2011	Size of Area Investigated:
Location of Finds/Curating Museum: Southend	Client: Royal Haskoning Ltd., acting for the RSPB
Further Seasons Anticipated?: No	Related HER Nos.:
Final Report: EAH Summary	Oasis No.: essexcou1-111311
Periods Represented: Post-medieval/ Modern	
SUMMARY OF FIELDWORK RESULTS:	
<p><i>Archaeological monitoring was carried out during the construction of a tidal exchange structure at the RSPB Bowers Marsh Reserve. The structure is located on the eastern side of the reserve and links a saline lagoon with Easthaven Creek, allowing regulated exchange of seawater between the lagoon and the creek. Prior to monitoring, that part of the exchange structure contained within the built-up bank of the lagoon had been constructed and the area of works subject to monitoring was focussed on the extant sea wall (to the east of the lagoon) and the saltmarsh between it and the creek.</i></p>	
<p><i>The construction of the tidal exchange structure was carried out by removing the vegetation and the top 200-300mm of soil from the footprint of a temporary bund (on the saltmarsh) and the removal of a section of the seawall, with the material from the seawall used to build the bund. A channel between this temporary bund and the lagoon was excavated and lined with scour matting, the temporary bund then was removed and the channel extended to Easthaven Creek.</i></p>	
<p><i>The archaeological monitoring did not identify any archaeological features other than the extant seawall (EHER 45783), which predates 1777. The removal of part of the wall allowed a section through it to be recorded, showing that it comprised a simple clay embankment which had been heightened in the past, presumably in response to the threat of overtopping.</i></p>	
Previous Summaries/Reports:-	
<p>Germany, M. 2009 <i>RSPB Bowers Marsh Wetland Nature Reserve, Basildon, Essex. Archaeological trenching and test pitting.</i> ECC FAU report 2130</p>	
<p>Young, D.S. 2009 <i>Trial pits at Bowers Marsh, Pitsea, Essex: Preliminary Geoarchaeological Report.</i> Quaternary Scientific (QUEST) unpublished preliminary report, project number 064/09</p>	
<p>Heppell, E. 2009 <i>RSPB Bowers Marsh Wetland Nature Reserve. Desk-based Assessment.</i> FAU report 2114</p>	
<p>Medlycott, M. and Gascoyne, A. 2006 <i>A contemplation of things wide and infinite. A report to the</i></p>	

Site name/Address: RSPB Bowers Marsh – Tidal Exchange Structure	
<i>RSPB on archaeological desk-top and walkover surveys of proposed new RSPB reserves in south Essex. ECC limited circulation report</i>	
Author of Summary: E. Heppell	Date of Summary: October 2011



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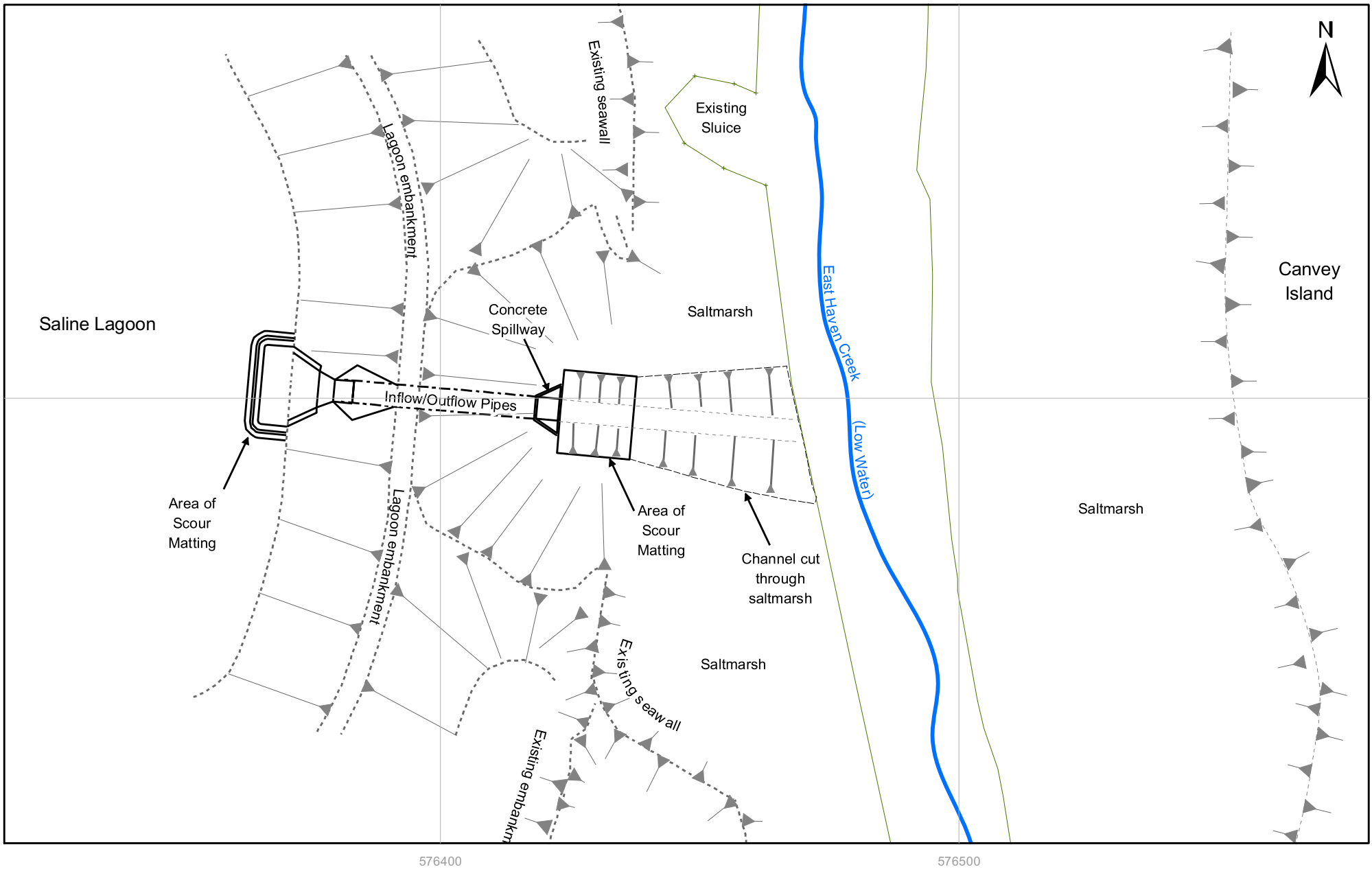
Fig.1. Location of archaeological monitoring of tidal exchange structure



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Fig. 2 Tidal Exchange Structure prior to the removal of the seawall (showing indicative position of temporary bund)





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Fig. 3 Tidal Exchange Structure following the removal of the seawall and temporary bund



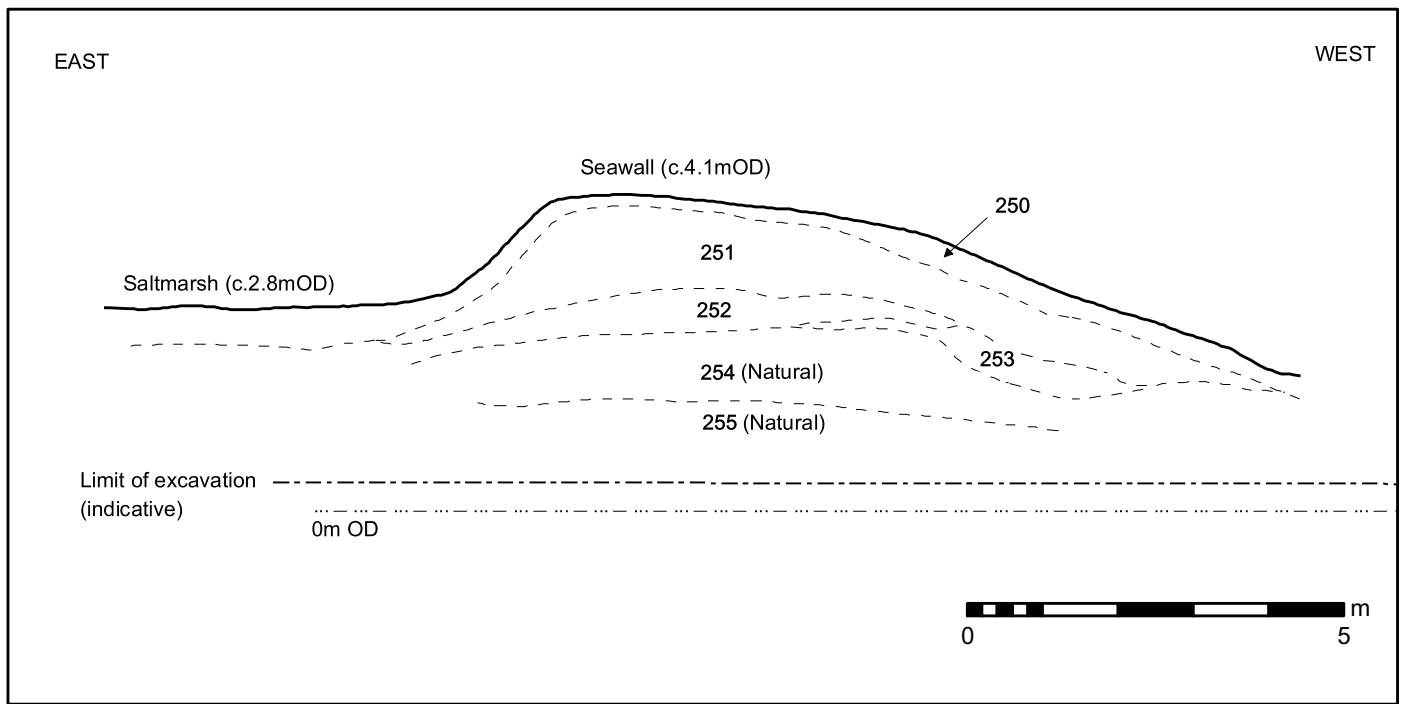


Fig. 4 North facing section through the seawall



Plate 1 Saline lagoon embankment and concrete spillway (from seawall)



Plate 2 Seawall being removed



Plate 3 Section through seawall (1.5m scale)



Plate 4 Excavation of the channel between the spillway and temporary bund



Plate 5 Scour mats being placed in the channel (from the temporary bund)



Plate 6 Completed structure. Looking from the saline lagoon embankment to Easthaven Creek at low tide.