# THE GREATER THAMES ESTUARY

# HISTORIC ENVIRONMENT RESEARCH FRAMEWORK

# 2010

## Update and Revision of the Archaeological Research Framework for the Greater Thames Estuary (1999)

Essex County Council

ENGLISH HERITAGE

Kent County Council

Thames Estuary Partnership

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**June 2010**

**Prepared by**
**Essex County Council, Historic Environment Branch**

**On the behalf of**
**Greater Thames Estuary Archaeological Steering Committee**

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## Update and Revision of the Archaeological Research Framework for the Greater Thames Estuary' (1999)

**Project Title:** Greater Thames Estuary Research Framework Review

**English Heritage Proj. Ref:** 5084

**ECC Proj. Ref:** 1592

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**Derivation:** 1592GTRF_draft_feb10

**Origination Date:** July 2009

**Date of document:** Nov 2010

**Version:** 6

**Status:** Final document
**Summary of changes:** Final report

**Circulation:** General circulation

**Filename and location:** ECC FAU, Braintree
*H:/fieldag/project/1592/text/1592GRRF_Final_Nov10.doc*

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## FOREWORD

The Greater Thames Estuary is an area with a rich historic environment resource; above and below ground, and above and below water. In 1999 the Greater Thames Estuary Archaeological Steering Committee published the first research framework for the estuary (Williams and Brown 1999) recognising the need for a coherent approach to research in this great European estuary. This document has served to direct research and underpin curatorial decision making for the last ten years. These are also years which have seen considerable change around the estuary which has been the site of large infrastructure projects, development and coastal management, with a consequent increase in archaeological and other investigations.

The research framework was not intended to be a static document and a review process was instigated by the GTEASC (with funding from English Heritage) to provide up to date tools for responding to the changes in the estuary and the challenges and opportunities they represent. This updated Research Framework presents the results of than review, considering:

- Work that has been carried out since the 1999 publication
- What has been achieved
- What research questions remain valid
- What new questions should be asked

This review has been a collaborative process, drawing from the incredible knowledge and experience of those with an interest in the historic environment of the estuary across all sectors. Their contributions have been key to the development of this document. They have also provided the inspiration to carry through the demanding review process and they deserve our grateful thanks.

Investigations into the historic environment will continue, the results answering some of the questions posed here and raising new ones. The GTEASC will continue to meet, encouraging research. In a few years time it is hoped that a review of the 2010 document will show the same significant progress as that which has taken place in the last ten years.

Rob Whytehead (Greater London Archaeology Advice Service, English Heritage)
Chair, Greater Thames Estuary Archaeological Steering Committee

## ACKNOWLEDGEMENTS

The production of this updated and revised Research Framework has been a collaborative process, reliant on contributions from a wide range of groups and individuals. These came from the various modern administrative areas around the estuary (Kent, Essex and Greater London). There have, inevitably, been some changes to the committee through this review process as people have changed jobs or roles. The following have been involved in the committee:

Rob Whytehead (Chair)
Jill Goddard
Nigel Brown
Lis Dyson
Dominique de Moulins
Jane Sidell
Jen Heathcote
Rachel Ballantyne
Mark Stevenson
Paul Cumming
Debbie Priddy
Judith Roebuck
Peter Murphy
Steven Brindle
Tony Sowerbutts
Rose Hooker
Steve Kemp
Clare King

Kathy Perrin has been the English Heritage Projects Officer for this review (and the development of research frameworks in general); she has provided invaluable advice and support throughout the review, many thanks.

The drawing together of the overviews of work carried-out and the development of the research framework has been possible through the contributions of a wide range of stakeholders with an interest in the historic environment of the estuary. These have included the natural environment sector, whose perspective has provided an added dimension to the document. We would like to take this opportunity to thank all those who have commented and provided information and support, without whom this review would not have been possible.

## 1.0 INTRODUCTION

1.1 The Greater Thames Estuary is a complex of estuaries and creeks opening into the North Sea. These estuaries include those of the Blackwater and Crouch to the north and the Medway and Swale to the south. The whole area is a network of subtle interfaces and is understood by seafarers to be a single 'broad sea gulf' (Raban 1986). At its heart is the Thames Estuary itself, a cultural social and economic artery between England, the continental mainland and the wider world. Archaeological evidence for this rich past can be found above and below ground all around the estuary, in the intertidal zone and within the subtidal zone. This research framework encompasses this broader estuary, encompassing the north Kent Coast, upstream into London and out along the Essex coast.

1.2 Research frameworks are now established as a vital part of work in the investigating the historic environment of Great Britain. In the late 1990s the original archaeological regional research framework was prepared under the direction of the Greater Thames Estuary Archaeological Steering Committee, recognising that the historic environment of the estuary needed a cross-cutting framework incorporating the three modern political authorities around the estuary; Essex, Kent and Greater London. The framework was published in 1999 (Williams and Brown 1999) and since that date has been utilized to inform the development of archaeological research and historic environment management strategies in response to major development schemes in the region, such as the Channel Tunnel Rail Link, supported research projects, for example Rapid Coastal Zone Survey and informed responses to individual development proposals. It also proved to be a useful tool for demonstrating the importance and range of the historic environment resource to organisations outside the heritage sector.

1.3 Research frameworks should not, however, be static documents. The process of investigation that they drive may answer some of the questions originally posed but will also present new questions and areas of research. Since 1999 the number of projects undertaken around the Thames Estuary saw a dramatic increase, a mix of research orientated initiatives and those undertaken in advance of development and its associated infrastructure. As the decade passed the Greater Thames Estuary Archaeological Steering Committee continued to meet. It became clear that the original framework should be reviewed in order to, in essence, assess what had been achieved moving towards the objectives that had been set out and what new objectives should be considered, ultimately contributing to a new strategy for the estuary.


Fig. 1: The Greater Thames Estuary

1.4 As the Greater Thames geographical area includes a number of modern administrative regions and as such there are other research frameworks, which include the geographical area such as those for the East of England, Greater London and the South-East. There are also a number of period based and thematic frameworks. These are generally 'dryland' frameworks whereas the Greater Thames Framework focuses on the modern intertidal zone, the extant and former marshland, the Holocene floodplain and marine zones. The framework also has a broad chronological scope, ranging from the Pleistocene through to the mid (and in some cases late) 20th century.

1.5 This updated research framework is intended to provide the basis for programmes of research into the historic environment of the region, a framework within which research initiatives can take place that build on existing knowledge to address identified objectives. The framework is intended for all who have an interest or stake in the historic environment; such as, individuals, local societies, archaeologists and historic building specialists. The framework will also assist in developing curatorial strategies for the region through providing defined objectives.

*Review Methodology*

1.6 The review has been carried out under the aegis of the Greater Thames Steering Committee. It was decided that for consistency and ease of reference the broadly thematic structure of the original framework should be retained. Key aspects of the archaeological resource of the Thames Estuary relate to the physical environment and landscape; the Pleistocene terraces on the estuary margins, the Holocene floodplain with its palaeoenvironmental potential, the waterlogged and damp conditions, landscape management and exploitation and ultimately the transformation of the estuary into the form we see today. A thematic approach was considered the best to bring out these aspects of the estuary and differentiate its character from that of the adjacent regions.

1.7 Given the wide geographical and chronological scope of the research there were a wide range of individuals and organisations with an interest in the review and consultation was key. This was carried out via e-mail with documents for comment including outlines and drafts. An open seminar also took place where the issues raised could be discussed.

1.8 The review commenced by identifying initiatives that had taken place since the publication of the original framework, through research and consultation. These were used to develop overviews of recent work, consider what contribution had been made to framework objectives, what objectives needed to be added, revised, or indeed had been completed which formed the basis of the strategy section.

*Format and Terminology*

1.9 The basic thematic structure of the original framework resource assessment and research agenda has been retained (with some minor alterations). Thematic sections comprise:

- The development of the Thames Estuary (Pleistocene geology, Palaeolithic and Mesolithic archaeology and Holocene palaeoenvironment)
- Maritime archaeology
- Intertidal and related archaeology (includes seawalls/flood defences and former wetland)
- Land-use and occupation
- Historic built environment
- Historic defences and other military installations

- Industry and transport
- Methodology, management, education and presentation

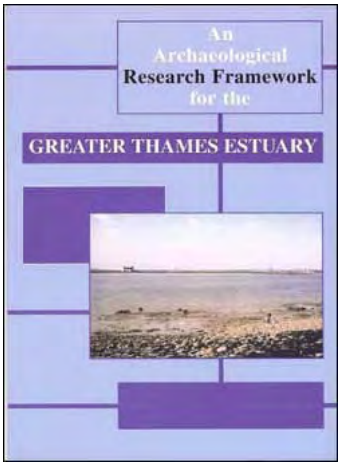
1.10 Each section comprises a tripartite structure: a review of recent projects (an updated resource assessment), consideration as to how these have contributed to the original objectives and new directions, and updated objectives.

1.11 As with the original framework there is a series of tiers of objectives:

- Framework Objectives - The broad questions that should be considered for each theme
- Specific Objectives - more specific questions which contribute to a framework objective
- Areas of Research – initiatives to address the framework/specific objectives

1.12 For ease of reference the objectives and areas of research for each theme have been assigned an alpha numeric identifier; FO refers to framework objectives, SO to specific objectives and AR to areas of research. These are not presented in order of importance and make no pretence to encompass every possible research question which could apply to the Greater Thames. The final section of this framework presents a research strategy for the Greater Thames Estuary.

1.13 Hyperlinks to relevant websites have been included where possible and were correct at the time of writing. PDF copies of the original framework can be found at http://www.thamesweb.com .



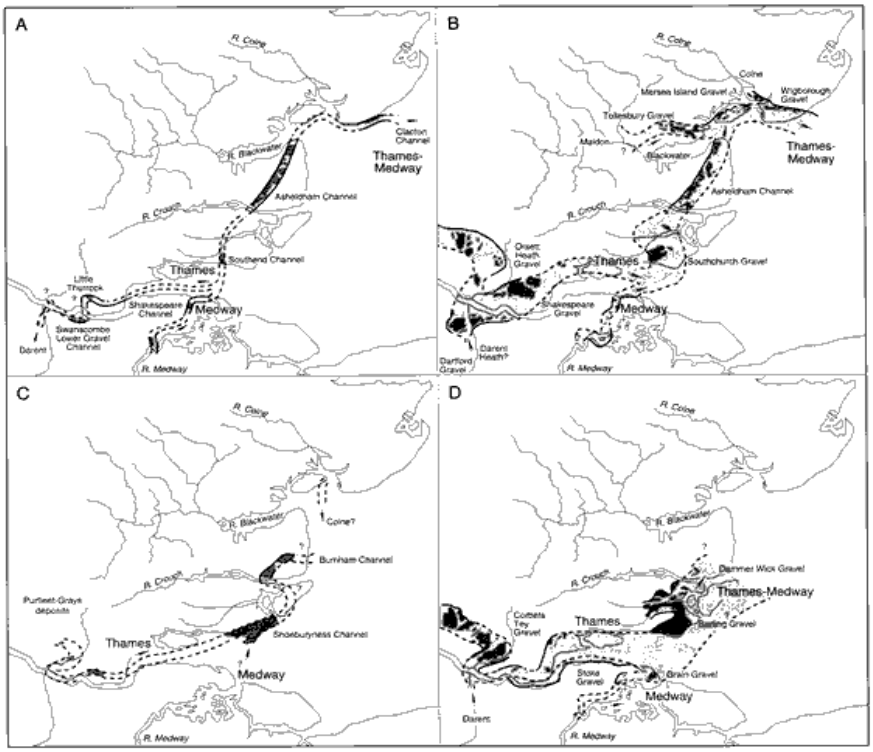

*An Archaeological Research Framework for the Greater Thames Estuary* 1999
Williams, J. and Brown , N. (eds)

# 2.0 THE DEVELOPMENT AND PALAEOENVIRONMENT OF THE THAMES ESTUARY

## 2.1 The Thames through Time

2.1.1 The Thames estuary of today has developed through millennia through natural changes and, in later periods, through human adaptation and transformation. The developing estuary has a wide range of evidence for landscape change, such as geological deposits, archaeological remains and palaeoenvironmental remains which, for example, are an important component of research into early occupation of the British Isles and past environmental and climate change.

2.1.2 The River Thames has long been a focus of study for river dynamics and terrace formation, particularly in the outer estuary. Nevertheless, the course of the Thames has moved substantially over its history. These days, the river is indelibly associated with London, but it did not begin its life here. Prior to the Anglian glaciation (MIS 12), the Thames ran significantly to the north, draining through the Vale of St Albans, through East Anglia to the sea at Clacton. Following the collapse of the ice-dammed lake at the front of the Anglian ice sheet, the River Thames was forced south to start shaping the current Thames Valley. Till was also deposited on the northern edges of the area by the Anglian ice sheet, as far south as Hornchurch. Over the next approximately 420,000 years, the familiar Thames Terrace sequence was created through successive phases of downcutting and gravel deposition (see 2.2 below). The major tributaries such as the Darent, Medway, Cray and Lea developed and shifted from their pre-Anglian routes, draining into the new course of the Thames.




*Series of Palaeogeographical maps of the lower reaches of the Thames, after Bridgland (1994) but modified to incorporate the findings of Roe (1995) and to depict the interglacial high sea level phases.*

Fig. 2: Palaeogeographic maps of the Thames

2.1.3 This system differs slightly along the length of the river, and it has not been possible to link the Upper and Middle Thames. Also, much of the lower Thames deposits are buried under tens of metres of Holocene alluvium and thus have not been studied as extensively. Nevertheless, the work of both Philip Gibbard and David Bridgland has meant the history of the Thames is better understood than most rivers in the UK.

2.1.4 The river changed out of all recognition with the coming of the Romans and the emergence of a riverside urban centre. Prior to this, it had flowed unchecked across the floodplain cut through previous terraces, being used relatively lightly for transport and deposition of votive objects such as swords. Traces of prehistoric riverside structures have been found very rarely, such as the Bronze Age jetty at Vauxhall, but nothing to impact upon the river in any significant manner.

2.1.5 The Roman city of Londinium was situated approximately at the tidal head and consequently was important for the transport of both people and goods. It became a port early on, with traces of riverside structures from the mid-first century AD. These were relatively modest, however following the sacking of Londinium by Boudicca, the quayside was rebuilt in a much more robust and regular form, possibly by the civil administration or military. The south bank was less heavily built-up; there, the island complex was revetted and channels modified to suit the growing city and port, which was linked across the river with the first major bridge across the Thames.

2.1.6 Owing to what appears to be a drop in river levels in the later Roman period, the waterfront was progressively moved out into the river, with a concurrent lowering in altitude of the quayside. The tidal head would seem to be moving downstream throughout the Roman period, although exactly why is not yet clearly understood; it may have been linked to land subsidence rather than an actual fall in relative sea-levels.

2.1.7 In the outer estuary the wetlands would have been more extensive than those of the present day and the shape of much of the estuary can broadly be postulated by the location of saltern sites of this period. These would have been situated at, approximately, the high tide line, either on the coastal edge or associated with tidal creeks. The landscape would have been a largely natural mixture of marshland, supratidal and intertidal flats. Modification of the rivers may have occurred but would be likely to be small scale and associated with specific sites; such as the cleaning out or lining of creeks to ensure salterns could operate.

2.1.8 By the Saxon period the Roman city of Londinium had fallen into disrepair. Some evidence is present to show that the foreshore along the Strand was used, next to where the Saxon *emporium* of Lundenwic was established. but possibly in an unstructured way, such as for beach markets. It was only in the late Saxon period, under King Alfred, through into the medieval period that the riverfront in the walled city was once again extensively revetted and modified. However, this was significantly different from the Roman waterfront. No consistency of building can be seen along the north bank, suggesting that stretches were built through different enterprises and taking many forms. Archaeological investigations in the outer estuary have shown that large areas of the wetland landscape were buried under alluvial deposits in the late/post Roman periods (e.g. Rippon 2000, 138).

2.1.9 By the 8th century it is possible that some of the marshland areas around the estuary were being modified by man, through improvements to flood-defence and drainage, perhaps taking the form of embankment. From the 12th century in North Kent there are numerous references to embanking (initial inning, extension/improvement of extant

walls). In Essex, to the west of Corringham, many marshes had been embanked by the early 14th century. Other extensive tracts, like Canvey Island, were not embanked until the 17th century. Embankment has continued through successive centuries, particularly through the 19th century. The scale of this enterprise and the effects on the estuary are demonstrated by the length of wall in Essex; *c.* 266 miles in 1777 and *c*. 321 miles in 1930 (Grieve 1959, 34).

2.1.10 The evolution of the Thames Estuary through these latter centuries represents a constant battle with the tide. After all "Essex and the sea have been antagonists for centuries" (Grieve 1959), as is true for Kent and London. Since the 1980s, recognition of global warming and consequent sea-level rise has brought the issue of coastal defences to the fore; new options are being examined, such as managed realignment, two tiered defences and soft defences (e.g. ECC 1994, 8–9). The environment of the Thames is once again being transformed through habitat re/creation, flood management and realignment.

2.1.11 When considering the evolution of the Thames through time, research objectives (detailed in Section 10) include increasing our understanding of the physical evolution of the Thames Estuary, climatic and environmental change, social and cultural strategies in relation to the changes in the environment.

## 2.2 Palaeolithic and Mesolithic

2.2.1 The Greater Thames area is one of considerable significance for Pleistocene environment and Palaeolithic archaeology. The river terraces of the lower Thames and its tributaries provide a key geological framework for this part of Britain. They have important links with the glacial stratigraphy of East Anglia, sites in the London and North Sea basins, and surrounding parts of continental Europe (e.g. Bridgland 1994). These deposits are not confined to modern dryland but continue offshore. Each of the terraces contains a sedimentary sequence, with cold climate gravels between which temperate climate, often fossiliferous, gravels occur (Bridgland 1994; Bridgland 2000). Most of the terraces contain discrete biostratigraphically diagnostic mammalian faunal assemblages, with complimentary evidence from molluscan fauna and Palaeolithic archaeology (Bridgland *et al.* 2003). They represent an important resource and many of the key sites are designated as Sites of Special Scientific Interest (SSSI) on geological grounds; these include Lion Pit, Globe Pit (in Essex) Wansunt Pit and Bakers Hole (in Kent).

2.2.3 These important early river terrace deposits have been subject to large-scale exploitation since the 19th century, particularly for aggregate and chalk extraction. The former pits and quarries remain in the modern landscape, in some cases the floors are already developed (e.g. Lakeside shopping centre, Essex) and others are proposed for development (e.g. Eastern Quarry, Kent), but in many instances, sections are available for study.

2.2.4 “The Thames Estuary is a key region for Palaeolithic archaeology in Britain” (Wenban-Smith 2004b, 35) as the Middle and Late Pleistocene fluvial deposits, contemporary with Palaeolithic occupation, are better preserved than in other areas. The fluvial deposits contain Palaeolithic artefacts and, although not necessarily undisturbed, these deposits do represent a (relatively) restricted period and spatial region. Reworked artefacts within these deposits therefore contribute to the understanding of behaviour and cultural change through the Palaeolithic (Wenban-Smith 2004b, 36). Research into the Palaeolithic has received an additional impetus in recent years by the establishment of the Aggregate Levy Sustainability Fund (ALSF), which has supported a number of

research projects. Large infrastructure projects, such as the Channel Tunnel Rail Link (CTRL) and the A13 have also provided the opportunity to examine these important deposits. The National Research Framework for the Palaeolithichas recently been completed and will guide endeavour in this area (http://www.english-heritage.org.uk/publications/research-and-conservation-framework-for-british-palaeolithic/palaeolithic-framework.pdf ).

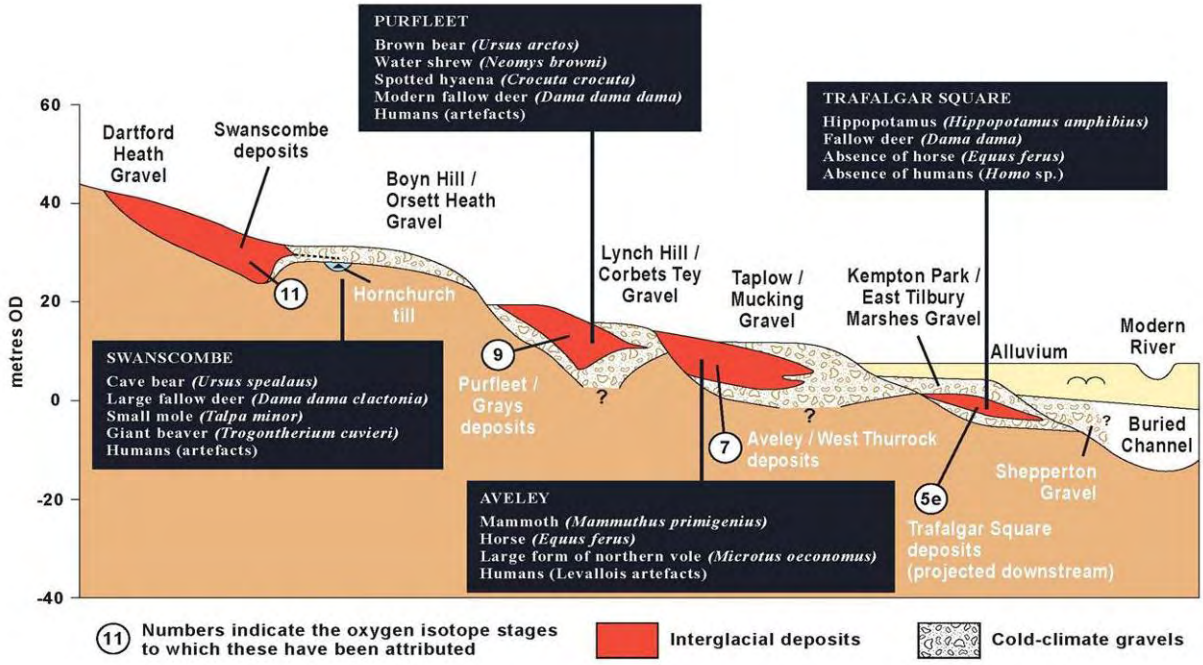



Fig. 3: The Thames Terraces (after ECC and KCC 2004)

| *Age BP* | *MI Stage* | *Archaeological Period* | *Epoch* | *Traditional Stage (Britain)* | *Climate* | *Events* |
|---|---|---|---|---|---|---|
| Present–10,000 | 1 | | Holocene | Flandrian | Warm — full interglacial | |
| 25,000 | 2 | Upper Palaeolithic (10k-358kBP) | Late (aka Upper) Pleistocene | Devensian | Mainly cold; coldest in MI Stage 2 when Britain depopulated and maximum advance of Devensian ice sheets; occasional short-lived periods of relative warmth ("interstadials"), and more prolonged warmth in MI Stage 3. | |
| 50,000 | 3 | | | | | |
| 70,000 | 4 | Middle Palaeolithic (38k-250kBP) | | | | Depopulation |
| 110,000 | 5a–d | | | | | |
| 130,000 | 5e | | | Ipswichian | Warm — full interglacial | |
| 190,000 | 6 | | Middle Pleistocene | Wolstonian | Alternating periods of cold and warmth; recently recognized that this period includes more than one glacial–interglacial cycle; changes in faunal evolution and assemblage associations through the period help distinguish its different stages. | |
| 240,000 | 7 | | | | | |
| 300,000 | 8 | Lower- Middle Palaeolithic Transition | | | | |
| 340,000 | 9 | Lower Palaeolithic 250k – 500kBP | | | | |
| 380,000 | 10 | | | | | |
| 425,000 | 11 | | | Hoxnian | Warm — full interglacial | Thames flowing in present course. |
| 480,000 | 12 | | | Anglian | Cold — maximum extent southward of glacial ice in Britain; may incorporate interstadials | Major glaciation: Thames blocked by ice in Vale of St.Albans: major drainage modification |
| 620,000 | 13–16 | | | Cromerian complex and Beestonian glaciation | Cycles of cold and warmth | Thames flowing to NE through St.Albans. |
| 780,000 | 17–19 | | | | | |
| 1,800,000 | 20–64 | | Early (aka Lower) Pleistocene | | Cycles of cool and warn, but generally not sufficiently cold for glaciation in Britain | |

Table 1: Dating conventions

## 2.3 Relative Sea-level

2.3.1 The Greater Thames is a valuable area for the study of past environmental change and its relationship to human activity, particularly relative sea-level change and its relationship to human activity over more recent prehistory. The extensive deep floodplain deposits which overlie the Palaeolithic sands and gravels of the Greater Thames Estuary provide a range of data on the geometry of the river system itself, evidence of plant and animal communities and indicators of past climatic change.

2.3.2 Relative sea-level change in the Thames has been studied, perhaps to a lesser extent than some of the other major estuaries such as the Severn and the Humber. Furthermore, this research has almost exclusively been confined to the Holocene period. Nevertheless, seminal works, such as that by Devoy (1979), have influenced the way research has been undertaken in the Thames. Devoy published two curves of relative sea-level change, focusing on Tilbury and elsewhere in the estuary, indicating a rapid rise in relative sea-levels following the onset of the Holocene warm period, consequent on discharge of melt water into the world's oceans. From approximately 6000 C14 BP, Devoy noted a drop in relative sea-level lasting for approximately 1500 years before rising again, in a trend continued to this day.

2.3.3 This model stood the test of time for 25 years and was subsequently revisited by several researchers (Long 1995; Haggart 1995; Sidell 2003). The evidence for a drop in relative sea-level in the middle Holocene is contested and has been refuted by Sidell (ibid.). A new illustration showing the evidence for sea-level change in the middle estuary is shown below in Fig 4. This can be expressed as a tri-partite model, where waterlogging of the floodplain began in the late Devensian causing the accumulation of freshwater peats in some places. River levels then began to rise but did not have widespread impact as the extensive glacial floodplain was encroached upon only gradually. Marine waters progressed through the middle estuary from before 5000 cal BC, causing raised water tables in the floodplain, and leading to peat formation. At this point, the rate of relative sea-level rise has been averaged at 2.5mm per year. From approximately 4000 to 1500 cal BC, the rate of rise seems to have decreased to 0.8mm per annum, for as yet unknown reasons, and is taken as the second phase of the model. Possibly this is as a result of changes to patterns of subsidence in the region. The reduction on the rate of rise led to massive expansion of the wetlands in which much important archaeology has been preserved. At the end of this period, a further phase of increased relative sea-level rise has been observed and carries on to the present day. The rate of rise is not as great as experienced following the end of the last ice age, and has been calculated at approximately 1.9mm per annum, with river levels in the Thames having risen in the order of 15m during the Holocene.

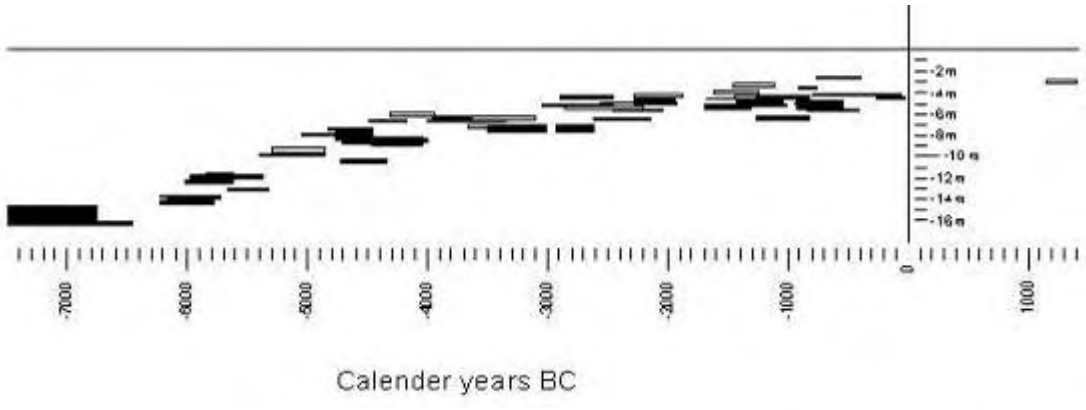



Fig. 4: Old and new sea-level curves

## 2.4 Recent Projects

2.4.1 A number of key projects have been carried out since the publication of the original research framework. These represent a wider body of work, which has taken place in the region and are presented, where possible, in chronological order although it should be noted that a number of projects extend across numerous periods.

2.4.2 The *Ancient Human Occupation of Britain* is a partnership between a wide range of organisations and specialists, areas of research include the earliest occupation of the British Isles, the Middle Palaeolithic abandonment and repopulation of Britain. A key site investigated under the programmes is that of Pakefield Cliff, Suffolk, where internationally significant flint artefacts, plant and animal fossils form the earliest evidence for human activity in northern Europe *c*. 700,000 BP (*Nature* 438:1008–1012). The programme is also investigating a site at Happisburgh, Norfolk, where flint artefacts and butchered bone were recovered from the base of eroding cliffs. The site dates to *c.* 500,000–600,000 years ago (britishmuseum.org/happisburgh). Although outside the Thames Estuary, part of the Bytham river system, the finds at Happisburgh demonstrate the potential of modelling and prediction.

*Lower Palaeolithic (pre-425 kBP; MIS 12 and earlier)*

2.4.3 Archaeological investigations at the Westcliffe High School for Girls, Southend-on-Sea, Essex, was carried out as part of the Medway Valley Palaeolithic Project (MVPP), which focussed on the Middle and Late Pleistocene fluvial deposits laid down by the early River Medway. The project included fieldwork and specialist analysis at a number of locations to validate and develop the chrono-stratigraphic framework, detailed recording of existing Palaeolithic artefact collections and GIS analysis to create a predictive model (including assessment zones containing information on objectives, investigative priorities and strategies). It has begun to develop research objectives for the valley, along with investigative methodologies. Test pitting at Westcliffe recovered a single flint flake from the Canewdon/Clinch Street deposits, pre-Anglian in date, deposited roughly 600,000 bp, and therefore the earliest evidence of hominid presence in the region (Wenban-Smith, Briant and Marshall 2007).

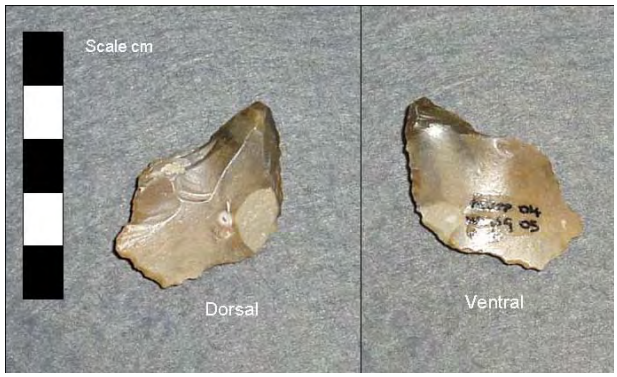



*Photo: Dr Francis Wenban-Smith*
*Dept of Archaeology, University of Southampton*

Fig. 5: Flake from pre-Anglian gravels at Westcliff High School for Girls, Southend-on-Sea

*Lower to Middle Palaeolithic (415–125 kBP; MIS 9–7)*

2.4.4 The Channel Tunnel Rail Link (CTRL) was a massive engineering project, cutting through extensive swathes of the Thames Estuary and its tributaries. The scheme had its own research framework, which focused on an examination of the occupation of the floodplain and its evolution. Extensive fieldwork was carried out along the route following initial geoarchaeological assessment. This included work at Bakers Hole/Ebbsfleet Valley, Kent, an area of Pleistocene deposits that from the late 19th century onwards has produced a range of Palaeolithic evidence. Although extensive aggregate extraction has taken place in the area, patches of sediments with archaeological potential do survive. The CTRL studies identified a variety of deposits, which were rich in biological evidence.

2.4.5 The fieldwork at Ebbsfleet also identified an important butchery site. An incomplete skeleton of a straight-tusked elephant (*Palaeoloxodon antiquus*) was recovered in close association with flint cores, flakes and notched flake tools. The environmental evidence indicated temperate conditions with local woodland. The deposits are likely to date to MIS 11, *c*. 425,000 BP (Wenban-Smith *et al*. 2006). At Station Quarter, Springhead test-pitting aimed to define the extents of lakeside deposits and identified a sequence, rich in palaeoenvironmental evidence such as ostracods, fish, small vertebrates and molluscs which will provide important new evidence for the climate and environment. A handaxe was recovered which, given its mint condition, is potentially from an *in situ* context (Wessex Archaeology pers. comm.).

2.4.6 Other projects have also taken place within the planning process, for example at the Swan Valley Community School, Swanscombe, where test-pitting was followed by further investigation and OSL dating (Wenban-Smith and Bridgland 2001). At two sites to the south of Swanscombe village, Palaeolithic flint artefacts and faunal remains were recovered from river gravels revealed during construction works. “Although outside the mapped extent of the Boyn Hill/Orsett Formation, the newly discovered deposits can be firmly correlated with the Middle Gravels and Upper Loam from the Barnfield Pit sequence dating to *c*. 400,000–380,000 BP. This increases greatly the known extent of these deposits, one horizon of which produced the Swanscombe Skull, and has provided more information on their upper part” (Wenban-Smith and Bridgland 2001).

Fig. 6: Investigating the Palaeolithic during construction of Channel Tunnel Rail Link
(Photo: Rail Link Engineering)

2.4.7 Work on the eastern side of Wansunt Pit, Kent exposed Pleistocene sediments and Palaeolithic artefacts (EH Summary Proj 2893ANL). The area under archaeological investigation at the eastern edge of Wansunt Pit contained no remnant of the Wansunt Loam. The upper part of the Pleistocene Dartford Heath Gravel was seen, overlain by a sedimentary unit 50–80cm thick of banded sands and sandy silts, probably of Pleistocene colluvial origin, and sloping downhill to the north, parallel to the existing ground surface. A few derived and transported Palaeolithic artefacts were found in the upper part of the Dartford Heath Gravel. The archaeological excavation also led to the exposure of a sequence of colluvial and possibly also ploughed Holocene deposits containing a range of lithic and pottery evidence from the Neolithic and maybe also subsequent periods. In the eastern part of the quarry geological investigations exposed Pleistocene sediments, including the Wansunt Loam. Twelve Palaeolithic artefacts (all flint flakes) were found in the Wansunt Loam at one location. These were mostly in very sharp condition, suggesting a minimum of disturbance, and two of them refitted. supporting the notion that there is an undisturbed occupation horizon at this location.

2.4.8 The *Medway Valley Palaeolithic Project* (Wenban-Smith *et al.* 2007) fieldwork at Cuxton in Kent recovered contrasting types of handaxe (cleaver and ficron) in the same archaeological level, dating to *c*. 230,000 BP. Artefacts included a massive ficron (307mm in length) and a similarly large cleaver, along with a further 18 handaxes, all from a small test-pit (Wenban-Smith 2004c, 15–16).

2.4.9 Archaeological work in the Purfleet area, Essex, has included rescue excavations prior to development at Greenlands (a.k.a. Dolphin) Pit (Bridgland 1994; Schreve *et al.* 2002, Allen, n.d.). The work at Greenlands resulted in the re-evaluation of an important site; argued to contain interstratified assemblages from the Clactonian, Acheulian and Levalloisian cultures. The site is important because it represents the only location in Britain where the three material cultures are found in association. At Aveley, to the north of Greenlands, exposed sections were examined in the 1990s during the construction of a new section of the A13 dual carriageway. The analysis of the results supported the attribution of the sequence to MIS 7, but also suggested that within this there may be more than one temperate phase, each represented by separate vertebrate assemblages (Schreve 2001). A review of published data on these and other key Middle Pleistocene localities, along new investigations, can be found in Bridgland *et al.* (2003) http://eprints.rhul.ac.uk/114/ .

Fig. 7:

Excavation on the A13 at Aveley recovered the first evidence for the presence of the jungle cat (*Felis chaus*) in Britain

(Reconstruction by R. Massey-Ryan, ECC)

*Upper Palaeolithic and Mesolithic (38kBP – 4000cal BC; MIS 2–1)*

2.4.10 *The Colonisation of Britain by Modern Humans* project aimed to enhance the national dataset of the Upper Palaeolithic and Mesolithic; the primary data source being the extensive and important archive of Dr Roger Jacobi. This, and other data, has been used to create a national record of sites and findspots for these periods, known as PaMela (Wessex Archaeology), The JJ Wymer archive, comprising his Field Note Books dating from *c*. 1949–2005, is also now readily available through the ADS (http://ads.ahds.ac.uk/catalogue/archive/wymer_eh_2008/). These notebooks are a unique record of the lifetime's work of Britain's foremost specialist in Palaeolithic archaeology.

2.4.11 At present, the Upper Palaeolithic and Mesolithic would generally appear to be poorly represented across the region. Evidence for Mesolithic activity appears most frequently in the Lea Valley, Essex/London, for example in the Olympic Park where Mesolithic flints have been recovered (MOLAS 2005). There are few new sites and this would also appear to be the case in the south-east region, which includes Kent, and the East of England, including Essex. This has been an issue which has been discussed at seminars for the development of regional research frameworks for the East of England (including Essex) and the South-East (including Kent).

*Artefact Studies*

2.4.12 Artefact studies, i.e. beyond that of intra-site analysis of a given project, include the *Stopes Palaeolithic Archive Project* (Wenban-Smith 2004a). This studied the substantial collection of Lower and Middle Palaeolithic artefacts collected by Henry Stopes in the 19th century, including material from Swanscombe. The project identified Stope's Kent findspots, the period to which the artefacts belonged, their stratigraphic provenance, potential for lithic analysis and the significance of a number of the sites (http://ads.ahds.ac.uk/stopes).

*Drowned Landscapes*

2.4.13 The gravel deposits continue offshore in some cases, but are at risk from the impacts of dredging, and other forms of development, such as offshore windfarms. Methods of investigating this resource are being trialled around the country, for example, *Seabed Prehistory* (http://ads.ahds.ac.uk/seabedprehist), which aimed to develop methodologies for assessing the prehistoric archaeological potential of submerged deposits and to provide guidance to the marine aggregate extraction industry. This was accomplished by assessing and applying industry standard geophysical and geotechnical tools for archaeological evaluation. English Heritage and British Marine Aggregates Producers Association (BMAPA) have also been developing a protocol for finds recovered during dredging, supported by a programme of education and awareness.

Fig. 8

Handaxes and other lithics dredged from Aggregate Extraction Area 240, off Great Yarmouth
(photo courtesy of Peter Murphy, EH)

2.4.14 The projects discussed above are contributing to a growing awareness of the significance and potential of these drowned landscapes both in Britain and on mainland Europe. They have also led directly to the development of the North Sea Prehistory group and the North Sea Prehistory Research and Management Framework (NSPRMF), which aims to develop a joint approach to the research and management of the submerged prehistoric archaeology and landscapes.

*Relative Sea-level*

2.4.15 On relative sea-level, the Pleistocene record is poorly resolved, although recent work has led to the conclusion that the Thames was estuarine within our study area during the last four interglacials. These are, however, only snapshots against a background of long-term uplift.

2.4.16 The most significant research has been to re-visit Devoy's model of sea-level change in the Thames Estuary, which has resulted in the development of a new tri-partite model for the estuary, discussed in 2.3.3 (above).

*Holocene Stratigraphy and Palaeoecology*

2.4.17 At the time of the publication of the original framework, the nature of the Holocene deposits was based on extensive work by Devoy (1979; 1982), where borehole studies were integrated with biostratigraphic studies to infer phases of transgression and regression. Holocene stratigraphy in the estuary is complex and affected by a range of factors, for example the underlying (pre-Holocene) surface topography. This complexity means that the broadly sub-horizontal sequences predicted do not always apply (Williams and Brown 1999, 28).

2.4.18 The Greater Thames region has a large amount of palaeoenvironmental data although the distribution of this data is patchy, with London being particularly well represented. Some large projects have taken place such as those along the A13, the Channel Tunnel Rail Link and the Jubilee Line Extension. These large projects represent just a fraction of the numbers that have taken place for individual sites, where reporting has taken place on a site-wide basis, but has rarely been published or synthesised more broadly

2.4.19 The current absence of a single collated source for palaeoenvironmental data, despite the volume of work undertaken, greatly limits the amount of synthesis, analysis and predictive modelling that can be carried out. This issue is being addressed in Greater London through the creation of a series of databases:

- Absolute dates; accompanied by a commentary.
- Pollen samples; drawing together records from key pollen sequences and the grey literature.
- Environmental datasets; currently being piloted. Includes botanical, zoological and geological finds, with fields for preservation and potential.

Further information can be found in 'The Archaeologist' Winter 2006, No 59, pg. 30–31; http://www.archaeologists.net/.The pollen and environmental data is now with the GLHER (Whytehead, pers. comm.).

2.4.20 Recent fieldwork on the Olympics site at Stratford, East London, has had a significant palaeoenvironmental component. Archaeological remains, including artefacts and cut features at Carpenters Road (Olympics site 26) confirmed the landscape modelling that predicted it lay on the margins of Neolithic/Bronze Age wetland suitable for human occupation. Evaluation identified widespread evidence for prehistoric occupation,

including Mesolithic flints, Bronze Age field systems and a hut (MOLAS Annual Review 2005). Interpretation of the resulting geoarchaeological database allowed the creation of palaeogeographic maps.

Fig. 9: Drilling at Binney Farm, Kent. The buildings on the horizon are on the Essex side of the estuary (Photo: ECC)

*Modelling and GIS*

2.4.21 A number of studies have been carried out around the estuary which have considered the Palaeolithic and development of the Greater Thames utilizing existing datasets. They have had a variety of aims but a common theme is the attempt to use existing, but disparate, data to provide tools to inform current and future land-use, and consider the potential of Pleistocene and Holocene deposits, develop research and management. Studies include the *Archaeological Survey of Mineral Extraction Sites around the Thames Estuary* (ECC and KCC 2004). The outputs included GIS layers incorporating the results of specialist studies (Geology, Palaeolithic Archaeology and industrial archaeology) supported by a detailed assessment report. This study was focussed on extant and former mineral extraction sites in the Thurrock/Dartford area http://ads.ahds.ac.uk). *Mapping the sub-surface drift geology of Greater London: Lea Valley* (carried out by MOLAS) set out to create a digital geoarchaeological database of the deposits of the Lower Lea, using borehole and archaeological records to generate models (MOLAS Annual Review 2004).

## 2.5 Assessment of Contribution to the Research Objectives and Future Directions

2.5.1 The wide range of work carried out on the lower and middle Palaeolithic and the Pleistocene deposits in the region has advanced the original framework objectives. The projects promoted through the ALSF have provided synthesis of existing knowledge and in some cases these have also developed methodologies for utilizing this data to provide predictive models (e.g. the MVPP) which can inform both management of the resource within a development context and for academic research by allowing important areas to

be identified and targeted. They also have a contributed to the development of effective investigation techniques. Investigation at individual localities has helped contribute to studies of chronologies, the environment and, potentially, behaviour (for example the Cuxton site). Promotion has often been an integral part of project dissemination, and the sheer volume of work carried out on the Palaeolithic has also served to raise its profile within the non-specialist community along with recognition that it can (and should) be considered within the development control process.

2.5.2 Many of the projects which have been carried out, particularly those through the ALSF, have studied large parts of our region, and in their conclusions identified areas for further investigation. The Mineral Extraction Sites Survey has identified key Palaeolithic sites with high potential and/or need of protection (ECC and KCC 2004, 90). This study also noted that mitigation and curatorial procedures are available to address the threat to the known resource from large-scale development (e.g. mineral extraction, road and housing schemes), but no mitigation/curatorial procedures are available to protect it from active and passive degradation (e.g. small-scale development, erosion, wildlife and tree impact etc), "The addressing of this flaw is seen as an urgent priority" (ECC and KCC 2004, 90). The survey also highlighted the quantity of significant sites in the region that have outstanding issues requiring further research. Many have not been investigated for a number of years, often several decades, and recent advances in areas such as Optically Stimulated Luminescence dating, amino acid dating, small vertebrate recovery and biostratigraphical interpretation make them suitable for further archaeological investigation. Whether this is done as independently funded research or as mitigation in the face of impact from development, this research needs to be carried out in relation to clearly defined aims and objectives, as outlined in national and regional Palaeolithic research frameworks. The MVPP has also proposed areas of specific research and possible strategic projects, as has the Stopes Project.

2.5.3 Overall the assessment of the results of the work carried out around the Greater Thames Estuary identified a requirement for further research at a variety of scales:

- The extension of wide scale data collation and modelling projects across the region (e.g. the Middle Thames Northern Tributaries Project, Medway Valley Project and the survey of Mineral extraction sites) to provide a framework for future research and management / development control
- Local/site specific studies to address specific research questions which have been identified by previous regional studies (e.g. the Medway Valley Palaeolithic Project, mineral extraction sites survey, and the Stopes Project).

2.5.4 There is now a wide range of data available, and the research archives of ALSF funded projects are in the process of being made available via the ADS website. The information on ADS is usually limited to assessment reports rather than deposit models/GIS data. There is a need to explore ways of getting this type of data, case studies and models into the public domain. In general, there is a need for wider circulation of the results, which the ALSF programme is now beginning to address. Similarly in parts of the region so-called 'grey literature' and major projects archives are also being digitally curated by the ADS.

2.5.5 Although not explicitly included in the original Greater Thames framework, promotion and education on the Palaeolithic has taken place as part of a number of the projects; i.e. formal promotion through seminars, websites and leaflets. Incidental promotion and education within the historic environment profession has arisen from the inclusion of non-specialists within project teams, encouraging dialogue. Promotion and education to the wider historic environment community, both professional and amateur, should be encouraged.

2.5.6 In contrast to the studies and progress discussed above the results of the review would suggest that there has been little progress on the Upper Palaeolithic and Mesolithic since the original framework, this is also reflected in the ongoing work on the South East and East of England Research Frameworks. Research objectives and associated projects need to be developed to address these gaps.

2.5.7 For later Prehistory the original framework stated "… there is a need to create a lithostratigraphic framework for the area combined with a controlled dating programme and palaeoenvironmental studies, to enable a chronostratigraphic model of the Holocene development of the estuary to be formulated" (Williams and Brown 1999, 28). A number of studies have contributed lithostraigraphic and chronological data, for example along the CTRL and the Jubilee Line Extension.

2.5.8 Previous work has suggested there are variations in relative sea-level between the inner and outer estuary, and to the north and south (Williams and Brown 1999, 28). There remains a need for more investigation of this, along with data on relative sea-level for the last 2000 years. The results of the RCZAS surveys could perhaps be useful in identifying areas or archaeological sites/structures, which may potentially be useful as sea-level index points, such as quays.

2.5.9 There does not appear to have been any new work on coastline/shoreline morphology. This is an important topic, but requires well-constrained sea-level data, plus information on bathymetry, erosion, uplift and subsidence. The development of models of shoreline and coastal morphology is important, not only for understanding the evolution of the estuary itself and changes in sea-level, but understanding the maritime landscape that would provide a basis from which other topics could be considered, for example the effects of the changes of position of tidal heads on the siting of ports / harbours / landing places.

2.5.10 It has been suggested that the development of palaeogeographical maps of the changing coastline, utilizing a range of sources such as historic mapping/charts, environmental data and archaeological data would provide important information. Whether this is achievable on a large scale with current data, and given the complex and dynamic nature of the coast is perhaps debateable.

2.5.11 There is a large amount of palaeoenvironmental data gathered in the last 10 years, and the process of data collation has begun for London. This should be extended across the region. The data represents a valuable resource, not only for research but also as a step towards synthesis, which remains a priority. Collation of existing datasets could also contribute to the identification of gaps in knowledge, both spatially and chronologically in order that priorities for future research can be defined. Spatial coverage is variable, with a large amount of data in London, but little around Kent and Essex.

## 2.6 Framework Objectives (Development and Palaeoenvironment of the Thames Estuary)

The following section outlines the framework objectives identified through the review. Where they remain relevant those from the original framework have been retained.

***Framework Objective 1A***
To increase understanding of the physical evolution of the Thames Estuary during the Pleistocene and of the social and cultural strategies of early human populations in relation to changes in environment and climate.

This would be taken forward by **specific objectives**:

1A.SO1 Developing further the framework for, and our understanding of, environmental and climatic change during the Pleistocene. Recent work, for example that around the Purfleet area, has contributed to this objective, however it still remains relevant.

1A.SO2 Developing knowledge of the evolution of the Thames and Medway drainage systems in the Pleistocene, initially at a local and regional level, then placing their development within a national and international context. This would be with a view ultimately to correlating the Thames sequences with glacial sequences to the north, the record from continental Europe and the Oxygen Isotope record from ocean cores. The MVPP, in particular, has taken forward the first part of this objective. The objective is still relevant more widely in the Greater Thames.

1A.SO3 Developing appreciation of human interaction with this environment through identifying key areas where primary context sites might be preserved and where evidence relating to current research objectives might be located. A number of the projects in the region, for example the MVPP and CTRL, have aimed to provide predictive modelling which takes forward this objective.

1A.SO4 Developing an appreciation of the contribution made by secondary context (reworked) data to understanding the range and distribution of Lower and Middle Palaeolithic activity. Disturbed and transported material has been neglected in the past. However their importance has been highlighted in recent reports (e.g. MVPP) and it has become essential to encourage the recording of such deposits/artefacts.

Specific **areas of research** could include:

1A.AR1 To develop a targeted programme of recording and sampling of geological exposures to improve knowledge of geological sequences and their environmental and chronological context, to assess the artefactual content of the deposits and to identify specific sites.

1A.AR2 To collate available geotechnical borehole/test-pit data and mapping areas of extant superficial deposits (classified in terms of their likely temporal and spatial characteristics) to provide, a framework for geoarchaeological interpretation and to identify areas where more detailed deposit modelling is feasible.

1A.AR3 Utilizing geotechnical borehole and associated data to improve knowledge of geological sequences and their environmental and chronological context, to assess

the artefactual content of the deposits and to identify specific sites.

1A.AR4 Compilation of palaeogeographic maps illustrating the physical evolution of the study area.

1A.AR5 Systematic compilation of environmental data to provide palaeoenvironmental frameworks, to agreed standards provided by recent guidelines (e.g. English Heritage guidelines for Environmental Archaeology and Geoarchaeology).

1A.AR6 Assessment of historic maps and antiquarian records relating to earlier quarrying to locate more accurately known artefact collections and assess the extent of significant geological deposits.

1A.AR7 Developing effective assessment techniques for Pleistocene/Palaeolithic deposits. The Medway Valley Palaeolithic Project has utilized a number of techniques and includes a sample method statement (Wenban-Smith *et al*. 2007, Appendix 10) with the planning framework.

1A.AR8 Characterisation and mapping of the seabed resource.

***Framework Objective 1B***
To develop a better understanding of the Upper Palaeolithic and Mesolithic around the estuary, which has been identified as a 'gap' in the record.

This would be taken forward by **specific objectives**:

1B.SO1 Integration of existing databases, e.g. the Wymer Gazetteer, the Jacobi database and the HERs, to develop a single gazetteer.

1B.SO2 To carry out field investigation of sites which previous studies have identified as having high potential (for example, Fenn Creek, Essex).

1B.SO3 To develop predictive techniques to identify key areas where sites may be found and good contexts for preservation.

***Framework Objective 1C***
To increase understanding of the physical evolution of the Thames Estuary and associated climatic and environmental change and their relationship with human activity during the Holocene.

This would be taken forward by **specific objectives**:

1C.SO1 Characterising key stratigraphic units and establishing the vertical sequence of buried land-surfaces and other deposits throughout the estuary.

1C.SO2 Developing understanding of coastline and sea-level change in the estuary through time.

1C.SO3 Developing models for environmental change related to the evolution of the estuary's geometry.

1C.SO4 Developing appreciation of human interaction with this environment, particularly with regard to the exploitation and management of woodland and marshes.

1C.SO5 Exploring the potential of submerged woodland for dendrochronology, woodland structure, composition and exploitation, and evidence of environmental change.

Specific **areas of research** could include:

1C.AR1 Development of palaeogeographic maps illustrating the physical evolution of the coastline in relation to sea-level change.

1C.AR2 Systematic compilation of environmental data to agreed standards to provide palaeoenvironmental frameworks for the estuary.

1C.AR3 Compilation and analysis of existing borehole data to identify gaps by area/period where there is little or no data, in order to contribute to targeted programmes of work and to ensure this can be considered when opportunities for investigation arise, or selecting areas for detailed investigation.

1C.AR4 Development of non-intrusive techniques such as geophysics for the location of sub-surface deposits and features.

1C.AR5 Detailed investigation of selected areas by means of palynological, soil micromorphological, molluscan and plant macrofossil analyses.

1C.AR6 Exploring the potential of submerged woodland for dendrochronology, evidence of climate change and woodland exploitation.

1C.AR7 Collation and synthesis of existing environmental data (published and unpublished) across the Greater Thames, including incorporation into HERs.

1C.AR8 Using the above to identify gaps by area/period where there is little or no data, in order to contribute to targeted programmes of work and/or to ensure they can be considered when opportunities for investigation arise and in selecting areas for detailed investigation.

1C.AR9 Establishing a protocol for the collection of sea-level indicators from archaeological sites.

1C.AR10 Characterisation and mapping of the seabed resource.

***Framework Objective 1D***
To advance our understanding of the Palaeolithic Medway valley, building on the recommendations of the MVVP identified a number of research priorities for that study area.

This would be taken forward by **specific objectives**:

1D.SO1 Establishing evidence for pre-Anglian occupation.

1D.SO2 Investigating for the Lower and Middle Palaeolithic artefactual evidence in the various channel deposits of the Medway Valley.

1D.SO3 Recovery of large, well-provenanced, artefact assemblages from gravel bodies.

1D.SO4 Investigation of spatial concentrations of finds within terrace deposits (are they evenly scattered or do they occur as distinct spatial concentrations, similarly are finds evenly dispersed vertically through a gravel body or are they associated with a specific horizon?).

1D.SO5 Resolving the dating and correlation of the Southchurch Gravel and the Asheldham Gravel and clarifying the number of different gravel bodies within each of these mapped formations.

1D.SO6 Dating the Burnham channel and clarifying its relationship with other channels.

1D.SO7 Confirming or re-assigning the dating of the Barling Gravel and investigating its archaeological content in more detail.

# 3.0 MARITIME HERITAGE

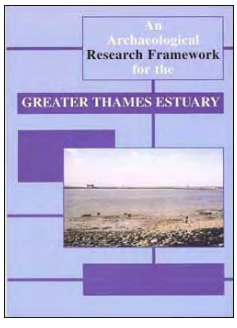
## 3.1 Introduction

3.1.1 The maritime heritage of the Thames Estuary is of considerable importance; the waterways providing access to continental Europe (and the world), London, communities around the estuary and, at a smaller scale, individual farms and industrial sites alongside it. They have provided a conduit for trade and links between communities. The original framework identified as a research priority gaining a greater understanding of the role of the estuary as a conduit for ideas, material culture and trade, through archaeological and documentary research into ships and their cargoes, and the relation to trade with dryland settlement, commerce and industry. The enhancement of, what were then, basic databases was identified as the primary need (Williams and Brown 1999, 29).

3.1.2 For the purposes of this section, maritime heritage has been taken to be those topics, which are maritime in character; that is, waterborne craft, shipping (transportation of goods/sea trade) and related infrastructure. It should be noted that the maritime heritage is inextricably linked with numerous other topics discussed in this framework, for example intertidal archaeology, post-medieval and modern/industrial and military.

3.1.3 Of all the themes identified in the original framework, this has seen the greatest advance over last 10 years. There has been an increase in the number of projects concerned with maritime heritage since the publication of the original framework, particularly associated with port operations and the development of new ports. As aggregate dredging is one of the issues that is likely to impact on the maritime resource a number of maritime projects have been funded through the ALSF (as distributed by English Heritage). Archive material from these projects can be accessed on the Archaeology Data Service website (http://ads.ahds.ac.uk/alsfarchives).

3.1.4 The 2002 National Heritage Act enabled English Heritage to take on the responsibility for maritime archaeology within England's coastal waters. *Taking to the Water* (published in 2002) set out their vision as to how maritime archaeology should be taken forward. English Heritage now have a dedicated maritime team, and have published a number of guidance documents, many of which can be found on line at http://www.english-heritage.org.uk/coastal and maritime.




*Relevant sections of the original framework:*

*Resource Assessment: pp.13–16*

*Research Agenda: pp.29–30*

## 3.2 Recent Projects

3.2.1 Numerous projects have taken place around the Thames in the last 10 years, ranging from desk-based studies to wreck recovery. Examples of some of these projects are discussed below and considered as to the updated resource assessment for maritime heritage.

*Port of London and London Gateway*

3.2.2 The Port of London Authority (PLA) manages a range of activities along the tidal Thames. A strategic review of known shipwrecks, aircraft losses, seabed anomalies and documentary references to the above has been carried out by Wessex Archaeology on the behalf of the PLA. The review aimed to enhance existing datasets and to provide sensitivity mapping.

3.2.3 Data was collated from the PLA's own wrecks database, the NMR and the UK Hydrographic Office. These wrecks and losses were cross-referenced to ascribe priorities based on the available information, in terms of their archaeological interest, priority for research (in comparison with others in the study area) and sensitivity to likely disturbances. Attempts were also made to consider the margin of error and possible distribution of NMR location ship loss data. As no similar project has been undertaken in England, it is difficult to assess the resource in comparison with other major shipping areas in the UK (Wessex Archaeology pers. comm.).

3.2.4 *London Gateway (Shell Haven)* is located on the north bank of the Thames to the east of Canvey Island. Used as a port from the 16th century, then the production of petroleum, it ceased production in 1999. It is now identified as the site for a new port development, London Gateway. A number of studies have been carried out in association with this scheme, including desk-based assessment and deposit modelling.

3.2.5 Work on the 'wetside' elements of the proposals has also included walkover of the intertidal areas and sub-surface deposit modelling which extended into the estuary (Wessex Archaeology 2004). Additional work included a review of wreck data held by the PLA. Below water survey of the capital dredge has included geophysical and diver survey (Pater pers. comm.), analysis of existing side-scan anomaly data and the acquisition of new higher resolution sidescan and magnetometer data. This refinement work has identified some 453 sites, and established the presence, extent and character of some of these. The potential sites of the *London, Dovenby* and *King* have been located. Later analysis has however concluded that the site of the *King* may actually be part of the *London*. The two lie only 400m apart and artefacts of similar date have been recovered from both. In addition the identification of the King does not correspond with any recorded loss (A. Hamer, pers. comm.).

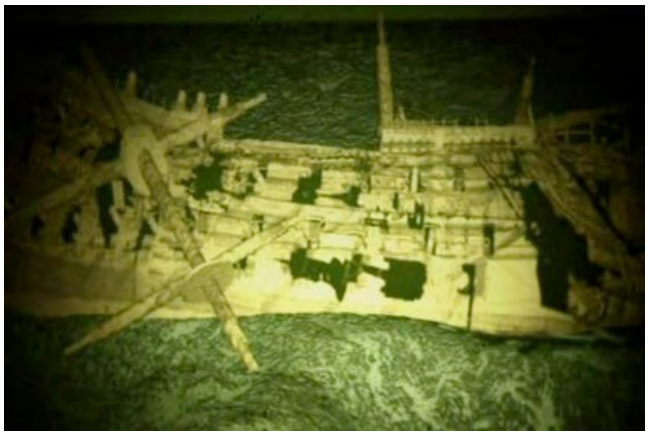


Fig. 10: HMS London/King
(Photo: BBC)

3.2.6 HMS London was a second rate ship of the line, built for the Commonwealth Navy at Chatham and launched in 1654. Upon the Restoration she was one of the ships that escorted Charles II from exile. The London blew up and sank in 1665. Rediscovered in 2008, the wreck was the subject of a salvage operation (Wessex Archaeology and the PLA). The London is now designated under the 1973 Protection of Wrecks Act, hence the need to resolve the identification of the *King.*

3.2.7 Diving teams also explored The Dovenby; a three-masted cargo ship carrying guano from Peru to Antwerp that sank off Sheppey following a collision with another vessel in 1914; HMS Aisha, a late 1930s cruiser drafted in to the "Dad's Navy", that hit a mine and sank in 1940; a Tudor brick barge; SS Letchworth, a collier, sunk in 1940; and an unidentified vessel. These represent a fraction of the vessels which have been lost in the estuary through the centuries.

3.2.8 Further out in the estuary lies the South Edinburgh channel wreck, which may perhaps be the remains of an unidentified Swedish sailing vessel that was lost in 1787. It was discovered by the PLA in 1972 and has been investigated by the National Maritime Museum. The fluctuating sand levels in the area generally provide a protective and stable environment for the wreck. Bournemouth University is currently undertaking an archive assessment and analysis of the site. It too is a designated wreck.

*The Princes Channel Wreck*

3.2.9 The Thames Estuary remains an area of considerable importance for shipping; ports around the estuary continue to expand, shipping routes run between large sandbanks, and include the Princes Channel. The PLA has the responsibility to maintain and improve access, and hence carry out dredging. During dredging in 2003, ships timbers, a quantity of iron bar, two iron cannons, an anchor and modern metal objects were recovered. Archaeological investigation and recording of these objects was carried out, with analysis suggesting the remains were a vessel of up to 200 tons burden, dating to between 1600 and 1850 and the iron bar its last cargo. Subsequent dendrochronological analysis of the wreck provided a construction date soon after 1574. The cannon comprised a 16th century wrought iron breech loading 'tube' cannon and a rare 16th century cast iron 'English small saker' from the foundry of Sir Thomas Gresham in the Weald. Gresham was a prominent Tudor merchant who, among other roles, founded the Royal Exchange.

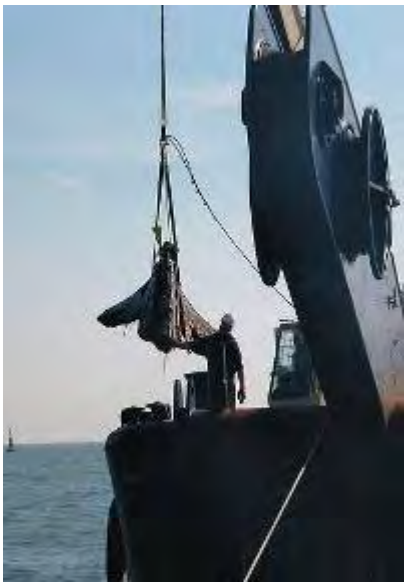


Fig. 11:

Raising the bow section of the Princes Channel wreck in 2004 onto the PLA's salvage barge Hookness.
(Photo courtesy of Wessex Archaeology)

3.2.10 Over subsequent years, geophysical and diver survey took place and large sections of the hull were salvaged; including part of the ship's side and the bow section. The vessel was probably three-masted, with the lowest deck serving as a gundeck. Although unidentified, it would seem likely that the ship may have been outbound from one of the main Thames or Medway ports with a cargo of iron bars, lead and tin ingots. The canons are likely to have been the vessel's armament rather than cargo. The ship's timbers are now stored in Horsea Lake, near Portsmouth, providing an underwater training site for maritime archaeologists under the auspices of the Nautical Archaeology Society. Work on the Princes Channel Wreck is ongoing, and further post excavation, including conservation work, and finally full publication (Auer and Firth), are among the outstanding tasks.

*Other Projects*

3.2.11 Archaeological work at the western end of Canvey Island, taking place in advance of the possible construction of a pipeline, has included some geotechnical and geophysical studies, along with below water survey. The latter has identified the remains of what may be a fish trap, well below present low water (Havis pers. comm.).

3.2.12 A number of other development-led desk-based assessments, evaluations and watching briefs have taken place at a variety of locations around the Greater Thames Estuary. These include archaeological assessments of a number of windfarm sites (e.g. Kentish Flats, Gunfleet Sands; Wessex Archaeology 2000b, 2000b). Although development-led work may not be specifically designed or planned to meet the framework objectives, in many cases the requirements of development-led work overlap to some degree with the research agenda. A basic requirement of much desk-based work is a review of the archaeological resource within the development area. In an offshore context, this may require the collation of various data sources, including wreck data from the UK Hydrographic Office, geophysical survey data, borehole data as well as the more familiar HER records. Non-archaeological data can require significant processing and interpretation. In many instances, some of the additional data sources reviewed were not originally obtained with archaeological requirements in mind, and they require significant processing and interpretation to be of use for an archaeological assessment.

3.2.13 *England's Shipping* researched ways of mapping evidence of historic shipping in UK waters in order to better assess the potential of the seabed, in relation to marine aggregate extraction. Assessments for EIA prior to extraction utilize the location of wrecks as recorded by the UKHO and NMR, however this is likely to represent only a fraction of losses. Understanding trade routes and density of movements allows better understanding of archaeological potential. The England's Shipping project collated information on routes, patterns of movements, approaches to harbours, incidences of large scale losses (e.g. battles), navigational shipping hazards and known losses. Post 18th century material is best represented in existing data and the project therefore focused on the medieval period. The output of the project comprises a prototype digital atlas. (www.wessexarch.co.uk/englands_shipping, ads/archive/englandshipping).

3.2.14 *On the Importance of Shipwrecks* project developed a framework and methodology for evaluating the importance of the physical remains of wrecks on the seabed. The project included a literature review; consultation with curatorial staff and environmental consultants; and the development of a draft framework to trial on sub-sets of wreck records from the National Monuments Record (ads/archive/shipwrecks). *Rapid Archaeological Site Surveying and Evaluation in the Marine Environment (University of St Andrews)* developed rapid geophysical survey for enhanced investigation of maritime

sites in sensitive aggregate areas. This was tested on the wreck of the Stirling Castle, located in Goodwin Sands ads/archive/rapid site survey).

3.2.15 The *National Register of Historic Vessels (*http://www.nationalhistoricships.org.uk*)* is a database which provides an assessment of the significance of historic vessels. The database can also be used to identify and prioritise vessels that should be preserved, provide guidance to decision-makers on the allocation of funding, and give an early warning of ships 'at risk'.

Built in 1945 by William Pickersgill, Sunderland for the Ministry of War Transport and designated TID 159, these steam tugs were one of the first UK ventures into all welded prefabricated steel shipbuilding. She was sold to the Port of London Authority to replace wartime losses and renamed BRENT. Working in the Dredging Department and Dock System of the PLA she was eventually laid up in 1969 and sold to a shipbreaker at Mistley in 1970.

BRENT was saved by Ron Hall in 1971 and by 1973 had won an award at the Greenwich Festival as 'Best Kept Privately Owned Power Craft'.


Fig. 12: The Brent

## 3.3 Assessment of Contribution to the Research Objectives and Future Directions

3.3.1 The role of the estuary as a conduit is one of the key components of the research objectives outlined in the original framework. Of the wide range of research, the Princes Channel wreck is the most remarkable new resource. It presents an opportunity to consider how small vessels like these linked areas such as Essex, Kent and London with the wider world, and provides physical evidence of the only way such communications could be maintained in this period, by sea, via important routes such as the Thames Estuary. The vessel can provide insights into shipbuilding practices of the period, including the sourcing and working of the timbers used to build it. In addition, study of the ship's construction can pose questions regarding the mutual influence of different ship building traditions in Atlantic Europe.

3.3.2 Less dramatic than the recovery of the Princes Channel wreck, but none the less important, is the enhancement of basic datasets resulting from projects. This was considered a primary need in the original research framework (Williams and Brown 1999, 29). Such enhancement has been provided by the work carried out for the PLA and at London Gateway, with large numbers of sites being identified, expanding the existing record. Reviews of existing wreck data have shown that the collation of several sources can improve understanding of the distribution of wrecks and other anomalies which may be identified through field survey. The extensive range of below water surveys which have taken place as part of development are also adding to the inventory.

3.3.3 The medieval and early post-medieval periods, were noted in the original framework as being particularly poorly represented in the maritime archaeological record, and this would appear to still be the case. The known resource is also generally skewed towards warships and East India Company vessels. Addressing this imbalance remains important. It should also be noted that important early wrecks, for example the Bronze Age Dover boat (http://www.dover.gov.uk/museum) and the Anglo-Saxon Graveney boat, have been recovered from what is now dryland. Identifying areas where there is potential for remains of this type to be located on dryland may be a worthwhile research exercise.

3.3.4 In general, enhancement of our existing datasets remains a priority but the projects carried out around the estuary over the last decade provide good examples of methodologies which can be used to take this forward. As with any new dataset, these should be designed so that they can be incorporated into or sit alongside the relevant HER. There also remains a need, however, to develop targeted research about ships and their cargoes to supplement the work discussed above.

3.3.5 On the fringes of the Greater Thames Estuary area, a zone from Clacton to Southwold was one of the pilot areas for the *England's Historic Seascapes*, referred to as Historic Seascapes Characterisation (HSC), which aimed to extend historic landscape characterisation (HLC) to the coastal and marine zones (http://www.english-heritage.org.uk/seascapes). The five pilot projects (funded through the ALSF) between 2004 and 2007, tested a range of options. These are now being reviewed to establish the most effective method for historic seascapes characterisation (HSC) applicable around England's seas. The project is likely to be extended around the estuary as a whole in the long term. The data collated by the pilots is likely to make significant contribution to HSC, and may perhaps form a useful component to enhancing our understanding of the marine zone in the future.

3.3.6 Other projects have also provided information with regards to trade and links around the estuary. Work at Gravesend (further discussed in section 8) has demonstrated how the administration of the estuary and resulting economic factors affected the evolution of the area. Desk-based research at Wallasea Island (Heppell 2004b) demonstrates the close links between the agricultural hinterland and London, using the estuary. Thames barges are an iconic component of the maritime heritage, and this economic history. Operational examples can be found around the estuary, for example at Maldon, Faversham and Sittingbourne. Numerous examples are included in the National Register of Historic Vessels. Restoration of some vessels has been funded through the Essex Heritage Trust. Non-operational examples can also be found around the estuary, in a variety of conditions. Early examples of barges have also been excavated by PCA at Deptford. The original framework noted that "…there is an urgent need for survey and recording" (Williams and Brown 1999, 29). A gazetteer of these sites has been collated by the Society of Sailing Barge Research (1996), which could be a useful starting point for survey and/or selection of sites for more detailed recording. There is a need to ensure that this baseline data has been incorporated into the appropriate HER/SMR and to develop research objectives.



Fig. 13: Sailing barge with some of the newly-constructed wind turbines off Clacton in 2009

3.3.7 The Thames barges are only one of the many types of vessel which can be found around the estuary, others include a variety of smacks and lighters, some of which have been identified during RCZAS survey. These vessels would have been integral to the estuary. The baseline information for Essex is likely to be less well developed than that in north Kent, as the recording of such monuments was not a focus of the Hullbridge Survey.

3.3.8 The original framework also noted the importance of the material recovered through commercial and recreational activities, for example fishing and dredging. Initiatives such as the BMAPA protocols have promoted it and the Receiver of Wreck has a number of initiatives to promote reporting. The pilot studies of the *Artefacts from the Sea* project, although outside the Greater Thames area, has also demonstrated that it is possible to use existing data, such as museum collections and antiquarian records, to enhance our knowledge (http://ads/archive/artefactssea) and it may be beneficial to extend this to the Greater Thames.

3.3.9 Development-led work, utilizing disparate data sources also contributes towards our current knowledge of the archaeological resource in the estuary across many of the themes discussed in the original framework. The identification of archaeologically-significant horizons within geotechnical boreholes, and the identification of aspects of the palaeochannel systems in the Thames Estuary is often a common component of

such work, and the appraisal of possible wreck sites from new data sources is frequently the first archaeological assessment of such data. The quality of information varies depending on the nature of the data available, and sometimes only a rudimentary identification of features is possible, but these projects do bring such features and sites into the archaeological domain, albeit often only in the form of so-called grey literature reports. Such projects represent useful opportunistic research into the prehistory and maritime history of the greater estuary.

3.3.10 As with many of the topics covered by the research framework, large amounts of data are now available and the effectiveness of collation and analysis has been demonstrated. It would be advantageous to extend this around the estuary. The need for a national research framework for maritime archaeology was raised during the workshop in 2008. Work on the development of a 'Maritime and Marine Historic Environment Research Framework' is now underway.

3.3.11 The maritime remains around the estuary represent an identity beyond that of physical remains; they are as a cultural entity our 'heritage'. They provide local distinctiveness and are often the focus of existing local communities. The maritime heritage of the area can also provide inspiration for the design of new development and re-development. The maritime heritage of the estuary and its environs is also a key element in the promotion of the historic environment to the public through tourism, for example through the use of maritime heritage trails (http://www.maritimeheritagetrail.co.uk/).


Fig. 14: The Olan, a 9m Thames workboat, during intertidal survey in Essex (Photo: ECC)

## 3.4 Framework Objectives (Maritime Heritage)

The following section outlines the framework objectives identified for Maritime Heritage through the review. Where they remain relevant those from the original framework have been retained.

***Framework Objective 2A***
To examine the role of the estuary in providing internal coherence through trading and other maritime contacts and as a major artery of communication between England and continental Europe.

This would be taken forward by **specific objectives**:

2A.SO1 Developing an understanding of the role of maritime activity in relation to settlement and land use around the estuary. This objective has been taken forward but remains relevant.

2A.SO2 Developing an understanding of the social and economic role of sea-borne trade and other maritime activity within and beyond the estuary.

2A.SO3 Researching documentary sources to increase knowledge of surviving and no longer extant sites and vessels and trade and communication patterns. This objective has been taken forward by a number of projects such as the work carried out for the Port of London. It however remains relevant.

2A.SO4 Review and collation of existing wreck data to improve the available baseline information.

Specific **areas of research** could include:

2A.AR1 Locating and recording the remains of vessels and associated structures within the subtidal and intertidal zone. Considerable progress has been made in locating ship remains in the subtidal zone, however it has not been carried out for the whole of the estuary. The location of remains in the intertidal zone is also patchy.

2A.AR2 Synthesising the available data on other types of wrecks/hulks around the intertidal zone to identify gaps in knowledge and develop a strategy for further work.

2A.AR3 Systematic record enhancement; a recent study of the Maplin Sands (Pearson 2006) revealed that most wrecks are too inaccurately located for designation/conservation management purposes.

2A.AR4 Synthesising and assessing the quality of the known ship / boat resource.

2A.AR5 Develop a protocol for levels of recording of vessel remains in order to establish consistent and comparable inventories.

2A.AR6 Selecting vessel remains for more detailed study and recording.

2A.AR7 Investigating the role of the estuary as a ship and boat-building area.

2A.AR8 Undertaking research on the nature of cargoes and their movements in relation to local and more distant trade.

2A.AR9 Carrying out opportunistic recording of wreck sites.

2A.AR10 Synthesising the various data sets available for Thames Barges to develop a programme of further work.

2A.AR11 Maritime recording of aviation wrecks.

# 4.0 INTERTIDAL AND RELATED ARCHAEOLOGY

## 4.1 Introduction

4.1.1 There is an impressive range of archaeological remains to be found in what is now the intertidal zone; palaeo-landsurfaces (sometimes with associated archaeological features and artefact scatters), submerged forests, peat beds, timber fishtraps, salterns, pottery production sites, remains of the oyster industry, landings, boat remains. These remains exist in a dynamic environment on the fringes of the estuary where they are vulnerable to a wide range of threats such as coastal erosion, rising sea-level, coastal squeeze and our attempts to manage the shoreline in response to these issues. Development pressures are also extensive around the estuary, for example the development of ports such as that at London Gateway and the Thames Gateway regeneration proposals.

4.1.2 Inland of the edge of the estuary, as defined by sea defences, lie extensive areas of former wetland. The character of these areas varies, some are now industrialised but many remain agricultural. There are also areas of grazing marsh. This former wetland contains a similar range of archaeological remains as in the intertidal zone, buried below alluvial deposits. There are also upstanding remains, particularly earthworks such as former seawalls and the remains of saltworking sites of a variety of periods.

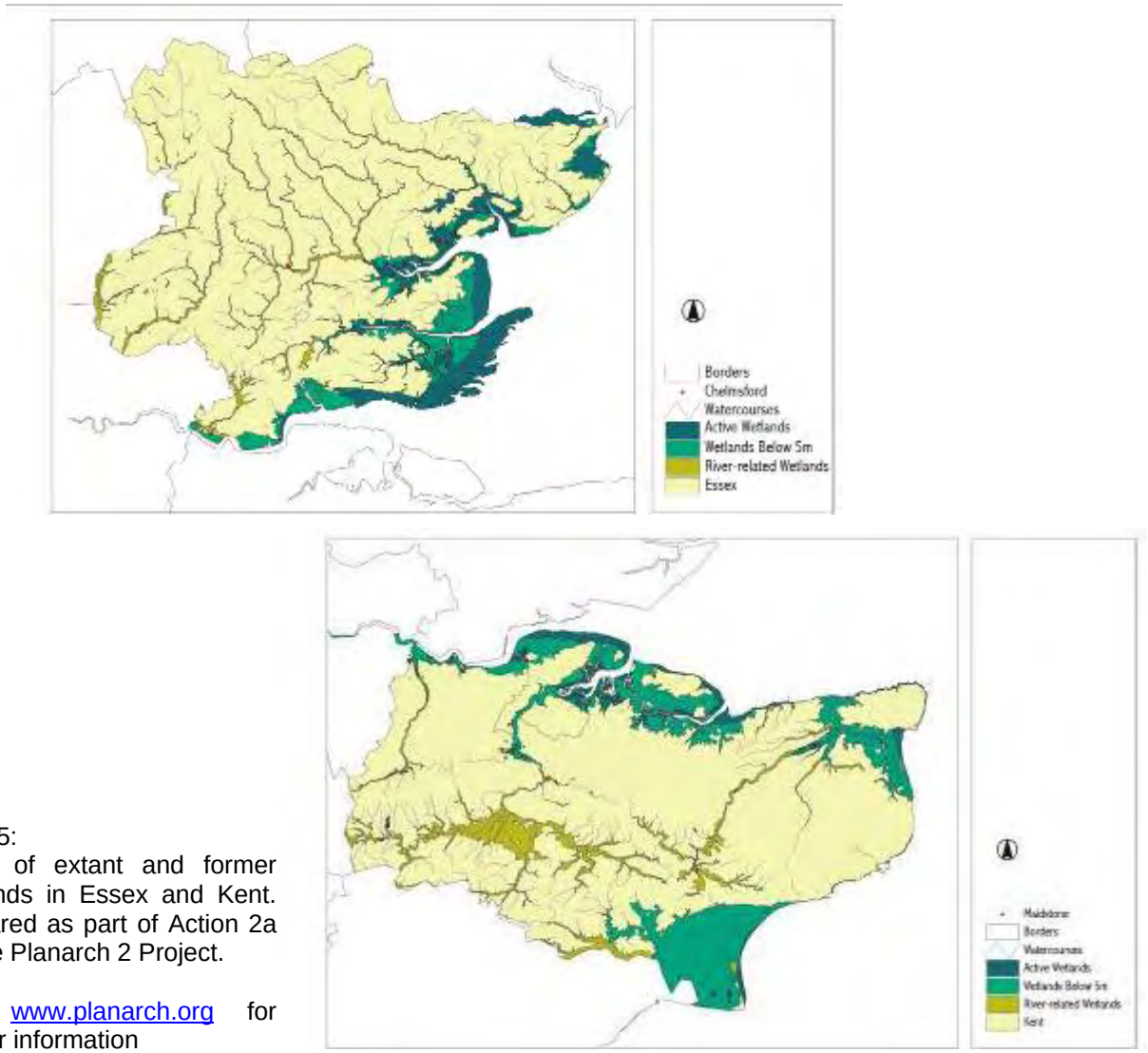
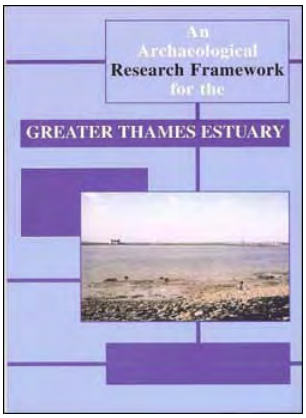



Fig. 15:
Maps of extant and former wetlands in Essex and Kent. Prepared as part of Action 2a of the Planarch 2 Project.

See www.planarch.org for further information

4.1.3 The importance of the coastal marshland and intertidal zone around the Thames Estuary is recognised in the many nationally and internationally designated sites located around the estuary. Baseline surveys had been carried out around the estuary prior to the publication of the original framework, both ground-based (e.g. The Hullbridge Survey, Wilkinson and Murphy 1995; London Foreshore survey Milne, G. *et al*. 1997) and using aerial photography (e.g. Saunders, submitted). Baseline survey is key to understanding the range of resources in the intertidal zone in order to identify areas for future research and to inform management decisions.

4.1.4 This section includes remains in the modern intertidal zone, seawalls and flood defences and the extant/former grazing marsh. There are numerous overlaps between intertidal archaeology and other topics, particularly palaeoenvironmental, military and industrial.




*Relevant sections of the original framework:*

*Resource Assessment: pg 14–16*

*Research Agenda: pg 30–32*

## 4.2 Recent Projects

*Baseline Surveys*

4.2.1 Baseline survey, in the form of Rapid Coastal Zone Assessment Survey (RCZAS) has been taking place around the coast of the UK in recent years, an important strand in English Heritage's research programme. This has included survey, carried out by Wessex Archaeology, around the North Kent Coast, which had been identified as a priority in the original framework (Williams and Brown 1999, 40). The North Kent Coast Survey has included both desk and field based survey (Wessex Archaeology 2000a, 2002a; Wessex Archaeology [a-d] 2004; Wessex Archaeology [a-b] 2005, Paddenburg and Hession 2007).

4.2.2 Along the north Kent coast, the desk-top element of RCZAS added 1864 'new' monuments to the Kent HER and a considerable number of existing records were enhanced. Preliminary field investigation to assess recording methods was undertaken before the commencement of the pilot field studies. In the course of two years of field assessment, 310 new monuments were added to the HER. A further 379 existing monuments were visited and information pertaining to them updated and enhanced. The range of sites reflected the high potential of the zone and included sites, standing buildings and military structures, remains associated with agricultural activity, abandoned sea defences, peat deposits, isolated finds and artefact scatters.

4.2.3 Among the notable new sites and sites known but not previously recorded on the HER were a Mid to Late Neolithic site on Hoo Flats, comparable to the better known Neolithic sites in Essex (e.g. The Stumble) and a prehistoric submerged forest recorded at the low water mark on the Thames shore near Darent Creek. Also, the remains of a possible prehistoric brushwood and wattle trackway were recorded at the mouth of a creek in Broadness Saltmarsh.

Fig. 16:
Hand auger survey, Blackwater Estuary, Essex (Photo: ECC)

4.2.4 Higham marshes produced scatters of Roman pottery dating from the first to the third centuries AD. In some places it appeared that the pottery was *in situ* and eroding out of a peaty organic clay layer. In addition, the survey initiated a reinterpretation of Romano-British deposits on Burntwick Island as a possible saltworking and pastoral farming landscape in association with Upchurch and Thameside Roman pottery. The substantial remains of a fishtrap were found close by at the site of the former Shornemead lighthouse. Other possible fishtraps were recorded on the west bank of Damhead Creek and at Shellness. A number of assessment points were also established along parts of the coast to identify areas of active erosion, assess the landscape's sensitivity to development, and gauge localised or general threats to its stability.

4.2.5 The Upchurch Archaeological Research Group is active within the Medway Estuary and has identified a wide range of sites in their area that they continue to monitor. They have also been carrying out studies as to the relationships of sites to tidal land processes and the archaeological record. This has included a selected levelling of sites (to Ordnance Datum) and considers these results in relation to their contemporary marsh topography, any indicators of tidal regime or influence within the marsh/archaeological formation processes, comparison with sites in the immediate area, and current tidal regime (Jackson 2003).

4.2.6 In Essex, the 1980s Hullbridge Survey had previously surveyed much, but not all, of the coastline. Accordingly a further 60km of coast was subject to RCZAS (Heppell 2001; Heppell and Brown 2008), designed to extend the scope of the survey both spatially and chronologically. The survey identified some 250 monuments (96% not on the HER), including timber structures, red hills, earthworks, wrecks/hulks. The majority of these reflect the importance of the network of creeks and estuaries providing major arteries for transport and trade well into the 20th century. These include loadings (jetties and hards) associated with individual farms on the Foulness Archipelago. Remains associated with the oyster industry, particularly pits, were also recorded. Earthworks included elements of earlier sea defences and causeways across marshland. The majority of the sites identified are likely to be post-medieval in date, although a large number remain undated.

*Monitoring Survey*

4.2.7 The dynamic nature of the intertidal zone presents practical challenges for survey and recording, but also means that sites are subject to erosion, which both erodes away existing sites and exposes new sites providing a good opportunity for further studies to take place. Monitoring of areas of archaeological interest or potential was therefore also identified as a research priority in the original framework (Williams and Brown 1999, 40).

4.2.8 In Essex a three year monitoring programme has taken place, focussing on selected sites identified during the Hullbridge Survey, which had provided data (such as site plans and sections) against which the recent results could be compared. This included visits to the Neolithic submerged forest at Purfleet, exposed stratigraphic sequences at Fenn Creek (River Crouch), red hills and a Roman and medieval fish processing site at Leigh Beck (Canvey Island), palaeo-landsurfaces at Jaywick and Clacton, and the site of the Canewdon paddle. At Rolls Farm (River Blackwater), an area of palaeo-landsurface, wooden trackways of probable Bronze Age date, a red-hill and the remains of a seawall were subject to regular visits over three years. The monitoring survey identified some degree of threat to all the areas visited. In the majority of cases some erosion was noted, particularly along the Thames. It could however be very localised, for example at Rolls Farm where broadly similar types of wooden structures were recorded on the foreshore. Some eroded away through the course of the survey, whereas others were still extant in 2006, having first been visited in 2001 (Heppell 2004; Heppell and Brown 2008).

Fig. 17:

Peter Murphy and Ron Hall investigate an eroding 'red hill' on the north shore of the Blackwater Estuary, Essex (Photo: ECC)

4.2.9 At The Stumble, in the 1980s, detailed studies (including excavation) were carried out on a Neolithic occupation site, along with later features which now lay exposed on an area of extensive mudflats (Wilkinson, Murphy *et al*. submitted.). This area has also been subject to monitoring survey, as part of the monitoring programme detailed above and as part of Planarch 2. The results indicated that artefact scatters were more widely distributed than previously noted, indicative of erosion across the flats and possibly the exposure of more occupation / activity areas (Heppell 2006; Wilkinson, Murphy *et al*. submitted).

4.2.10 Monitoring has also taken place on a number of the large fishtrap complexes found in the Blackwater Estuary. Despite practical problems accessing these sites, which are very close to low water and can only be accessed by boat, visits have enabled more complete site plans to be built up. In one case, around 130m of an arm of a trap was surveyed and found not to have been recorded on earlier surveys which had taken place in the 1990s (Heppell in prep).

4.2.11 In Kent, the Upchurch Archaeological Research Group and D. Applegate have carried out monitoring survey in the Medway Estuary, particularly around the Upchurch area. Since 2003, a salting hearth has been regularly planned as areas become exposed. This has identified six firing levels with associated finds, post-holes, stake-holes. As well as demonstrating the effectiveness of monitoring in building up site plans it shows the degree to which archaeological sites in this environment are being eroded (Applegate pers. comm.). At another site regular recording has identified 7–8 pottery kiln firings, again without excavation (Jackson, UARG, pers. comm.). Monitoring of an early Bronze Age site, partially sealed by a peat deposit, identified an immediate threat to the site from bait digging. The site was therefore investigated and a possible cooking place/sweat lodge identified (Jackson pers. comm.).

*Landing Points*

4.2.12 Landing points (jetties, wharves, quays etc) are a key component of the estuary, providing the link between land and sea. Larger wharves and docks have been incorporated into the industrial theme but there are also a wide range of these sites around the rural fringes of

the estuary. Ferry points provided links between communities, industrial sites around the estuary (e.g. brickworks) would also have had loadings. Many farms would have a loading from which their produce could be exported and 'London Muck' imported. On Wallasea the proximity of the farms to navigable waterways was mentioned in sales catalogues, and "…the advantages arising there from are too obvious to be mentioned here" (ERO D/DC/41/116, dating to 1794). Extracts of title and deeds for Ferry Farm (probably Creeksea Ferry) identify goods being transported to the island, which include coal and dung "… but not so as to cause a nuisance" (ERO D/DCf T170, 1868 entry). In the case of much of Wallasea island the fragmentary remains of some landings survive though the farms the farms they served are no longer extant (Heppell 2004b).

4.2.13 Landing points have been identified during RCZAS surveys around the estuary. Two in Essex have subsequently been subject to excavation; at St Osyth Creek in the Colne estuary (Wessex Archaeology 2005) and Cudmore Grove, Mersea Island. The latter is located in close proximity to an earthwork Tudor fort with which it is thought to be associated. Limited excavation identified a range of structural elements on the site, likely to represent a number of phases of repair or rebuild, perhaps linked to episodes of activity at the fort (Heppell 2005).

4.2.14 In Kent the identification of hards and landing places, including some substantial but now defunct 19th-20th century jetties and wharves, illustrates the development of trade and industry along the Kent coast and the importance of the estuary as an artery of communication. The number of these types of site which are now derelict illustrates how the focus of maritime activity has changed on this side of the estuary as smaller scale maritime mercantile traffic declined in the 20th century with the rise of large scale containerised shipping. The importance of the estuary has not changed significantly, but the patterns of activity have changed a great deal.


Fig. 18:

Survey at a rural quayside, near Faversham in Kent (Photo: Wessex Archaeology)

4.2.15 Unsurprisingly boat building has also taken place around the Greater Thames Estuary, perhaps most notably the various naval yards and the Thames sailing barge industry. These have been subject to research in recent years through desk-based studies (e.g. 'Thames Spritsail Barge Industry') and fieldwork (e.g. excavations at Strand Wharf, Leigh-on Sea).

*The Oyster Industry and Wildfowling*

4.2.16 Baseline surveys and aerial photography have identified jetties and quays, along with numerous pits, associated with the oyster industry. The latter are numerous around the coastline but beyond their identification these sites have received little attention. Some consideration of the distribution of these sites around the Essex estuaries is included in the publication of the results of the National Mapping Programme (Saunders in press), and where possible relates it to studies of the industry (e.g. Benham 1993). The NMP has also examined remains associated with the exploitation of wildfowl, particularly duck decoy ponds, and attempts have been made at phasing these with reference to documentary sources and typology (Saunders in press).

*Saltworking*

4.2.17 There are significant numbers of saltworking sites around the intertidal zone, and indeed inland of the walls on reclaimed land. A number have been either identified or their type confirmed through the landscape scale surveys which have taken place around the Greater Thames Estuary since the publication of the original framework. Limited excavation of two examples has taken place at Abbotts Hall Farm, prior to managed realignment (CAT 2000). Evaluation of an example at Tollesbury Creek, again prior to realignment, established that it dated to the Middle Iron Age and may have been reused as a fold in later periods (Germany 2004). These investigations, along with those carried out by the Upchurch Archaeological Research Group in the Medway, demonstrate the complexity of these monuments.

4.2.18 Later saltworks also exist around the estuary. A medieval example at Morris Farm, Stow Maries, has been subject to detailed survey by the RCHME (Barker, L. 2003). As well as recording extant platforms, mounds, banks and ditches the study notes that this is the single survivor of a group of works that once clustered around a creek.

*Extant and Former Grazing Marshes*

4.2.19 Inland of the modern coastline lies extensive areas of enclosed marshland, protected by seawalls. In Essex a number of these areas are to become part of a series of wildlife reserves, part of the 'Green Grid' for south Essex. These have been subject to grazing marsh surveys, carried out by ECC HEM for the RSPB, supported by the Thames Gateway South Essex Partnership and the ODPM (as was). These studies have been used to inform the design of the reserves, so that invasive works, such as the excavation of red beds, can be located away from known assets. Similar surveys have also been carried out for some of the National Trust holdings on the Essex coast to assist in site management. These studies were designed to establish what historic environment assets may be present, through desk based and walkover survey. The outputs include descriptions, current land use, site assessments and management recommendations (e.g. Medlycott and Gascoyne 2006).

4.2.20 Archaeological mitigation works have also been carried out, for example monitoring at Vange Marsh North during the construction of a new wall and fleet ditch. These works identified a possible red hill, medieval layers and water channels. An extensive carbonised grain deposit was also identified. The results suggest that embankment in the area was

post 13th century in date. The medieval water channels had silted-up and become subsequently buried (Ennis 2006). At Wallasea Island, the site of a massive habitat creation scheme, extensive documentary and cartographic research has enabled the landscape evolution, settlement patterns and economy to be understood (Heppell 2004).

*Seawalls*

4.2.21 Seawalls are the most extensive monuments around the estuary. Former defences can be found in both the intertidal zone and inland. The considerable potential of these walls for phasing reclamation through a combination of spatial and documentary research has been illustrated in a number of studies, particularly on Foulness (Smith 1970). Realignment schemes have provided the opportunity to record cross sections of walls at breech points (e.g. at Orplands on the southern side of the Blackwater Estuary). The Foulness Conservation and Archaeology Society are currently carrying out a study of the phases of 'inning' on Foulness, building on earlier studies (e.g. Smith 1970) and utilizing information from aerial photography, soil types and vegetation (through local inhabitants who have worked on the island). It is hoped this study will point to the location of 'sea guttters', which could provide dating evidence, as has an excavated example on Foulness (Crump pers. comm.; Crump 1981).

Fig. 19: Managed realignment at Wallasea; the cut through the seawall


*Methodological Developments*

4.2.22 Methodologies for RCZAS have been developed since the publication of the original framework, these particularly relate to the use of technology. Advances in GPS have meant that the more recent surveys have been able to locate monuments both accurately and rapidly. Discussion between fieldworkers who have carried out these surveys has shown that although there are local variations in methodologies (for example the type of software used) they are broadly consistent in approach. There will no doubt be further developments in technologies in coming years. The work on the North Kent Coast has also developed methodologies for boat-based survey in those areas where access by land is

either impossible or difficult. This has been demonstrated to be effective, although highly dependant on weather conditions.

## 4.3 Assessment of Contribution to the Research Objectives and Future Directions

4.3.1 It is clear that there has been considerable progress made in addressing the short-term priorities identified in the original framework, particularly the expansion of baseline surveys through the RCZAS programme. It should however be noted that there are areas around the estuary which have yet to be surveyed, and the completion of this should remain a priority. In terms of resource assessment, few new site types have been added to the diversity of sites already known in the Greater Thames, but new sites under almost every category of archaeological resource of the intertidal zone have been discovered or had their records updated.

4.3.2 Synthesis of the results of the surveys is needed to identify gaps in the available baseline data; for example, are there stretches that were inaccessible during the original survey programmes that it may be possible to access by boat? In the case of the older surveys, there may also be chronological gaps resulting from the focus on specific periods or site types. Synthesis is also needed to place the baseline information into a wider context. The completion of the North Kent RCZAS is crucial in order that a Thames Estuary synthesis can be produced.

4.3.3 One of the main weaknesses of RCZAS is the lack of height data, due to the limitations of existing GPS technology and the practical constraints in using traditional land-based survey techniques. Synthesis could be used to identify areas where obtaining height data would be advantageous, such as distinct horizons (e.g. the 'Lower Peat' in Essex), saltern sites, landings and jetties. This would allow ready comparison of this horizons/site types around the Greater Thames, potentially contributing to the study of sea-level change and providing a sound basis for monitoring the effects of erosion/deposition through monitoring survey.

4.3.4 The data gathered by surveys has, where possible, utilized standard monument terms (INSCRIPTION word lists) so that it can be easily (and consistently) incorporated into the relevant HER/SMR (either by direct entry in the field or as part of post-fieldwork stages). These lists have however been problematic to use in the field and the development of a 'streamlined' word list may be useful, although it is acknowledged that there is a danger that this may result in the use of more general descriptive terms. In addition, there is currently no available term for some types of site. This area would benefit from review.

4.3.5 Monitoring surveys carried out on specific sites in the intertidal zone have demonstrated the importance of revisiting key areas to identify new sites that are being exposed by erosion, or by shifting deposits in what is a dynamic environment. The technique is also effective in its own right for building up records of sites in areas where excavation can be difficult at best. Clearly, regular monitoring of the entire coastline of the estuary is not feasible but with the enhanced baseline data now available (e.g. as a result of RCZAS) it should be possible to identify key areas and/or classes of monument for monitoring, through a process of synthesis as discussed above. Collaboration with outside organisations may also be useful in defining areas where erosion is known to be a major concern in order to prioritise survey and provide information that is relevant to current management and planning needs.

4.3.6 The recent work around the Greater Thames has demonstrated the crucial contribution of local amateur archaeologists, and the importance of communication and co-operation. The research framework should be part of a mechanism for information exchange. They also present an opportunity for multi-disciplinary participation with other professions such as geologists.

4.3.7 There is also a need to carry out "ground truthing" of selected sites to establish the accuracy of rapid site identifications and interpretations. In addition to the benefit such work would have in refining rapid walkover interpretations it would also aid in further developing evaluation and excavation techniques within the intertidal zone.

4.3.8 The landing points around the estuary can potentially provide a wide range of information, for example settlement patterns, local economy and trade.. They could also potentially contribute to studies on relative sea-level. Although recorded in the more recent surveys they are perhaps less well represented in earlier work. The study of landing points is, along with waterborne transport, an area where the integration of historical and archaeological survey is likely to be effective. These remains are located on the edge of the present coastline and are therefore vulnerable to erosion. Interestingly, initiatives to take industrial traffic off roads and onto waterways are encouraging the regeneration and redevelopment of many waterside jetties and wharves. Derelict timber, composite wooden and iron, and iron-built structures will probably be destroyed as redevelopment becomes an attractive option and have a knock on effect likely to increase development pressures along this coast.

4.3.9 'Red hills' represent one of the most commonly identified monuments around the estuary but are poorly understood. Firstly there is a need to consider the use of the term which, particularly in the East of England, has become interchangeable with 'saltern' although properly represents a subset of this wider group (a saltern being a 'salt production site' and a red hill being a salt production site of a particular period i.e. *later* prehistoric and Roman) and type (coastal and typified by mounds of briquetage and burnt material). Further analysis of the extant data would assist in identifying examples where a confirmation of monument type would be advantageous. Indeed, field investigation by the Morant Club in 1913 served as a reminder that "… not all marsh mounds were red hills" (Fawn *et al.* 1990, 3).

4.3.10 Much of the work on 'red hills' carried out prior to the original framework and condition survey (such as the Monuments at Risk Survey) of the known monuments to identify priorities for future research has been limited. Although numerous, these monuments are vulnerable to ploughing inland and costal erosion on the unenclosed marsh. There is therefore a need to begin to address the questions raised to inform research priorities and inform management strategies.

4.3.11 The original framework raised a number of questions about salterns in general and red hills in particular. These included questions relating to their chronological and functional development, and the paucity of identified prehistoric examples. It is of interest that one of the few recently investigated examples of a 'red hill' was of Middle Iron Age date, which is considered atypical.

4.3.12 Although further work has been carried out on fishtraps, and additional surviving examples have been identified, projects have focussed on survey rather than more detailed analysis. These structures have the potential to provide information on carpentry and woodland management. Strategies need to be devised to consider how these questions may be addressed within the logistical constraints presented by the almost subtidal location of some of these sites (for example in the Blackwater, Essex).

4.3.13 In considering the oyster industry, the NMP has provided a good baseline and considered phasing, particularly for the post-medieval and modern periods. These studies could be taken forward by field survey, confirming identification and looking for wooden structural elements, which may provide dating opportunities. There is also the potential to integrate the historical and archaeological record; considering, for example, analysis of oyster shell

from archaeological contexts and studying the links (or rivalries) across the estuary between Kent and Essex.

4.3.14 Seawalls have great potential to integrate historical and archaeological studies, for example the relationship between secular and ecclesiastical land ownership and exploitation. The sea defences around the estuary are indicative of coastal changes, landownership and management, and changes in agricultural policy. They have the potential to contribute to understanding the topographical evolution of the Greater Thames Estuary through to the modern day. Investigation of the extant walls is limited to opportunities that arise through realignment. It could be possible, utilizing existing data (e.g. the grazing marsh surveys), to identify inland counterwalls that could be investigated to consider typology and potentially dating. Any work on such monuments would however need to bear in mind the importance of these features as part of the natural environment resource, for example Least Lettuce (a schedule 1 plant) grows on the old walls around Fobbing. Other nationally scarce plants also grow on walls and in the marshes, hence any field investigation would need to be carried out in consultation with natural environment bodies such as Natural England.

4.3.15 The question also remains as to when the earliest defences were constructed around the estuary, is there evidence for Roman reclamation? The transformation of a natural marsh to full-scale exploitation may include modification of the landscape, for example perhaps through the improvement of drainage, perhaps low walls and seasonal exploitation (Rippon 2000, 52) that is not as well represented in the known archaeological record.

## 4.4 Framework Objectives (Intertidal and Related Archaeology)

The following section outlines the framework objectives identified for intertidal and related archaeology through the review. Where they remain relevant those from the original framework have been retained.

***Framework Objective 3A***
To develop a full appreciation of the range and context of remains within the intertidal zone as evidence of environmental change and the exploitation and management of the intertidal resource.

This would be taken forward by **specific objectives**:

3A.SO1 Completion of baseline survey to provide a framework for defining further research priorities in the intertidal zone, with the North Kent Coast identified as a priority.

3A.SO2 Increasing understanding of remains associated with activities such as fishing and saltworking, and their function in relation to the intertidal zone. Improved baseline data has contributed to this but progress remains to be made.

3A.SO3 Integrating the specialised sites and structures within the intertidal zone into wider patterns of interpretation and explanation. Some progress has been made towards this in both Kent and Essex but it remains relevant.

3A.SO4 Selecting sites for further examination where the preservation of organic materials will contribute to archaeological understanding beyond the wetland zone through a process of analysis and synthesis.

3A.SO5 Publication / dissemination of the results of surveys and the promotion of intertidal archaeology in general.

3A.SO6 Developing a robust understanding of the effects / impacts of the coastal management options on the historic environment resource (e.g. re-wetting of deposits resulting from habitat recreation).

Specific **areas of research** could include:

3A.AR1 Collating information derived from existing collections of aerial photographs and commissioning new surveys as appropriate as a means of rapid data gathering.

3A.AR2 Exploring the possibilities that other datasets have to contribute to the framework objectives and the development of the strategy (e.g. Lidar survey).

3A.AR3 Review and analysis of the results of the variety of baseline surveys (i.e. RCZAS and Grazing Marsh Surveys) in order to identify key areas of known sites / areas of potential for; more detailed study, monitoring, obtaining (OD) levels.

3A.AR4 Reviewing results of RCZAS and selecting sites for 'ground truthing' to test the rapid initial identifications made in the field.

3A.AR5 Review the results of the grazing marsh surveys in order to identify selected earthworks/monument types for further study. For example ditched and/or banked enclosures.

3A.AR6 Identifying the sites of former landings (through a review of RCZAS / documentary and cartographic research) in order to develop a programme further work.

3A.AR7 Carry out synthesis/analysis on existing gazetteers and data on red hills in order to identify monuments where this interpretation could be confirmed through fieldwork.

3A.AR8 Develop field programmes for identification of red hills and condition surveys.

3A.AR9 Carry out pilot fieldwork on salterns/red hills in order to better understand these monuments and to develop methodologies for their investigation.

3A.AR10 Surface survey of areas landward of the seawall, augmented by borehole survey. This also supports framework objectives relating to the Holocene palaeoenvironment.

3A.AR11 Monitoring the effect of erosion on the estuary system as a whole.

3A.AR12 Assessing the impact of dredging and the erosional effect of other estuary management regimes on subtidal and intertidal archaeological deposits.

3A.AR13 Utilizing sonar survey for the investigation of sites.

3A.AR14 Developing research objectives in relation to the oyster industry.

3A.AR15 Opportunistic recording of sites.

3A.AR16 Investigation and analysis of the Hullbridge, Essex palaeochannel, regarded as our best possibility for an East Anglian Star Carr.

***Framework Objective 3B***

To develop a holistic approach to the study of seawalls and flood defences in the estuary landscape as evidence of climatic change, and reclamation, management and exploitation of the marshland resource.

This would be taken forward by **specific objectives**:

3B.SO1 Developing an overview of the evolution of sea defences in relation to sea-level and climatic change.

3B.SO2 Developing an understanding of the construction methods of seawalls and their water control mechanisms.

3B.SO3 Developing an understanding of the historical context of sea defences in terms of secular and ecclesiastical land ownership and exploitation.

Specific **areas of research** could include:

3B.AR1 Identifying sites of extant of former seawalls/counterwalls and in order to develop a programme of field investigation (in consultation with nature conservation bodies where appropriate).

3B.AR2 Establishing a chronological framework for the development of sea defences.

***Framework Objective 3C***
To continue develop a holistic approach to the study of the extant grazing marsh and former wetlands around the estuary to understand the physical survival of historic monuments and landscapes; to consider this as evidence of climatic, social and economic development around the estuary through the centuries.

Specific **areas of research** could include:

3C.AR1 Completing grazing marsh surveys (desk-based and walkover) of the extant and former marsh around the estuary.
3C.AR2 Plotting the extent of earthworks and cropmark sites and relating them to cartographic and documentary evidence.
3C.AR3 Basic identification and dating of earthworks. Their significance needs to be appreciated. They could be indicative of the development of coastal change, changes in the basis of the coastal economy, interactions within wider landscape and with towns, impact of the growth of towns on the coast and reflect wider historical events.

***Framework Objective 3D***
To continue to develop methodologies for the investigation of the intertidal zone.

Specific **areas of research** could include:

3D.AR1 Continue to develop techniques for recording in the intertidal zone.
3D.AR2 Consider the potential for providing condensed word lists for use in RCZAS/identifying gaps in available lists.
3D.AR3 Develop experimental research protocols related to marine inundation of archaeological soils and sites (e.g. Macphails's study at Wallasea Island, Macphail 2009).
3D.AR4 Identifying sites specifically related to exploitation of the coast, such as fish processing, landing places.

# 5.0 LAND-USE AND OCCUPATION

## 5.1 Introduction

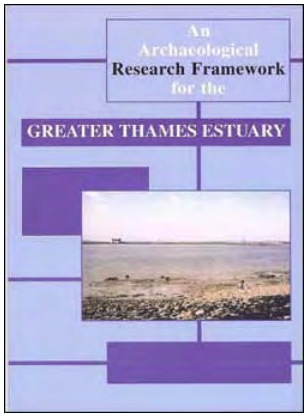
5.1.1 There is an extensive archaeological resource on the dryland around the estuary, including remains associated with land-use and occupation, both urban and rural in character. The review of the maritime and intertidal archaeological resource (sections 3.0 and 4.0) demonstrates the importance of the estuary itself as a resource with direct links to sites on dryland, such as small ports. There are also more intangible links between the estuary and dryland, the latter having a ritual significance, aesthetic value and relative isolation that varies through time. Although in some cases no explicit link between a community and the estuary can be made (for example the local economy is not directly dependant) the proximity of the estuary must have had an effect.

5.1.2 Land-use around the estuary varies but is broadly agricultural, industrial (including the extensive extractive industries) and natural, the resources of the latter being exploited. Settlement also varies, from single houses/homesteads, to farms, hamlets, villages and towns. These relate to one another and to the estuary itself. There may be, for example, inter-dependencies, direct or indirect associations.

5.1.3 Determining the extent of this zone inland of the modern estuary shoreline is difficult; for the purposes of the review, it has been considered to be the estuarine hinterland as seen from a Thames-focused viewpoint.

5.1.4 There is, inevitably, an overlap between the research agenda presented here and those of the relevant regional research frameworks; London, the South-East and the Eastern Counties. There are also national research frameworks such as Town and Country in England: Frameworks for Archaeological Research (Perring *et al*. 2003), which include relevant research topics.

5.1.5 This theme is closely related to a number of other sections of the Greater Thames research framework; the Pleistocene environment and Palaeolithic archaeology, intertidal, and the historic built environment. Pre-Mesolithic periods are covered in Section 2.0.




Relevant sections of the original framework:

Resource Assessment: pp.16–18

Research Agenda: pp.32–33

## 5.2 Recent Projects

5.2.1 The following summarises some of the archaeological investigations that have been undertaken around the estuary since the publication of the original framework. It does not provide an exhaustive overview of all works, but rather presents some examples.

*Mesolithic*

5.2.2 The original framework noted that evidence for Mesolithic activity around the estuary largely derives from chance finds, with some formal collection and limited excavation. This, to a large degree remains the case. A number of projects carried out as part of the planning process have recovered Mesolithic artefacts. *In situ* material has been recovered from the shoreline of a glacial lake in Bermondsey (MOLAS 2002, 21). Progress on collating records on existing collections has taken place as part of The Colonisation of Britain by Modern Humans Project (Wessex Archaeology 2002). Flint-working debris and possible hearths have been found on the Tank Hill Road site, Essex .

5.2.3 What would have been the wetland/dryland interface during the Mesolithic is likely to be a key area where Mesolithic sites may be located. Geomorphological mapping (as discussed in section 2.0) has a considerable part to play in identifying such sites. Predictive models of the Lower Lea have been generated from the Mapping the sub-surface drift geology of Greater London; Lea Valley databases (created by MOLAS), and are being utilized to inform the mitigation strategies in the area.

*Neolithic*

5.2.4 The Medway Valley is an important area for Neolithic studies, and is the site of two groups of megalithic chambered tombs (Williams and Brown 1999, 17). Recent work on the dating of 16 individuals in the sarsen chamber of the Coldrum megalith provided a date of the first centuries of the fourth millennium BC (Bayliss *et al*. forthcoming). One of the most dramatic discoveries in recent years has been the identification of a Neolithic longhouse at White Horse Stone. This large, 18m by 8m, post-built structure is of a continental type, with characteristics of the '…Linearbandkeramik and post-LBK traditions of NW Europe, mainly dated to the 6th and 5th millennia BC' (OAU 2000, 451). Two circular post-built Late Neolithic buildings have also been identified, but it is unclear if they are the remains of houses.

5.2.5 Other excavations around the estuary have identified Neolithic activity, for example at Tollgate (Gravesham, Kent). It is possible that this long enclosure is Middle Neolithic in date or perhaps a plough-truncated Early Neolithic Long Barrow.

5.2.6 At Lodge Farm in Essex, on a spur of high ground overlooking St Osyth Creek, investigation of a cropmark complex in advance of aggregate extraction identified a sequence of archaeological monuments, including an Early Neolithic causewayed enclosure, and its subsequent Bronze Age funerary use. The causewayed enclosure was delineated by up to three lines of interrupted ditches. Over 100 Early Neolithic pits were located within this enclosure. Radiocarbon dates from these indicated that activity dated to the 4th millennium BC and was short-lived (Germany 2007). The close association between causewayed enclosures and watercourses, in this case St Osyth Creek, may reflect sacred significance and/or a ritual role, along with more practical uses such as watering of cattle, communication and trade. Plant remains suggest much of the immediate area was grassland, possibly used for grazing. The evidence for Neolithic trade and manufacture is slight, with evidence for flint-working (Germany 2007, 105).

Fig. 20: Excavations at Lodge Farm, St Osyth (photo: ECC)

5.2.7 The remains of two causewayed enclosures have also been investigated at Kingsnorth on the Isle of Sheppey, Kent (Oswald et al 2000, 153; Allen and Leviers, 2008). The first lies just below the crest of a low hill, and the second on the highest point, both with the same aspect, overlooking the Thames Estuary to Essex.

5.2.8 The dating of causewayed enclosures in southern Britain of the 4th millennium BC has been the subject of a project to date these monuments more precisely than before, using radiocarbon dating of selected samples and Bayesian modelling (Dr Frances Healy pers. comm.). The dating achieved for sites in the Greater Thames Estuary relates them to each other and to the wider record of early Neolithic settlement in the area. At present there is an apparent contrast between the two sides of the estuary, which may be summarised as follows:

| | **South** | **North** |
|---|---|---|
| First dated trace of a Neolithic presence | 40th century cal BC | 37th century cal BC |
| First causewayed enclosure built | 38th century cal BC | 37th or 36th century cal BC |

5.2.9 Some of these distinctions may be accidents of the history of investigation and of the nature of the Neolithic record on either side of the water. The 40th century BC date for a Neolithic presence south of the estuary depends on recent work on the White Horse Stone rectangular structure (Oxford Archaeological Unit 2000) and on the human remains from the megalithic tomb at Coldrum (Whittle *et al*. in prep). The 38th century BC date for the causewayed enclosures there is based on dates obtained from recently excavated enclosures. North of the estuary, fourth millennium BC burials are scarcely known and rectangular structures remain undated. Alternatively, there may genuinely have been an earlier uptake of Neolithic beliefs and practices to the south than to the north, especially as the Neolithic presence in Kent seems early by national as well as regional standards.

5.2.10 The remains of Neolithic and Mesolithic date on dryland are indicative of the remains which are now located in the modern intertidal and subtidal zone, which both complement and supplement the record.

5.2.11 Sites of Neolithic to Roman date have also been investigated in east London. A review of former Passmore-Edwards Museums sites has also been prepared by MOLAS, 'From Ice Age to Essex', which synthesises the highlights of many years work on quarry sites in this area (Perring *et al*. 2005).

*Bronze Age*

5.2.12 The sites at both White Horse Stone and Lodge Farm had significant Bronze Age components. At White Horse Stone an Early Bronze Age post-built structure and evidence of Late Bronze Age/Early Iron Age settlement was identified. At Lodge Farm a pond barrow situated within the causewayed enclosure was the focus of funerary/ritual activity, in use in the first part of the 2nd millennium BC, and supplemented by Middle Bronze Age some 22 ring ditches and 11 cremations (Germany 2007, 114).

*Iron Age and Roman*

5.2.13 At Lodge Farm, Essex, the earlier ritual activity was succeeded by the establishment of trackways and a settlement (roundhouses and post-built structures) in the Middle Iron Age. The economy of the settlement was probably based on a combination of pastoral and arable farming. The presence of a significant number of loom weight pieces would suggest wool production was significant; sheep may have been grazed on the nearby marshland, demonstrating the importance of this resource (Germany 2007, 116).

5.2.14 Ongoing analysis of the results of the Elms Farm excavations at Heybridge, Essex, a settlement close to Maldon at the head of the Blackwater has shed light on the nature of contact with the Roman world in the LPRIA (diplomatic, trade and culture). It has provided information on Late Iron Age funerary practice, understanding the LIA to Roman transition. The Roman phase of the site will provide information on the origins, nature and development of Roman settlements (including the zonation of activities). With the presence of a substantial temple complex and associated votive deposits there is also the opportunity to consider religion, including the possibility of Late Roman Christianity. There are also important finds assemblages.

5.2.15 Elms Farm has also demonstrated the importance of pastoral farming. The recovery of numerous cheese presses when considered in light of the large number of salterns and the production of sheep's milk is suggestive of cheese production.

5.2.16 The work of Dr J. Crighton has offered new perspectives on the transition between the LPRIA and the Roman periods in the east and south-east of England.

5.2.17 Excavations have taken place at Springhead, Kent (CTRL) at the north-western edge of the settlement of Vagniacae. These identified 1st–2nd century occupation, including debris from crop processing. 2nd–3rd century boundary/enclosure ditches were also investigated. At Pepper Hill a late 1st–mid 3rd century cemetery was excavated (CTRL). Fragments of Roman field systems have been identified at the above sites and at Cobham Park. In Essex, work on the A13 investigated a non-villa rural site, where evidence for changing agricultural practices was noted (Foreman and Maynard 2002).

5.2.18 Excavation in advance of a cemetery extension at St Nicholas Church, Great Wakering, Essex identified elements of a Late Iron Age/early Roman cremation burial cemetery (established in the last quarter of the 1st century BC), with an increased use of the surrounding landscape, evidenced by the creation of a loose system of fields, through

the early Roman period, although the cemetery would appear to remain unenclosed. It is likely that the primary activity before and throughout the Roman period was agriculture, possibly supplemented by opportunities for wildfowling, shell-fishing and fishing provided by the coastal location, although these may only have played a small part in the economy of the community (Dale *et al.* in press).

Fig. 21 – Excavation of a later Roman bathhouse at the edge of Shadwell Dock and Tobacco Dock. This unexpected discovery lies outside the walled city (photo, Pre-Construct Archaeology)

*Saxon*

5.2.19 Saxon occupation at Wakering would appear to date from the 7th century and continue through to the 9th. During the 7th century it would seem likely that a church was established nearby which may have been the minster mentioned in contemporary documents such as the *Passio.* Other remains include a substantial ditched enclosure with associated rubbish pits, hearths and a possible cesspit from which a large pottery assemblage was collected. An elaborate carved masonry fragment recovered from the enclosure ditch is potentially indicative of high status patronage in the 8th or early 9th centuries, potentially of the minster (Dale *et al*. in press).

5.2.20 Investigations on Saxon sites around the estuary have identified a number of cemetery sites, the most dramatic being the Prittlewell Princely burial, important for understanding the Saxon elite, conversion to Christianity and contacts with the continent (e.g. MOLAS 2004). Work at Rayleigh identified an early Saxon cremation cemetery, although no known Saxon sites were known in the immediate vicinity. Finds analysis suggest the individuals were probably of low status, in contrast with Prittlewell (Ennis 2004 and

2008). A cemetery has also been excavated at Cuxton, close to the Medway (MOLAS 1999). The incidence of these Saxon sites in close incidence to east coast estuaries may hint at the nature of early Saxon settlers up rivers and valleys and infer the importance of waterways to the lives of these communities. Similarly, the arrival of Christian missionaries also has a coastal incidence, with monastic/collegiate sites at Bradwell-on-Sea, Essex and at Minster-in-Thanet, Kent.

*Medieval and Post- Medieval*

5.2.21 The medieval and post-medieval periods saw the increasing influence of London as a major, and growing, market for food goods and raw materials. Much was supplied by the Thames hinterland, which provided, for example, ready access to marsh for grazing and fattening of sheep. The expansion of settlement around the estuary saw the establishment of small towns and farms and field system.

5.2.22 Much of the medieval and post-medieval historic environment of the estuary is covered in other sections of the research framework, for example intertidal and related archaeology, military and industrial.

5.2.23 Excavations at Maldon, Essex have identified fragmentary remains of medieval remains along the High Street frontage and, pertient to this framework, remains of fishbones which formed part of the diet. Types included Gadidae (e.g. cod and whiting) Scombridae (e.g. mackerel), flatfish and *Anguilla anguilla* (European eel). This represents not only marine fish but freshwater and anadromous (Stokes, unpublished). At the Shepheard Neame Brewery, Faversham, Kent evaluation adjacent to the tidal creek identified a timber revetment and archaeobotanical remains of crops (Gaimster and Bradley 2003).

5.2.24 On Foulness Island, Essex, excavation at Great Burwood established that the site was continuously occupied from the late 14th to earlier 20th centuries (Crump pers. comm.). Similarly excavations at Great Garlands, Corrigham, Essex identified the possible remains of a late medieval farm, situated overlooking the Thames-side marshes (Peachey 2005).

*Urbanism*

5.2.25 The development of urban settlements has been considered in the numerous Extensive Urban Surveys (EUS; also known as Historic Towns assessments) that have been carried out around the region; including small towns like Maldon. Many can be found on ADS (http://ads.ahds.ac.uk/catalogue/projArch/EUS/index.cfm). There are also Urban Archaeological Databases in Colchester and Canterbury, collating information on these important settlements.

5.2.26 In addition to the urban settlement studies there have also been historic settlement assessments of a number of rural parishes in Essex, some around the estuary. These extend the scope of studies from the urban core into the wider landscape and consider its origins. A synthetic assessment of the excavated medieval rural sites in Essex has been prepared in Essex (Medlycott 2006). Characterisation has also made a contribution, considering interpretations of field types. Data gathered from the National Mapping Programme and the Portable Antiquities Scheme can also contribute to studies of settlement patterns through, for example, further analysis into distribution patterns.

## 5.3 Assessment of Contribution to the Research Objectives and Future Directions

5.3.1 As with all themes, it is clear that there is a large resource of existing data that has potential to contribute to the objectives outlined in the original framework (Williams and Brown 1999, 33). Synthesis of the results of both published and 'grey literature' is regularly identified as a key need to address research questions. It was a common theme to emerge from the discussion at the 2004 workshop and is also identified as a key priority in the review of the East of England research framework. It also highlights the need for consistent reporting, archiving and incorporation into HERs. The results of projects are increasingly available digitally through the Archaeology Data Service (OASIS), the collections of HER / SMR / NMR, and a wide range of GIS data. The deposition of 'grey literature' with the ADS is encouraged, and is now generally a requirement of briefs of work issued by the curatorial authorities. This should be standard practice. Discussions regarding digital archiving and incorporation into HERs of other types of data (for example site plans and GIS data) are ongoing.

5.3.2 These possibilities can be explored by systematically radiocarbon dating samples close in age to their Early Neolithic contexts and modelling the results with the other available information. This applies to already archived projects as well as to current and future ones. Similarly, there is a need for consistent dating for all prehistoric periods. For example, a recent seminar held to develop the South-East England research framework, identified a need to radiocarbon date pottery-rich Bronze Age and Iron Age contexts to refine dating for pottery types.

5.3.3 Characterisation in Kent, categorising the resource by period and type of activity (e.g. funerary, settlement) as GIS layers, has been utilized to consider the development of the landscape through time. From initial analysis it has been possible to identify shifts in foci and possible key nodes of activity (Waugh 2006, 24). This approach has allowed a narrative of landscape development to be described, engaging the interest of people, including residents, planners and developers (Waugh 2006, 26). In Essex, characterisation has been approached in a different way, refining a polygon model created as part of the Thames Gateway Historic Environment Characterisation Project (Chris Blanford Associates 2004). This refined model considers the diversity, character and sensitivity of the historic environment (Waugh 2006, 27). More information on characterisation around the Thames can be found in Section 10.0 and at :http://www.planarch.org/planarch_actions_info.php?action=5. The characterisation projects discussed above, alongside English Heritage's Historic Landscape Characterisation Programme, illustrate the time-depth of our modern landscape. There is a need to develop a methodology and carry out characterisation in Greater London.

5.3.4 Dynamics of settlement in the rural landscape are complex; farms are established, shift, amalgamate and disappear, in response to complex interplay of factors, particularly in relation to agricultural changes (e.g. technological) economic factors and weather events. These farms and their associated infrastructure are of potential interest, contributing to studies into distribution of settlement, land-use, economics and phases of activity. For example, work on Foulness into the evolution of domestic dwellings has suggested three main phases of building on the island – the 16th, late 17th to mid 18th and early 20th centuries. Research on the island has suggested that there may well have been 10–12 small self-supporting hamlets (Crump pers. comm.) whereas there are now two.

5.3.5 Extensive Urban Surveys (EUS) have considered the origins and development of urban areas around the estuary. In Essex these have included Burnham, Harwich, Maldon, Manningtree, St Osyth, Rayleigh, Rochford and Wivenhoe. In Kent they include

Dartford, Northfleet, Gravesend, Rochester, Chatham, Gillingham, Queenborough, Sheerness Whitstable and Margate. The reports can be found online in the ADS archive (ads.ahds.ac.uk/EUS/index). The EUS have been used to inform the planning and development process, but also present research questions. The more general research themes presented in the EUS have some commonality; they typically include considerations of origins and development. Other questions are quite specific to the individual town. It would perhaps be advantageous to collate the recommendations/ questions outlined in these and other characterisation studies, such as the HECAs. This document has gone some way to reflect them, but does not present a detailed breakdown. The EUS are also, in some cases, almost ten years old. In some cases, for example Maldon and Rayleigh, additional work will have been carried out since their publication. There is therefore a need to carry out a review of these studies to identify those which need updating and revising in light of more recent work if they are to continue to meaningfully inform planning.

5.3.6 The development of deposit modelling techniques supported by multi-disciplinary assessment is a useful tool for identifying likely areas of potential. In the Lower Lea Valley this has been used to inform mitigation strategies in advance of Olympics construction. It could potentially be used to target research investigations.

5.3.7 The work on the dating of Neolithic causewayed enclosures being carried out by Dr Frances Healy, Dr Alex Bayliss and Proff. Alisdair Whittle has enabled a number of monuments to be better placed within their chronological framework, and has raised questions. The results suggest an uptake of beliefs and practices to the south of the estuary before the north. This may however reflect the history of the investigation and types of sample. Further radiocarbon dating / modelling will allow the possibilities to be explored as to the chronologies of such sites in relation to themselves and each other.

5.3.8 The original framework identified a need to research the development of specialised settlements, for example Barking, which was, at a point in the 19th century, the largest trawling station in the British Isles (Williams and Brown 1999, 23). A number of settlements are also closely linked to the oyster industry, for example Paglesham (Essex) and Whitstable (Kent). This industry is one that links both sides of the estuary and the major market of London. There remains a need to carry out more research into these specialised settlements, their development, nature and activities.

## 5.4 Framework Objectives (Land-use and Occupation)

The following section outlines the framework objectives identified for land-use and occupation through the review. Where they remain relevant those from the original framework have been retained.

***Framework Objective 4A***
*To further understanding of the evolution of settlement and other land-use patterns around the estuary in terms of their social, economic and political development.*

This would be taken forward by **specific objectives**:

4A.SO1 Analysing the adaptation and evolution of settlement patterns in response to coastal change.

4A.SO2 Developing interpretation and explanation of sites along the coast of the estuary which integrate such sites with data from the intertidal zone and buried landscapes.

4A.SO3 Developing an understanding of early agriculture and land use on terrace gravels and brickearth.

4A.SO4 Examining the impact of the Roman Conquest on settlement patterns and the social, economic and political articulations of the landscape.

4A.SO5 Examining the chronology of the Anglo-Saxon migrations into the areas surrounding the Thames Estuary and the impact on existing settlement and material culture.

4A.SO6 Examining the development in the Anglo-Saxon period of new organisational and administrative frameworks based on secular and ecclesiastical estates and "territories".

4A.SO7 Examining the impact of the Norman Conquest on settlement patterns and estate organisation.

4A.SO8 Examining the role of the town from the Roman period onwards.

4A.SO9 Analysing the pattern of settlements of all types through time as evidence of the social, economic and political evolution of the study area.

4A.SO10 Examining the impact of the church on the historic landscape in medieval times.

Specific **areas of research** could include

4A.AR1 Synthesis of the results of projects which have been carried out around the hinterland of the estuary (both published and 'grey' literature) and considering how their results relate to the broad research objectives outlined above. This could perhaps be best carried out as a series of thematic projects.

4A.AR2 Selecting sites for further examination and investigation which specifically contribute to the understanding of the role of the estuary through time.

4A.AR3 Developing radiocarbon dating programmes for prehistoric periods in general (particularly for deposits of pottery-rich Bronze Age and Iron Age contexts).

4A.AR4 Systematically radiocarbon dating samples close in age to their Early Neolithic contexts (principally articulated bone and single fragments of short-life charcoal and charred plant remains in coherent deposits) and modelling the results with the other available information. This applies to already archived projects as well as to current and future ones.

4A.AR5 Testing current hypotheses concerning the characterisation of medieval rural settlement in relation to sub-provinces and local regions and exploring social, economic and political evolution against this framework.

4A.AR6 Identification of the sites of 'lost' farms, considering them in relation to agricultural developments/economy, and their relationship to the estuary.

4A.AR7 To consider what form farms take, range of building-types present and how far can functions be attributed to them.

4A.AR8 To consider if there are regional/landscape variations in settlement location, density or type.

4A.AR9 To consider how far the size and shape of fields can be related to the agricultural regimes identified.

4A.AR10 Studying field systems and bio-archaeological evidence from associated wells/watering holes and settlement features.

4A.AR11 More study of green lanes and other ancient routes – e.g. their origins, role as a focus for occupation. Are any pre-Medieval in origin? And consider how these relate to the estuary and its tributaries.

4A.AR12 Analysis of the distribution of artefacts recorded by the Portable Antiquities Scheme or recovered by archaeological fieldwork to help in establishing relative settlement distribution and cultural links.

4A.AR13 Review, update and revision of existing EUS.

4A.AR14 Understanding of the inter-relationships between towns and their hinterlands; settlement hierarchies.

4A.AR15 Development and role of the towns, changes in their internal layouts and housing densities, role as centres of supply and demand in relation to maritime trade.

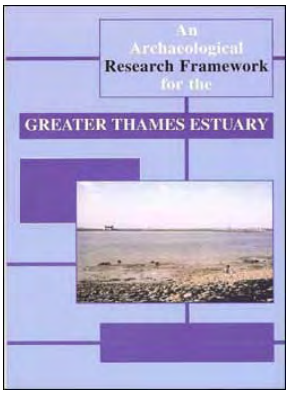
4A.AR16 Creating models of the interrelationships that can be tested by further research and investigation.

# 6.0 HISTORIC BUILT ENVIRONMENT

## 6.1 Introduction

6.1.1 Due to its nature as an archaeological document the original research framework focused on archaeological issues and, with the exception of industrial and military/defence heritage there was little coverage of the remainder of the built environment, although its importance was recognised. The resource assessment focused on the modern built environment, particularly urban residential growth, the consequent need to address social and health issues, changes in use of buildings, new towns and social housing and seaside towns (Williams and Brown 1999, 18–19). The built environment is a significant part of the historic environment as a whole, and archaeological and built environment data is increasingly integrated. This is demonstrated in the recent development of HERs. Hence, in this updated document the results of the review are presented as a general resource assessment and agenda.

6.1.2 Many of the points made in relation to the historic built environment apply to the regions as a whole and not the Greater Thames exclusively; as such the relevant regional frameworks should also be consulted (East of England South-East England and London). There are inevitable overlaps between the built heritage in the post-medieval and modern periods with topics covered in the industrial and military themes.




*Relevant sections of the original framework:*

*Resource Assessment: pp.18–19*

*Research Agenda: p.34*

## 6.2 Resource Assessment

*Listed Building Registers and Other Sources*

6.2.1 The Listed Buildings Registers are the main source of data on historic buildings, listed for their 'special architectural or historic interest'. In general, the older and rarer a building the more likely it is to be listed. Buildings post-dating 1840 have to be 'exceptionally important' to be listed (information from EH website). Thematic listing programmes of more recent buildings have been carried out, which include industrial and military heritage. Listed buildings only represent a portion of the built environment; non-listed buildings can be of local or regional importance and form a key part of the character of an area, either individually or as groups. There are digital versions of the listed buildings 'green books' available. At a national level this comprises 'Listed Buildings Online', a limited access website (hosted by English Heritage). Information is also available through the NMR and local government. Data on listed buildings is also being incorporated into Historic Environment Records.

6.2.2 The Vernacular Architecture Group also maintains a series of databases; these include a bibliography of references (four volumes of which are published and a fifth in preparation), dendrochronological dates published by the group and cruck buildings. These are currently hosted by the ADS (see http://www.vag.org.uk/databases.htm). Other sources on information on historic buildings include the Victoria County History series, the Survey of London and the Royal Commission inventories.

6.2.3 Urban built heritage, both listed and non-listed, is generally included in Extensive Urban Surveys (also known as Historic Towns Surveys). These consider both the demolished and surviving resource. They also place the built heritage within the wider context of the development of the towns. These have been carried out for a number of towns around the Greater Thames (see http://ads.ahds.ac.uk/EUS Kent and http://www.essexcc.gov.uk/Essex Towns ). Extensive Urban Surveys also set out key research questions for the areas studied. It should be noted that extensive urban surveys have generally been carried out for those towns with their origins in the medieval period (or earlier) and therefore settlements with more recent origins are not covered.

6.2.4 Districts have identified conservation areas, which reflect the importance not only of individual buildings but of groups of buildings and the spaces between. These are a fundamental tool in the planning framework. They are supported by character appraisals. The character appraisals, like the EUS, provide a valuable round up of the built environment resource. Within the Greater Thames area examples of character appraisals include Rochester Cathedral and its associated sites, Rochester Castle, Shurland Hall (scheduled country house) and the defence sites Upnor Castle, Oare Gunpowder works. Appraisals have also been carried out at East Tilbury, Queenborough/Rushenden, and Woolwich. These present statements of current knowledge and significance of the areas. There are therefore a wide range of datasets which provide information on the built historic environment but these have, in general, not been synthesized.

*Inventories*

6.2.5 The sources of information which relate to the built environment around the estuary, some of which are outlined above, have chronological and geographical gaps and would benefit from the development of inventories, similar to the comparative industrial

surveys. This applies to the regions as a whole but, for the purposes of the Greater Thames Estuary, could focus on building types which specifically relate to the estuary.

Examples could include:

- Seamen's missions
- Harbour and quayside infrastructure
- Hotels, bed and breakfasts
- Beach huts
- Warehouses
- Boatsheds/stores
- Cliff lifts

6.2.6 These comparative surveys have proved to be useful in the past, not only for developing an accurate catalogue of the resource but also significance and condition so that management priorities can be further developed.

*Seaside Towns and Resorts*

6.2.7 The architectural development and history of seaside towns around the Greater Thames was identified in the original framework as an important element of the built environment around the estuary. In recent years English Heritage has been carrying out a survey of seaside towns which has included work at various sites around the estuary. This has included Gravesend, Whitstable and Southend-on-Sea (Brodie pers. comm.). The results of this study have recently been published (Brodie and Winter 2007).

6.2.8 "Margate's Seaside Heritage", focuses on the regeneration of a town with a colourful past, whose historic assets are being used to in prompt regeneration, highlighting how Margate has capitalised on its heritage and architecture (Barker *et al.* 2007).

Fig. 22: Marine Parade, Margate

6.2.9 The development of seaside towns remains an important research objective. There are still a number of seaside towns around the Greater Thames Estuary whose built environment has not been subject to detailed study. An assessment of existing studies could be advantageous in understanding the development of the British seaside resort, its significance and its vulnerability within the context of regeneration and coastal change.

6.2.10 Other small towns around the estuary developed around specific industries and/or as small ports, fishing centres etc. As industries have declined there has been an increasing emphasis on tourism, reflected in changes in architecture. The former industries become part of the 'heritage tourism' component of the town, an opportunity for preservation and promotion.

6.2.11 The development of the towns around the estuary reflects other social and economic changes, for example small working ports are now becoming part of the London commuter belt, such as Leigh-on-Sea, Essex.

6.2.12 There are a wide range of other building types around the estuary reflecting its nature as a sea-side destinations; these include hotels, guesthouses, boarding houses and bed and breakfasts.

*Rural Buildings*

6.2.13 Although the Thames Estuary is perhaps most well known for the industrial landscape, such as the Isle of Grain and Canvey Island, it is rural for much of its length. The built environment in the rural hinterlands comprises a mix of structures including farm complexes, hamlets, villages and houses.

6.2.14 Historic farm buildings "… are by far the most numerous type of historic structure in the countryside. They are valued as a prominent part of the landscape in addition to informing present and future generations of the long history of farming and settlement in the English landscape." (Gaskill, Lake and Trow 2001). The *Historic Farmsteads Research Project* has, at a national level, aimed to quantify the listed resource and the changes which affect it and consider best practice (Gaskell, Lake and Trow 2001). There have also been numerous studies of individual buildings and farmsteads carried out through the development control process. There are close links between the rural economy around the outer estuary and the major market of London.

6.2.15 The development of inventories of historic farms, particularly those of the reclaimed marshes, and including the non-listed resource, would be advantageous. As part of wider analysis it could consider whether such structures around or associated with the estuary have a distinct character in comparison with others in the region. Inventories could also consider survival and condition of individual farms and could enable comparative significance to be considered for groups as a whole. This would assist in identifying those buildings which would benefit from further study, and the development of management priorities. This is of particular importance as rural buildings come increasingly come under threat, from factors such as disuse and conversion.

*Suburban Development*

6.2.16 In addition to the specifically industrial (or associated, e.g. workers housing) urban built environment, the Greater Thames is also characterised by the expansion of settlements associated with London (Williams and Brown 1999, 18). This expanding suburban settlement, typically 19th century and later in date, includes public housing (i.e. constructed by local authorities, housing associations or other organisations in receipt of state housing subsidies). In metropolitan Essex much of the suburban expansion came

about as a result of the incursions of the LCC in the 1920s at, for example, Barking and Dagenham, which was part of a wider scheme to create a satellite town. Other London 'overspill' estates were also constructed, like that in the South Ockendon area in the 1930s, and greatly expanded after World War II. Post-war housing expansion also took place within existing urban areas around the estuary, as populations continued to shift.

6.2.17 English Heritage has recently completed work which considers the heritage of suburbs at a national level and guidance for planning and development (www.helm.org.uk/suburbs).

6.2.18 Research around the estuary could include the characterisation of early suburban development in order to identify what elements of this resource survive as standing structures and linking development to the historical record. This will contribute, for example, to the understanding of urban development along the estuary in relation to London and changing transport networks, the socio-economic factors that have influenced the nature of the built environment and the effects of the changing economic basis of the region on its character.

*Plotlands*

6.2.19 In the hinterlands of London, at the end of the 19th and beginning of the 20th century, a combination of factors led to the evolution of 'plotlands', self-built settlements. The agricultural depression of the late 19th century saw land with a marginal yield sold off to speculators and developers who developed them into rectangular plots for sale. Other factors included the overcrowding and pollution in major cities, the development of mass transport, and the absence of a strict planning framework or of enforcement of existing regulations (2003). Houses were constructed in a variety of styles, tracks were generally unsurfaced, and drainage and services generally poor. Plotland areas could be found, for example, around what is now Basildon new town, Jaywick Sands, Biggin Hill and on the Isle of Sheppey.

6.2.20 Establishing the nature and extents of these plotland communities was identified in the original framework as an area of research (Williams and Brown 1999, 34). There has however been little research carried out and hence this topic should be addressed as a priority, especially as they may well be 'brownfield' sites which may be re-developed. A first phase of research could be a programme of documentary research and field assessment, similar to that carried out for character appraisals.

Fig. 23 A plotland scene about 1930 (Artist – Peter Froste)

*Other Buildings*

6.2.21 There are also ranges of public buildings around the estuary, such as schools, hospitals, workhouses, prisons, governance buildings. These building types are vulnerable, they are generally situated within grounds which can be used for development, and are unsuitable (or unfashionable) for continued use as offices or as public space. They are also not well represented in the existing record although studies are being developed; the RCHME has carried out national studies of both Poor Law buildings and hospitals which include greater Thames examples (Morrison 1999; Richardson 1998).

6.2.22 Churches are a key component of the historic environment of the Greater Thames, their position in the landscape means that they occupy some of the most dramatic locations around the estuary, reflected in their marking on admiralty charts as a navigation aid. The distant view between Rainham church and St Andrew's parish church in Hornchurch is where possible protected as the sight line acted as a navigational aid in the past (Sue Smith pers. comm.). Medieval churches require further study, including the synthesis of the results derived from building recording and excavations.

6.2.23 Some types of religious buildings are also likely to be less well represented in the record. This could include, generally unlisted, Victorian/20th century churches, along with Non-conformist chapels and other (non-Christian) religious sites. In general, these religious sites would have been the centres of towns and individual communities within them. They reflect the changing attitudes and faiths of populations that have moved to or around the estuary, such as the Roman Catholic communities found in Dagenham associated with the immigration of Irish workers to the Ford plant on the Dagenham Marshes.

6.2.24 Other building types which may be found, but have perhaps been little studied and/or are vulnerable to alteration and development include those found along High Streets such as shops, which may well be associated with produce transported along the estuary, cafes/concession stands, workshops (as at Gravesend – see industrial section), public houses (the internal features of which are particularly vulnerable) and temperance halls. There are also building types which are more closely associated with the maritime character of the estuary, such as seamen's missions/churches, customs houses and coastguard stations.

*Other Aspects of the Historic Built Environment*

6.2.25 Carpentry techniques have been studied for medieval timber-framed buildings (e.g. Hewett 1980). However, further research is needed on 18th and 19th century timber-frame techniques in order to establish regional building methods and trends. The changing role of brick, from a high status building material to a vernacular construction method also merits further study.

6.2.26 The recording of fixtures, fittings and finishes associated with built structures needs addressing, these range from integral structures such as staircases and doors to furniture and wall-paintings.

6.2.27 The use of dendrochronolgy, in the form of targeted projects, can prove highly informative in establishing dating and chronological developments.

*Designed Landscape*

6.2.28 The designed landscape around the Greater Thames is also an area which was not covered in the original framework. The designed landscape includes features such as:

- Designated Parks and Gardens

- Public parks and gardens
- Public open space
- London's green squares
- Private gardens (both large and small)
- Cemeteries

Large industrial and defence sites could also perhaps be considered to be designed landscapes in that they re-modelled terrains that can be consequently conserved/maintained even when the original use ends, for example as public gardens or tourist attractions.

6.2.29 Designed landscapes form key components of the many coastal towns, resorts and villages of the Greater Thames Estuary. These spaces, as well as being of interest in their own right, are part of a local identity and influence perceptions about neighbourhoods. Where historic landscape characterisation has been carried out, it is likely to have identified some elements of the designed landscape, primarily parks and gardens shown on the early editions of the Ordnance Survey. Gardens Trusts undertake surveys (cartographic, documentary and walkover) of historic parks and gardens.

6.2.30 Many inventories include the Register of Parks and Gardens (English Heritage) and the London Inventory of Historic Green Spaces (London Parks and Gardens Trust http://www.londongardenstrust.org/). The Essex Gardens Trust is undertaking a survey of historic parks and gardens in Essex. As with other topics there is a need to ensure that such inventories can be integrated into or set alongside the relevant HER.

6.2.31 Framework and specific objectives for the designed landscape around the Greater Thames need to be developed.

## 6.3 Framework Objectives (Historic Built Environment)

6.3.1 The following section outlines the framework objectives identified for the built environment through the review. These objectives are perhaps broader in scope than other themes, reflecting the fact that they were little covered in the original framework. They incorporate objectives from the original framework (Williams and Brown 1999, 34) and some new objectives. As well as their relevance to the estuary these complement the objectives being developed as part of the East of England Research Framework Review.

6.3.2 The framework objectives have been split into two groups, the first focuses on the identification of the built heritage (developing an effective baseline) and creating inventories. The second presents more specific objectives.

***Framework Objective 5A***
To develop an understanding of the built heritage around the estuary.

This would be taken forward by **specific objectives**:

5A.SO1 Identifying important themes and/or areas around the estuary for research and recording.

5A.SO2 Developing inventories of the built heritage around the estuary to provide a platform for comparative studies / characterisation.

Specific **areas of research** could include:

5A.AR1 Identifying key groups of the post-1840s building stock, which is largely unlisted, for research and recording.

5A.AR2 Identifying and inventorising key building types associated with the estuary (e.g. seamen's missions).

5A.AR3 Synthesis and analysis of data uncovered by building recording projects (e.g. the numerous timber-framed barns which have been recorded in Essex).

5A.AR4 Establishing the distribution of extant and lost farmsteads through a programme of documentary research, creating an inventory of sites.

5A.AR5 Syntheses of the significance, economic and social importance of classes of historic buildings.

***Framework Objective 5B***
To further the understanding of the evolution of the historic built environment along the estuary with special reference to structural form and function, the aspirations of the associated individuals and communities and the use of local building materials.

This would be taken forward by **specific objectives**:

5B.SO1 Considering the growth of seaside towns and resorts along the Thames.

5B.SO2 Considering the growth of industrial communities.

5B.SO3 Examining the impact of London on settlement character and form.

5B.SO4 Considering the growth of suburbs.

Specific **areas of research** could include:

5B.AR1 Undertaking a further programme of documentary research, supported by field survey, to establish patterns of development of seaside towns.

5B.AR2 Establishing the extent and nature of 'plotland' communities on both sides of the Thames during the inter-war period through a programme of documentary research followed by rapid field assessment of selected areas.

5B.AR3 Examining the character of agricultural building around the estuary.

5B.AR4 Assessing the effect of urban and industrial development on rural sites.

5B.AR5 Considering the origin, development and character of suburbs (through characterisation / area appraisal).

5B.AR6 Undertaking rapid survey of selected areas to assess the evidence of standing structures for understanding urban growth and the development of industrial communities.

5B.AR7 Refining our understanding of the range of domestic building types, their function and the clues they contain for cultural and ideological associations.

5B.AR8 Considering the form, character and chronology of individual properties.

5B.AR9 Contributing to our understanding of the creation of London suburbs and the meanings and values of domestic and public gardens.

5B.AR10 Completing baseline surveys of buildings and synthesizing data to establish patterns of renewal and replacement and to understand the life cycle of buildings of different types and function at different periods.

5B.AR11 Expanding our knowledge of public buildings – their locations, construction and disuse dates, purpose and character as symbols of status.

5B.AR12 Considering the impact of private and public enterprise (e.g. government initiatives, army and naval authorities) in urban and infrastructure development.

# 7.0 HISTORIC DEFENCES AND OTHER MILITARY INSTALLATIONS

## 7.1 Introduction

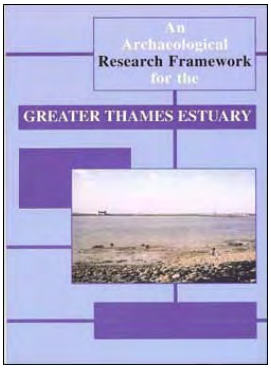
7.1.1 The strategic importance of the Greater Thames region means that it is one with an outstanding defence and military resource of regional, national and international significance. These include Roman defensive walls (e.g. Rochester) and forts of the Saxon shore (Bradwell on Sea and Reculver), medieval fortifications (e.g. Hadleigh and Queenborough), Tudor fortifications, dockyards and their associated defences, Napoleonic fortifications, Royal Commission Forts, military sites dating to the two World wars and the Cold War.

7.1.2 The Greater Thames Estuary is also the site of naval dockyards, most notably at Chatham, which has been put forward as a possible World Heritage Site, and Sheerness. It is also the site of the Royal Arsenal at Woolwich. The extensive mudflats around the estuary encouraged the establishment of ranges and weapons firing/ testing establishments, at Shoeburyness and Foulness.

7.1.3 The Greater Thames Estuary provides the link between the various defence and munitions manufacturing sites. Gunpowder and explosives manufacture is an important theme with Royal Gunpowder Works at Faversham and at Waltham Abbey and many private late 19th century works along the Thames shoreline. The royal works, along with the private works, supplied the government works at Upnor Castle (Chatham), Purfleet and also the filling factory at Woolwich. The estuary and its tributaries are the key link between these sites.

7.1.4 The specific areas of research in the original framework identified the need to establish baseline inventories, from which an understanding of the defences around the estuary could be developed, along with an appreciation of their relationship to the estuary, London and the South-East.

7.1.5 The subjects considered in this section are closely related to other sections of the framework, particularly those relating to the historic built environment and industry and transport.




*Relevant sections of the original framework:*

*Resource Assessment: pp.19–21*

*Research Agenda: pp.34–35*

## 7.2 Recent Projects

7.2.1 The following section summarises some of the extensive work that has been carried out around the estuary in recent years that has contributed to research into historic defences and military installations.

*Othona, Bradwell on Sea, Essex*

7.2.2 Othona is the site of a Saxon shore fort. Although the eastern part of the site has been lost to coastal erosion and the vast majority of the walls are no longer upstanding, the route of the walls can be traced on the ground. It is now the site of St Peters Chapel, dating to the 7th century, which is located over the west gate. The area of the fort is scheduled. In 1999 landscape, geophysical and fieldwalking surveys, along with a synthesis of archive material, were carried out (Medlycott *et al*. 1999). The fieldwalking and geophysical surveys identified areas to the south of the fort that may be the site of extra-mural activity, as well as structures within the fort itself. The results of these surveys have been used to inform a countryside stewardship agreement, and the scheduled area is now no longer under plough and there is also public access to the site (Gascoyne 2006, 16). This has resulted in additional protection for the remains of the fort.

*Hadleigh and Queenborough*

7.2.3 At Hadleigh Castle, Essex (13th century in date) rescue recording and survey have taken place. This monument, which is one of the iconic monuments on the Essex side of the estuary, is vulnerable to landslips (Ennis and Roy 2007). The castle was positioned to defend the approach to London.

Fig. 24: Recording a landslip at Hadleigh Castle (Photo: ECC)

7.2.4 At Queenborough Castle, Kent excavation has taken place at the castle, a unique form of medieval defence (e.g. Firth 2000).As with Hadleigh the location of the castle reflects the strategic importance of waterways, in this case it defended the Swale.

*East Mersea Blockhouse, Essex*

7.2.5 Part of a Tudor earthwork blockhouse survives on Mersea Island (EH SAM). The blockhouse has not been subject to detailed survey but small-scale excavation has taken place to investigate wooden structures on the shoreline, including the remains of a timber framed jetty, which are likely to be associated with various phases of activity at the blockhouse (Heppell 2005). Changes in the local landscape around the blockhouse were noted through the course of fieldwork and post excavation GIS analysis. The blockhouse would now appear to be being buried below mobile beach deposits (http://www.flickr.com/photos/b2kap/168860497/ ).

*Chatham and The Medway, Kent*

7.2.6 A royal dockyard at Chatham was established in the Tudor period and by the reign of Elizabeth I the River Medway at Chatham had become England's principle fleet base. By 1613 it had moved to its present location, the pre-eminent ship building and repair yard and fleet base. By the 18th century the focus shifted to ship-building and repair. In the 20th century the yard produced submarines and a nuclear submarine refitting facility opened in 1968. Chatham is the most complete surviving example of a Georgian and early Victorian Dockyard, instrumental in securing and maintaining Britain's worldwide influence. As well as dockyard structures there are barracks and defence lines. Chatham is therefore currently on the shortlist to be proposed for World Heritage Site status. http://www.chathamworldheritage.org.uk/index.htm

7.2.7 A wide range of studies have been carried out at Chatham. These have included 'Defending the Dockyard' which is the first time the historical significance of this major monument has been assessed and 'Historic Barracks in the Medway' considered the historic development and significance of the barracks that accompanied the dockyards and its defences. It also considers the development of Chatham as a town to serve the military. Work on the Inner Lines is currently underway. This first phase of survey of part of the Chatham Lines will be to develop a model for survey work elsewhere on the lines. Each of these studies has illustrated the need for survey and fieldwork to understand the physical survival of monuments and inform effective planning and management (Kendal pers. comm.).

7.2.8 Numerous other studies have been carried out on the Medway military estate:

- Gunwharf – Chatham (Oxford Archaeology 2004) Desk-Based Assessment
- Gunwharf and marines barracks Chatham (EH unpublished report) – enhanced DBA
- Evaluation at Amherst Hill – Canterbury Archaeological Trust for MOD/Holdfast
- Walkover survey and recording of structures – Lower Lines – Canterbury Archaeological Trust
- Upnor Ordnance Depot – work by David Evans and Canterbury Archaeological Trust
- Chattenden barracks – Canterbury Archaeological Trust
- Lodge Hill – EH archaeological survey report – in preparation
- Chatham Dockyard – interface land – (Wessex) desk-based assessment and trenching
- Fort Pitt – outer earthworks (English Heritage 2007)

7.2.9 The evaluation of the dockyard identified substantial remains of dockyard structures, chiefly sawpits and part of the 18th century river wall. Archive research and test-pitting has been carried out at the Smithery, Chatham to establish the significance of the iron working building as part of a major repair and conversion programme.

7.2.10 Other military sites in and around the Medway have been subject to survey. These include Cockham Wood Fort, survey at a unique 16th century artillery fort (Barker 2002), Fort Pitt (archive research and survey of an early 19th century gun tower), Allhallows Fort (archive research and survey). Survey work at Shornmead Fort, a 19th century artillery fort, is currently in progress. At Fort Clarence survey of the early 19th century Napoleonic gun tower and associated lines, included desk-based assessment, trial trenching and monitoring, carried out prior to the conversion of the tower to residential use and development of the remainder of the site (Heppell 2000; Pattison 2002; Robertson 2000).

Fig. 25: Fort Clarence, Rochester; recently converted to apartments (Photo: ECC)

*Sheerness Dockyard, Kent*

7.2.11 Sheerness Dockyard, now the UK's leading port for fresh produce, was formerly established as a naval dockyard in 1665, although the area had probably been utilized for basic maintenance from the 16th century. The yard gradually expanded through the 17th and 18th centuries. Between 1813 and 1826 the yard was reconstructed to the designs of Sir John Rennie Snr, enlarging the area of the yard by the construction of a new river wall and infilling to the rear. The wall and building in the yard were constructed on a massive number of piles given the unstable nature of the underlying marshland. The dockyard was closed in 1958 and became a commercial port.

7.2.12 In the vicinity of the dockyard/port other military heritage includes defence lines which partially survive, Garrison Point Fort, built in the 1860s (NMR TQ 97 NW 157) to replace de Gomme's earlier fort and the settlement of Blue Town which had developed on the outskirts of the dockyard from the mid to late 18th century onwards. Prior to this, the dockyard workers and their families had been housed in the hulks which made up the yard.

7.2.13 Numerous structures of the historic dockyard are still extant within the modern port, including the Grade I listed Small Boat Store, a forerunner to the modern skyscraper. A survey of the buildings in the dockyard and Blue Town has been undertaken by the RCHME (1995) and further historic research into the dockyard, fortifications and townships is currently underway.

*Shoeburyness Range and the Atomic Weapons Establishment, Foulness*

7.2.14 The experimental artillery range was moved from the Royal Arsenal, Woolwich, to Shoeburyness in the mid 19th century, the increased range of guns making Woolwich Marshes too dangerous. Recent studies have been carried out which identify the historic assets on the ranges (Pearson 2006).

7.2.15 Within the Shoeburyness Ranges is the Atomic Weapons Establishment on Foulness. A desk-based assessment of this research establishment has been carried out (Cocroft 2004) and more detailed fieldwork in 2007 (Cocroft forthcoming). A national English Heritage project, *England's Atomic Age*, will consider this and other nuclear related sites, including those around the Thames.

*World War I and II*

7.2.16 The Survey of World War II defences around much of the Greater Thames Estuary has been completed, for example http://unlockingessex.essexcc.gov.uk. These surveys have primarily comprised inventories of the existing resource, such as pillboxes, airfields and defence lines. They have often involved local volunteers on the ground.

Fig. 26: Pillboxes on the foreshore at Walton-on-the-Naze (Photo: ECC)

7.2.17 Parts of this defensive network have been investigated during development control works, for example a pill box on the outskirts of Southend (Pocock 2006). In Kent desk-based work and field survey (commissioned by KCC) has been carried out on 20th century military remains has been carried out in Gravesham, Dartford and Medway Districts to understand the nature, significance and state of survival of military remains with a particular focus on stop lines (Gulvin and Smith 2008).

7.2.18 More unusual sites have also been recorded. The war at sea during the 1914–1918 conflict saw a number of developments, including employment of fast torpedo boats to act as raiding craft on enemy ships. Launched from light cruisers, these Coastal Motor Boats, as they were officially called, were designed to attack in the shallow waters around enemy harbours. Of five coastal motor boat stations around the county the most extensive was at Osea Island in the Blackwater.

Fig. 27: The north gallery of a World War II air raid shelter below the Ecko Works, Southend, designed to withstand gas attacks (Photo: ECC)

7.2.19 The national Defence of Britain Project databases were created from field and documentary work carried out between April 1995 and December 2001, including areas of the Greater Thames. The purpose of the Project was to record the 20th century militarised landscape of the United Kingdom, and to inform the responsible heritage agencies at both local and national level with a view to the future preservation of surviving structures. Following completion of the Defence of Britain Project in 2002, and using the records it generated, the Council for British Archaeology undertook a study of 'defence areas' in England (with funding from English Heritage). This project resulted in extensive revisions and additions to the original Defence of Britain database (http://ads.ahds.ac.uk/catalogue/specColl/dob/index.cfm).

7.2.20 In Essex, HER enhancement programmes have included surveys of World War II defence sites (e.g. districts of Colchester, Castle Point, Basildon, Rochford). The World War II surveys have demonstrated the importance with which our more modern historic environment is viewed (general information can be found at http://unlockingessex.essexcc.gov.uk).

*Other Studies*

7.2.21 There have also been a number of other national studies, carried out as part of English Heritage's thematic listing and monuments protection programmes (http://www.helm.org.uk/server/show/category.7766). These have included the *20th Century Fortifications in England* project, aerial photographic assessment of surviving sites, surviving airfield defences, naval heritage (Ordnance yards and the steam navy).

7.2.22 English Heritage's Landscape Investigation and Historic Buildings Teams have carried out a research project, covering a vast range of sites, monuments and installations from the Cold War era: tiny monitoring posts, radar sites, missile testing grounds, airfields, communication networks, command bunkers, and test ranges (Cocroft and Thomas 2003).

7.2.23 At Greenwich Hospital, 107 burials from a sailors' cemetery of 1749–1857 have been excavated (Boston et al 2008).

*Regeneration and Reuse of Historic Defences and Military Installations*

7.2.24 The Royal Arsenal, Woolwich is a historic site of national significance. The Royal Arsenal was once the world's largest and most technologically advanced manufacturer of guns and artillery, and played a vital role in the expansion of the British Empire. Many of its activities were focused on engineering/research (and teaching) and it could therefore also be considered to be a major industrial site. At its peak, in the First World War, the Arsenal employed 80,000 workers in its armament factory and occupied 1200 acres. However, after the Second World War, the site fell into a rapid decline and was closed down by the Ministry of Defence in 1964. Part of the site became part of Thamesmead Town, and many buildings were demolished without record between the late 1960s and early 1980s (Stevenson 2007).

7.2.25 The Royal Arsenal was saved from ruin in 2000 when public and private sector stakeholders joined forces to secure a sustainable future for the site. The Royal Arsenal is now part-way through a 20 year regeneration programme. The mixed-use development is achieving an important balance by integrating 21 listed buildings and the heritage of the site. As part of the SHARP (Sustainable Historic Arsenal Regeneration Programme), the experience of regeneration at this key site, and other arsenals in Europe, is being used to develop a broad approach which can be utilized for other regeneration projects (see Stevenson 2007). The work at the Arsenal has been supported by a programme of survey and excavation, incorporating both above and below ground remains.

7.2.26 Conservation plans have been prepared for Rochester Castle, Upnor Castle and Oare Gunpowder Works, which include statements of current states of knowledge and significance of the monuments (P. Kendall pers. comm.).

7.2.27 On a smaller scale the *Crossing the Lines* project developed and implemented knowledge on restoration techniques (climate control and brick work) and the use of sustainable energy for (post) Napoleonic fortifications through transnational studies and investment pilots. The project included two sites in the Greater Thames, Tilbury Fort

and the Jaywick Martello Tower, Essex. The latter has been restored and has now opened as a major arts space, a sustainable re-use of this important monument (Pattison 2005)

7.2.28 English Heritage undertook a survey of Tilbury Fort in Essex as part of the European 'Crossing the Lines' project, in order to inform the management plan. Tilbury protected London's seaward approach from the 16th century through to World War II, with the present fort dating to 1672 with numerous additions and modifications.

*Promotion and Education*

7.2.29 Promotion, education and access have played a part in the majority of the projects discussed above, and in relation to the defence and military sites in general. The majority have their own websites, which house a range of resources and a number of the sites are open to the public. This reflects their visibility in the modern landscape and popularity.

## 7.3 Assessment of Contribution to the Research Objectives and Future Directions

7.3.1 There has been a considerable amount of progress in relation to military and defence sites in recent years; this is particularly the case at Chatham Dockyard and its associated defence lines, where a considerable range of material has been pulled together to support a bid for world heritage status. These have not only considered the dockyard itself but the wider defensive network and barracks. This work contributes to the framework by providing enhanced data on military sites for inclusion in the SMR / HER / NMR and providing more detailed assessment of this internationally-important site.

7.3.2 Regeneration at the Royal Arsenal, Woolwich, has also been supported by a programme of survey and excavation, which has been of value not only for understanding the development of the site but for developing an approach to regeneration which incorporates the historic environment. The experience gained through the course of this (and other regeneration projects around Europe) has been used to develop a broad approach which can be utilized for other major regeneration projects.

7.3.3 Progress has been made in establishing a baseline of defence sites, particularly for the 20th century. There has therefore been progress in establishing basic inventories for historic defences and military sites, identified as an area of research in the original framework. This baseline can be used to identify sites for further work (for example those which illustrate technological developments). There is a need to ensure that the data from these baseline projects has been incorporated into the relevant SMR/HER. More detailed study, including fieldwork, has been carried out at selected sites, for example around the Medway.

7.3.4 Synthesis and collation of the wide range of baseline data we now have available could potentially be utilized to identify chronological/geographical gaps. At first glance it would appear that the recent focus has been on the World Wars. There are therefore chronological and geographical gaps in the baseline datasets which need to be addressed. The earlier extant studies also need review and synthesis.

7.3.5 Remains of coastal defences sometimes lie in locations which are vulnerable to coastal erosion, military and defence sites in vulnerable positions such as this should be

identified in order that they can be monitored, and subject to investigation where protective measures are not possible.

7.3.6 There has been extensive work on the Royal Dockyards, particularly at Chatham. The development of the dockyards is closely interlinked with the development of defences. They have also had a significant effect on the development of the surrounding areas, both physically and in socio-economic terms. As with other military/defence sites, studies need to relate the dockyards to their wider contexts, the effectiveness of which is being demonstrated at Chatham.

7.3.7 In 2004, the CBA (with English Heritage grant aid) published *Modern Military Matters* (Schofield *et al*. 2004) focusing on recent military heritage. This reviewed work carried out and identified future research themes and priorities. This document identifies a number of themes and topics, similar to those outlined here.

## 7.4 Framework Objectives (Historic Defences and Other Military Installations)

The following section outlines the framework objectives identified for Historic Defences and other Military Installations through the review. Where they remain relevant, those from the original framework have been retained. The extended areas of research outlined below reflect the considerable progress in recent years, which has allowed a number of specific questions to be presented.

***Framework Objective 6A***
To develop an understanding of defensive systems around the estuary and their role in relation to the estuary, London and South-East England.

This would be taken forward by **specific objectives**:

6A.SO1 Examining the impact of changes in military technology and tactical and strategic approaches on individual defence sites and defence systems.

6A.SO2 Developing understanding of the evolution of the estuary's defences in relation to political change.

6A.SO3 Developing interpretations of these defences integrated with wider patterns of settlement, commerce and landscape.

Specific **areas of research** could include:

6A.AR1 Establishing a basic inventory of defence sites related to changing defensive systems within the estuary integrated into the region's SMRs / HERs.

6A.AR2 Review and synthesis of existing inventories to identify sites for further work

6A.AR3 Undertaking more detailed study of selected sites which illustrate technological development or are key to the understanding of defensive systems.

6A.AR4 Developing an understanding of the distribution of specific building types.

6A.AR5 Analysing variations between fortifications as planned and as built.

6A.AR6 Identification and survey / more detailed investigation of vulnerable historic defence / military sites

6A.AR7 Considering the development of naval dockyards and their relationship with other military/defence sites

6A.AR8 Identifying structures which had a key role in technological developments.

6A.AR9 Technological developments in dockyard construction.

6A.AR10 Considering the links between defence sites/military installations and their infrastructure and support framework (e.g. barracks, camps, manufacturing, shipping).

6A.AR11 Considering the strategic and organizational links – as a relationship between fortifications, armies and fleets.

6A.AR12 The evolution of methods of transport for the movement of forces /supply.

6A.AR13 Relationship between historic defence/military sites and their environs.

6A.AR14 Considering the changes to the coastline of the estuary and the extent to which this influenced aspects such as the locations of defence sites.

6A.AR15 Development of links with the public/local groups. Oral history has the potential to make a significant contribution to this theme.

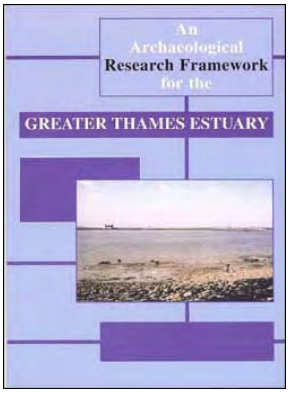
# 8.0 INDUSTRY AND TRANSPORT

## 8.1 Introduction

8.1.1 The Greater Thames Estuary is the site of numerous industrial sites, many of which are in close proximity to the river itself. The industrial activity around the estuary reflects the importance of London as a manufacturing centre noted for technical innovation, a market and a source of raw materials and waste products. The estuary and its tributaries are also important, providing a transport network and raw materials.

8.1.2 A wide range of industrial sites are represented around the estuary ranging from the late-medieval and early post medieval industries such as Copperas works like that investigated at Tankerton, Kent (Allen, Pike and Cotterill 2004), which provided the foundation for chemical and pharmaceutical industries. Other industries include boat and barge building, gunpowder and other explosives, quarrying, cement production, brickmaking, food processing, engineering, lime production, maltings, papermaking, chemicals, petrochemicals, and utilities such as gas and power generation. Although the key means of transport was the Thames and associated waterways, canals or canalized rivers were also utilized. Railways and the road network also became increasingly important. The development of industry around the estuary is closely linked to the expansion of settlement. In some cases, like the Bata factory in East Tilbury and Botany Pit in Purfleet, workers housing and social facilities were provided. Industrialisation is also closely linked to the socio-economic history of the region.

8.1.3 The following provides summary information on some of the work, which has been carried out since the publication of the original framework, considers the contribution these have made to the framework objectives and future directions.




*Relevant sections of the original framework:*

*Resource Assessment: pp.21–24*

*Research Agenda: pp.35–36*

## 8.2 Recent Projects

*Industrial / Post-Medieval / Modern Comparative Surveys*

8.2.1 The original research framework identified a need to carry out baseline research to create an inventory of the post-medieval/modern and industrial remains in the Greater Thames area in order to enhance the SMR/HER and inform priorities for recording/research and management.

8.2.2 Comparative surveys of a number of post-medieval and modern/industrial sites have been completed for a number of topics in Essex and Kent. These studies, carried out to enhance the SMR/HERs, comprise introductions and backgrounds to the topic and gazetteer. Some include comments as to site significance and recommended action/management. There is a need to review these substantial documents (which would be beyond the scope of this update) to identify research objective and areas of research.

8.2.3 The following comparative surveys have been carried out:

Essex:

*Industry*
Malt Industry (Gould 1996 and Gould *et al*. 1997)
Lime Industry (Gibson 1997)
Iron Foundries (ECC 1997)
Buildings of the Radio Electronics Industry (Cocroft and Mengue 2001)
The Public Water Supply Industry 1850–1939 (Crosby 1999)
The Essex Textile Industry (Crosby 2001)
The Essex Brewing Industry (Crosby 2002)
Industrial Housing in Essex (Crosby *et al*. 2006)
Brickworks (Corder-Birch 1997; Ryan 1996; Ryan 1999)
Essex Watermills and Steam Mills (ECC ongoing)
The Explosives Industry (Cocroft 2000)

Kent:

*Industry*
The Explosives Industry (Cocroft 2000)
The Cement Industry (Eve 1999)
The Lime Burning Industry (Eve and Stead 1999)
The Malt Industry (Eve and Stead 1998)
The Oil Seed Milling Industry (Eve 1998)
*Transport*
The Kent Spritsail Bargebuilding Industry (Eve and Worley 1999)
Passenger Tramways (KCC)
The Chelmer and Blackwater Navigation and Conservation Area (Kemble *et al*. 2001)
Road Transport in Essex 1750–1900: Tollhouses, milemarkers and signposts (Pratt 2002)
Road Transport in Essex 1750–1900: a survey of road bridges (Pratt 2003)
The Essex Railway Network (KCC ongoing)

8.2.1 The 'Archaeological Survey of Mineral Extraction Sites around the Thames Estuary' also provided information on the industrial archaeology in former extraction sites in the Thurrock and Dartford/Gravesham areas, largely relating to the aggregate industry (ECC and KCC 2004, http://ads.ahds.ac.uk/catalogue/archive/thamesagg_eh_2007). In

London the GLIAS holds a database of industrial archaeology sites in Greater London http://www.glias.org.uk/gliasdatabase.html . There is a need to further develop thematic surveys around London that are comparable with those in Essex and Kent, and for these to be incorporated or to sit alongside the GLHER.

Fig. 28: Crayland Gorge Tunnel, Swanscombe Kent. This tunnel cuts through the chalk spine separating two quarries (photos:ECC/KCC 2004)

Fig. 29: The remains of 'Glory Bumps' on Dartford Heath, Kent, associated with the former mineral extraction at the site

*Gunpowder and Explosives Manufacture*

8.2.2 Gunpowder and explosives manufacture has been a significant industry around the estuary, with works being located at, for example Faversham, Oare, Bramble Island, Kynochtown and Cliffe. The Faversham gunpowder industry and later chemical explosives industry around the Thames are covered in some detail in the national study, 'Dangerous Energy' (Cocroft 2000). The estuary and waterways linked these sites to other military sites, providing a good means of transport. It also meant that a number of the sites could be situated away from population centres. Due to the restrictions to moving explosives into London docks, a number of explosives magazines were sited in the Thames Estuary, including important government magazines at Tilbury and Purfleet. The location of the gunpowder works was largely determined by the location of pre-existing mills, with later chemical works relying on the local chemical industries.


Fig. 30 Magazine No. 5, Purfleet. Constructed by 1765 this magazine would have held up to 9600 barrels of powder. This example is the only survivor of a group which were situated on the north bank of the Thames where the Mardyke enters it.

*Transport and Trade*

8.2.3 The Thames is a conduit for transport and trade, and this is reflected in the historic environment resource, which includes commercial port facilities, dockyards, wharves and associated infrastructure. Communities around the estuary would also have been served by simple quaysides and landings. The importance of these in the agricultural economy of outlying communities has been demonstrated by documentary research at Wallasea Island, Essex, where each of the (once numerous) farms on the island, along with the oyster layings/pits were served by landings where produce could be exported to London and manure provided in return (Heppell 2004b).

8.2.4 Closer to London, a wharf is thought to have been founded at Rainham in the medieval period, and the wharf facilities expanded in the early 18th century, with new quays and granaries. Documentary sources illustrate the trade links at this time, with marble and stone being imported from Portland, iron, clinker and delft tiles from Holland, coal from Newcastle and softwoods from Scandinavia. The production of vegetables for the London market was particularly important in the later post-medieval period (including the 'Rainham Cabbage'), with a further wharf being built on the creek in 1872 by a market gardener who used it for the importation of London Muck, the smell of which is commented on in a number of documents (Heppell 2002). Excavations at the site, carried out in advance of CTRL construction, identified timber revetments associated with the 19th century wharf (Barker 2003).

8.2.5 At New Providence Wharf, Isle of Dogs, excavation revealed a 20m section of timber dock wall, built of oak uprights and sheathed with pine and tropical hardwood. A slipway for the construction of small boats was identified, of probable late 18th-century date. The dock edge was supported with horizontal land-tie assemblies. There was evidence of the earliest dock phase at the base of the excavation, dating to the early 17th century. A 3m high section of 18th-century dock wall, built very simply with posts and planks, was located, its backfilling including tools, fixtures and fittings from the dockyard (London Fieldwork and Publication Round-up 2005). The mansion and ancillary buildings associated with the dockyard were also identified. Artefacts included leather shoes, and Mediterranean/Far-East pottery (London Archaeology Review 2005, 9).

8.2.1 At Wood Wharf Business Park, West India Dock, the early timber dock wall of Blackwall Basin (completed in 1802) was recorded, together with associated tieback mechanisms. In the centre of the site, evidence of Junction Dock and associated dockside structures was also found. At Wood Wharf/Horseferry Place a record was made of a below ground Engine Room. This served the Greenwich Steam Ferry (1888–1900). Here steam power was used to move two carriages and the landing stage up and down the foreshore to meet the ferryboats (London Archaeology Review 2005, 9). Warehouses have been recorded at the Royal Victoria Dock (N,O and P Warehouses).

8.2.2 Although the rivers that form the Greater Thames Estuary were central to communication and transport, other modes of transport were also important. These included canals, such as the Chelmer and Blackwater Navigation, which linked Heybridge on the Essex Coast to the county town, Chelmsford (insert ref to the canal study). Other canals include that linking the Medway (Strood) with the Thames (Gravesend). Started in 1799 it eventually opened in 1824, and was never commercially successful. The Gravesend basin became a focus for coal wharves, as it lay outside the authority of the Port of London and hence their taxes, eventually gas and electric works were sited nearby to exploit this situation (Letch 2004a).

8.2.3 Since the mid to late 19th century, railways have also become an integral part communications around the estuary. Railways in Essex are currently being studied as part of the series of comparative surveys (Garwood pers. comm.).

8.2.4 Roads dominate much of the modern landscape. Elements of the road transport infrastructure have been the subject of comparative surveys in Essex (see above). There is developing interest in late 20th century landscapes, including roads and their associated infrastructure (*Change and Creation: historic landscape character 1950-2000*; English Heritage).

*Industrial Sites in a Wider Context*

8.2.5 The expansion of industry around the Thames is also closely linked to the development of workers housing and associated infrastructure, for example at Botany Pit, Purfleet, Essex (ECC and KCC 2004) where the former school house, school masters house, chapel parsonage (including part of Whitbread House), and two terraces of workers housing are still extant. These lie within the Purfleet Conservation Area, which also includes other buildings which are part of a planned village built by the Whitbread family who at one time owned the quarries.

Fig. 31: Derelict historic buildings in Botany Pit (also known as Church Hollow) Purfleet. These are being recorded prior to renovation

8.2.6 The advantageous position of Gravesend, with links to the estuary and canal, led to the development of industry around the fringes of the town in the 19th and 20th centuries, such as that recorded at Albion Parade. Here initial development included businesses, workshops and housing, with increasing industrialisation (particularly foundries) from the latter part of the 19th century. The late 20th century has seen buildings demolished or incorporated into larger industrial units, subsequently becoming disused (Letch 2004b).

8.2.7 At Queenborough and Rushenden, historic area appraisal (by English Heritage) examined the development of this estuarine town, which included in-depth analysis of the built environment and historic assets. This appraisal has considered the growth of industrial communities around the town through the centuries; a planted medieval town which gained importance due to its location on the Swale (with easy access to the Medway). From the late 16th century it was important in the copperas trade which was superseded by chemical and glue manufacture. Housing in the area includes workers housing, reflecting the growth of industrial communities (Barson *et al*. 2006; Barson and Franklin 2006 http://www.english-heritage.org.uk/publications/research-news-3/). This appraisal has demonstrated that assessment of standing structures, supported by desk-based research can be effective in understanding the development of industrial

communities and urban growth. Rushenden is also the site of one of the first factory/industrial estates in the country. The EH study considered the evolution and growth of this important estate within its regional and typological context and within the 'Second Industrial Revolution'. This work highlighted the fact that, "Despite some economic history analyses and studies of individual sites, the subject of early industrial estates is surprisingly incomplete" (Clarke 2007). It should also be pointed out that prior to the appraisal the origins of the estate were 'obscure'.

8.2.8 "An unusual but important industrial site in the area is the Bata Shoe Factory at East Tilbury, founded in 1933 with a planned industrial town built around it" (Williams and Brown 1999, 23). The estate was a planned community, including social facilities as well as housing. The Bata complex now forms the core of the East Tilbury Conservation Area. It has also been the subject of an area appraisal by EH (Smith 2007; Smith Forthcoming).

*Other Aspects of Industry and Transport*

8.2.9 "The Thames Estuary can claim to be the cradle of the electric power station" (Williams and Brown 1999, 21). The surviving structures at the Gravesend, Milton and Northfleet Electric Light and Power Works, constructed between 1902 and 1903, have recently been recorded prior to demolition (Letch 2003).

8.2.10 *England's Past For Everyone* is a community-based local history project (Kent lead, Dr Andrew Hann). In Kent volunteers have been involved in village and building surveys, records transcription, newspaper research and photography; the basis of a publication entitled '*People and Work in the Lower Medway Valley 1750–1914*' (2008). The project considers how the development of agriculture and industry in the Lower Medway fits into the wider regional context. For example did migration, proximity to London and the arrival of the railways affect the development of the Medway villages and the everyday lives of their residents? How mobile was the local population, and to what extent did this affect the relationships between the Medway valley, other parts of Kent and the wider world?

*Beneficial Re-use and/or Interpretation of Sites*

8.2.11 The European Route of Industrial Heritage (ERIH http://www.erih.net/) aims to promote the industrial heritage of Europe through providing routes. These routes provide information on industrial heritage sites. Around the Greater Thames the route includes the Bata Factory site, Southend Pier and the Museum of Power, Langford (near Maldon, Essex). The website provides background to the sites and information on visiting hours/facilities where appropriate.

8.2.12 The Museum of Power, Langford, one of the points on the ERIH route, is housed in a steam pumping station built in the 1920s. A massive Lilleshall triple-expansion steam engine No. 282 "Marshall" dominates the exhibition halls. There are numerous examples of other types of machinery at the museum. Prior to the founding of the Museum of Power the works were disused.

## 8.3 Assessment of Contribution to the Research Objectives and Future Directions

8.3.1 There has been considerable progress in taking forward the areas for research outlined in the original research framework, which identified as a key need the creation of inventories of industrial sites. As outlined above numerous industries in Kent and Essex have been the subject of HER enhancement programmes and comparative surveys. This thematic inventory programme needs to be taken forward in London.

8.3.2 As well as providing information on the resource, inventories also have an important role to play in the development control framework where they flag up the importance of (non-scheduled or listed) industrial sites in order that appropriate recording can take place before conversion / demolition.

8.3.3 These programmes provide a valuable basis from which, following synthesis/analysis, important sites can be targeted for research and recording, identified as an area of research in the original framework. This should be taken forward through a review of the existing inventories to identify areas/sites for more detailed research and recording (e.g. through building recording, documentary research and, where appropriate, excavation). It is likely that there is now sufficient information to consider thematic studies for publication.

8.3.4 Given the wide range of activities around the estuary there are undoubtedly industries which remain to be inventoried (for example the pharmaceutical and chemical industries and refineries which were located around the estuary). Some of the surveys have also not been completed for the region as a whole, for example the study of extraction sites and the cement industry has been carried out in Kent, but only a small part of Essex. There therefore remains a need to continue this process of creating inventories to inform both the research and development control process.

8.3.5 Perhaps the key point to come out of a number of the studies, particularly at Queenborough and Rushenden, is the close inter-linkage between industrial sites and their strategic location, the development of workers housing and associated infrastructure. This multi-stranded approach has been very effective in understanding themes beyond industrial sites, such as urban growth. It also identified a potential strand for further study, factory/industrial estates. Areas should be identified for this type of study, placing industrial sites within their wider context. The importance of economic history, as well as technological, developments as a driver for change is also of considerable importance.

8.3.6 The work on the *England's Past for Everyone* has also illustrated the wider links and contribution that local communities can make. This is also a theme where documentary research can make an important contribution to answering some of our questions, placing industrial sites within their wider historic and socio-economic context. They are also likely to be able to make an important contribution to answering questions relating to trades and cargoes.

8.3.7 The increasing industrialisation of agriculture, the introduction of hollow/under-drainage, machinery and steam cultivation, when combined with other social, political and economic factors, had a significant impact on the rural landscape of the estuary, perhaps most dramatic being the loss of grazing marsh.

## 8.4 Framework Objectives (Industry and Transport)

The following section sets out the framework objectives for industry and transport. Where they remain relevant those from the original framework have been retained.

**Framework Objective 7A**
To develop an understanding of the estuary's industrial archaeology remains and their relationship to the history of industrialisation in the estuary.

This would be taken forward by **specific objectives**:

7A.SO1 Formulating a systematic approach to the study of industrial archaeology and relating it to existing historical studies.

7A.SO2 Identifying important sectors of industrial activity for research and recording, e.g. the pharmaceutical industries, refineries, industrial/factory estates.

7A.SO3 Identifying important or representative sites for research and recording through synthesis of the results of the various inventory projects.

7A.SO4 Identifying important or representative sites which are vulnerable (e.g. disused and decaying) in order to develop programmes for research and recording.

7A.SO5 Developing a strategy for the beneficial reuse and/or interpretation of selected sites (see military sections for examples of regeneration at the Royal Arsenal, Woolwich) European Route of Industrial Heritage – ERIH).

7A.SO6 Publishing of the results of important individual sites (e.g. the Royal Arsenal, Woolwich) and groups of sites (e.g. the various closely inter-related sites around Chatham).

7A.SO7 Research into the wider effects of industrialization and transport changes (e.g. the development of industrial communities, the effects of migration of groups to industrial centres, middle class migration to suburbia/ countryside).

7A.SO8 Research into the effects of de-industrialisation / changes in the types of industries to be found around the estuary.

Specific **areas of research** could include:

7A.AR1 Establishing, as a sub-set of the region's HER / SMRs, an inventory of industrial sites and monuments related to the estuary. This is ongoing around the estuary, and momentum needs to be maintained. There is a particular need to carry out thematic inventories in London.

7A.AR2 Undertaking baseline research to provide a platform for further research within and beyond the estuary.

7A.AR3 Developing synthetic studies of the industrial heritage resource on the results of the baseline studies.

7A.AR4 Identifying industries and/or areas to be targeted for detailed research and/or recording, through reference to the results of the inventory projects.

7A.AR5 Studies of late 20th century industries and places of work and changes of work patterns. This might include the electronics industry, the impact of the internal combustion engine, consumerism and leisure.

7A.AR6 Considering how the growth and decline of mid to late 20th century industry has affected the landscape, economy and social character of the estuary.

7A.AR7 Considering the links between the natural resources of the estuary and industry.

7A.AR8 Considering the inter-relationships between different industries (e.g. the chemical industry and explosives manufacture).

7A.AR9 The role of non-waterborne transport.

7A.AR10 Developing methodologies for research and recording.

**Framework Objective 7B**

To develop an understanding of the industrial sites around the estuary within the wider landscape.

This would be taken forward by **specific objectives**:

7B.SO1 Studying the effects of industrialisation around the estuary on its surroundings. As illustrated by the studies around Queenborough and Rushenden/England's Past for Everyone.

7B.SO2 Studying the links between the various industries around the estuary.

7B.SO3 Studying the development (and decline ) of industrial communities.

7B.SO4 Considering the effects of regeneration.

7B.SO5 Studying transient populations.

# 9.0 METHODOLOGY, MANAGEMENT AND PROMOTION

## 9.1 Introduction

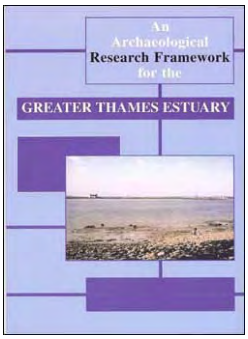
9.1.1 The Greater Thames was identified in the original framework as an 'ideal area' for developing and evaluating new techniques, which would have wider applications elsewhere. Particular note was made of the following themes:

- Deep Holocene sediments
- Data standards
- Stratigraphic studies/borehole logs
- Site prospection (particularly in relation to deposit modelling)
- Site recording and interpretation (particularly intertidal and survey systems)
- Intertidal site management

9.1.2 Many of the projects discussed in previous sections have contributed to the development of methodologies in these areas; for example Binney Farm, All Hallows and the CTRL Medway Crossing (evaluation of deep sediment sequences), mapping the sub–surface drift geology of the Lea Valley and MTNT (stratigraphic studies and the use of geotechnical borehole logs), RCZAS survey in Kent and Essex (site recording and the use of GPS).

9.1.3 Management of the historic environment does not only concern individual monuments but landscapes, particularly when feeding into planning frameworks at various levels (for example Local Development Frameworks). There have been a range of characterisation studies carried out around the Greater Thames that consider the evolving historic landscape, which are discussed below. The desk-based and walkover surveys of grazing marsh in south Essex (Medlycott and Gascoyne 2006) have also played an important role in an integrated approach to the development of a number of nature reserves that incorporates the historic environment at an early stage of the design process.

9.1.4 The promotion of the historic environment of the Greater Thames, including its value as an educational resource for all ages, should play an important part of any work carried out as part of the research framework.




*Relevant sections of the original framework:*

*Resource Assessment: -*

*Research Agenda: pp.36–37*

## 9.2 Recent Projects

*Deposit Modelling and GIS*

9.2.1 A number of the projects outlined above have included developing methodologies, particularly in relation to predictive modelling, for example the Medway Valley Palaeolithic Project and the MOLAS work in the lower Lea Valley. In the case of the MVPP a possible methodology for the evaluation of Pleistocene contexts has also been proposed (Wenban-Smith *et al.* 2007).

*Drowned Landscapes*

9.2.2 Pleistocene deposits in some case continue offshore, at risk from the impacts of dredging. Methods of investigating this resource are being investigated around the country, for example, *Seabed Prehistory Project* (Wessex Archaeology). The project aimed to develop methodologies for assessing the prehistoric archaeological potential of submerged deposits and to provide guidance for the identification and mitigation of these deposits to the marine aggregate extraction industry. This was accomplished by assessing and applying industry standard geophysical and geotechnical tools for archaeological evaluation. English Heritage and British Maine Aggregates Producers Association (BMAPA) have also been developing a protocol for finds recovered during dredging, supported by a programme of education/ awareness (Wessex Archaeology).

Fig. 32: Fossilised remains dredged up from Westerschelde, Zeeland, 2007

(Photo: Bjorn de Wilde)

9.2.3 The *Archaeological Survey of Mineral Extraction Sites around the Thames Estuary* (ECC and KCC 2004) was concerned with the establishment of up to date information on extant and former mineral sites around the Thurrock / Dartford area. The outputs of this project included a range of GIS layers, incorporating the results of specialist studies (including geology, Palaeolithic archaeology and industrial archaeology). These consider the importance and potential of the resource in and around the extraction sites. They also draw together material from a range of sources and are supported by a detailed assessment report (ECC and KCC 2004).

*Landscape Characterisation*

9.2.4 The English Heritage *Historic Landscape Characterisation* programme has covered Kent and Essex. Characterisation views the landscape as a whole rather than as individual elements. It is carried out as a map based analysis, where morphological and cartographic evidence are combined to interpret the landscape. The outputs of the HLC programme comprise GIS data and databases. Part of the Kent output van be found at http://extranet7.kent.gov.uk/klis/default.asp; the Kent Landscape Information System.

9.2.5 The *Thames Gateway Historic Environment Characterisation Project (*Essex and Kent County Councils, Chris Blanford Associates and English Heritage) aimed to provide a broad overview and general analysis of the character of the Thames Gateway's historic environment. The study divided the area into Historic Environment Character Areas (HECAs), using a combination of three separate characterisations:

- Historic Landscape Characterisation
- Archaeological Context Analysis
- Historic Urban Characterisation

9.2.6 Initial analysis also assessed the sensitivity of the fabric, integrity and historic significance of these components in order to develop a large-scale view of sensitivity in a GIS based resource to assist in planning at a strategic level. (Waugh 2006 – www.planarch.org/downloads/library ; Chris Blanford Associates 2004 – http://www.english-heritage.org.uk/publications/thames-gateway-historic-environment-characterisation-project-final-report/finalreporttextonly.pdf /).

9.2.7 Further characterisation, at a more detailed level has been carried out in the Kent and Essex parts of the Thames Gateway, funded through Interreg 3B through Planarch 2, the ODPM, ALSF and KCC. The approaches taken by the two counties have differed but both share the same objectives.

9.2.8 In Kent, the characterisation started with a more detailed archaeological character assessment, looking at patterning of human activity and considering how the landscape developed over time. Information from the SMR and other readily available data was categorised into different types of activity and analysed for patterning/grouping by archaeological period. GIS layers have been developed for each period, which illustrate landscape use in the various periods and providing an indication as to the time depth of the landscape. The approach is based on past rather than present landscape units. Analysis of the data has been used to identify foci of activity through archaeological periods, which can be used to inform green-space/regeneration strategies (Waugh 2006, 24–25).

9.2.9 In Essex, the more detailed characterisation was based on that use in the CBA/EH study discussed above, focussed on sub-dividing and refining the large HECAs into Historic

Environment Characterisations Zones (HECZ). This has been carried out in those districts alongside the Thames (Thurrock, Castle Point, Basildon and Rochford) through Planarch 2 and is being rolled out in other districts in the county. HECZs boundaries are defined by analysing the main datasets (e.g. ancient woodland, HER data, historic mapping, secondary sources), digitised with descriptions behind the reasoning behind their definition. Seven criteria were scored (low to high) based on the current knowledge which can be updated.

*Thames Estuary 2100*

9.2.10 The Thames Estuary 2100 (Environment Agency/Capita Symonds) project has been developed to ensure London receives exceptional flood risk management over the next 100 years, the remit of this project also includes socio-economic implications as well as cost-benefit analysis, in developing flood defence options for the Thames floodplain. Assessment of the sensitivity of the historic environment to a variety of flood-management options has been carried out as part of this study (Capita Symonds 2006, 1). Although not characterisation as such this study is interesting as it utilizes a range of historic environment data to develop strategic plans, a similar objective to other characterisation projects. The project was taken forward by establishing baseline information, developing spatial layers of this information, developing a methodology for assessing sensitivity to the various defined high level flood management options. The study includes a review of the available historic environment datasets, providing a short background to each and considering their strengths/weaknesses and 'gap analysis' (Capita Symonds 2006, 22).

*Extensive Urban Surveys and Parish Surveys*

9.2.11 The extensive urban surveys and parish surveys which have been carried out in Kent and Essex have been discussed in relation to Historic Settlement / Historic Built Environment they are however also planning tools.

*Geoarchaeology*

9.2.12 *Mapping the sub-surface drift geology of Greater London; Lea Valley* (carried out by MOLAS) set out to create a digital geoarchaeological database of the deposits of the Lower Lea, using borehole and archaeological records to generate models of the area. These can be used to reconstruct the sub-surface stratigraphy of the floodplain and terraces, and hence better-informed predictions as to archaeological potential (MOLAS 2004 Annual Review).

9.2.13 Along the coastal wetland around the estuary there are thick Holocene alluvial sequences which can contain waterlogged artefacts and environmental sequences. Understanding these sequences and underlying deposits can be problematic, not easily addressed by standard techniques. Geological mapping only shows what is at the surface and geotechnical borehole logs may not necessarily be detailed enough and terminologies vary between engineers, geologists and archaeologists. Regional scale mapping is possible as is site scale but the latter is difficult to scale up to a local level (Dyson 2006, 59; Bates and Bates 2006).

9.2.14 Pilot study at Allhallows, on the Hoo peninsular an area where Pleistocene deposits enter the Holocene floodplain tested multi-disciplinary methods to understand these sequences. The investigation used a combination of geophysical and borehole surveys (Bates 2006; Bates and Bates 2000).

- Electro-magnetic survey (upper 3m)
- Electrical resistivity (3–15 m )

- Electrical sectioning (differentiate geological sequences from the Pleistocene/ Holocene)
- Ground truthing (boreholes / test-pits)

The results demonstrated the effectiveness of the techniques in distinguishing near surface sediment types, typical of the Holocene, with electrical sectioning distinguishing between the Pleistocene and Holocene sediments.

*Deposit Modelling*

9.2.15 The work on deposit modelling, both around the Greater Thames and elsewhere (e.g. the upper Lea Valley and St Albans area, studied as part of the Middle Thames Northern Tributaries Project) have demonstrated that the complexity of the deposit sequences in the area is not reflected in large-scale geological mapping, which only illustrates the surface deposits. Floodplain mapping also provides little indication of depth, sediment types, ages/environments of alluvial environments. There are other limitations on the investigation of sequences and palaeogeography including (from Dyson 2006, 60):

- The reasonably well established palaeogeographies are at a scale suitable for placing sites within the landscape context, but their ability to predict the location and character of individual sites is poor
- Pleistocene sediment bodies have complex post depositional histories ad are often characterised by lateral discontinuity
- Holocene and late Pleistocene sequences are more contiguous but sub-surface and near surface stratigraphy bear little resemblance to each other
- Detailed modelling requires a considerable quantity of (suitable) borehole data, regional models cannot simply be scaled down

## 9.3 Assessment of Contribution to the Research Objectives and Future Directions

9.3.1 There has clearly been progress in developing methodologies, particularly resulting from the development of technology (both hardware and software). The use of GIS is increasingly commonplace as is the manipulation of the large amount of data generated by historic environment projects by digital means. Beyond data standards, which are being developed at a national level through bodies such as the Archaeological Data Service and FISH, there is a need to consider how to keep data accessible in an environment when software develops regularly. This can result in digital data becoming inaccessible or having to be reconstructed (a time consuming process). It is therefore important that at the early stages of most projects the type of software is considered, and that it is compatible with most standards packages or that conversion/export of data into such a format is straightforward. Closely linked with this is the need to ensure that data gathered as part of projects, for example inventories, is structured in such a way that there is some compatibility or linking field which enable data to be integrated into or sit alongside the relevant HER/SMR.

9.3.2 Characterisation is now seen as a key tool in managing the historic environment, and has now been carried out in Kent and Essex but remains to be carried out for London. This needs to be addressed.

*Methodologies for Geoarchaeological Assessment of Alluvial Sequences*

9.3.3 Along the coastal wetland around the estuary there are thick Holocene alluvial sequences which can contain waterlogged artefacts and environmental sequences in their own right. Understanding these sequences and underlying deposits can be problematic, and not easily addressed by standard techniques. Geological mapping only shows what is at the surface and geotechnical borehole logs may not necessarily be detailed enough and terminologies vary. Regional scale mapping is possible as is site scale but the latter is difficult to scale up to a local level (Dyson 2006, 59; Bates and Bates 2006).

9.3.4 A pilot study at Allhallows, on the Hoo peninsular has been carried out at an area where Pleistocene deposits enter the Holocene floodplain (section 2.0 above; Bates and Bates 2006). The investigation used a combination of geophysical and borehole surveys. The results depicted the distribution of Holocene channels, which appeared to equate with recent drainage features on the marsh surface. This information can be used to predict the locations of sediments of a finer grained texture which may be suitable for palaeoenvironmental investigation. The edges of these zones are also the lost likely locations for features such as jetties and trackways (Dyson 2006, 60).

9.3.5 Progress has been made in developing non-intrusive techniques (supplemented by ground truthing) as demonstrated by the work at Binney Farm, All Hallows. This, and studies at Kingsnorth Power Station(e.g. Bates 2000) have demonstrated the effectiveness of multi-disciplinary approaches to geoarchaeological evaluation.

9.3.6 The original framework stressed the importance of deposit modelling in establishing the three dimensional stratigraphic framework (Williams and Brown 1999, 40–41). Those studies that have taken place have demonstrated that progressing modelling will require investment in data gathering and analysis. The methodologies that will need to be applied will vary depending on the scale of model required. Further work is required in developing and refining methods, carrying out case studies and testing models.

*Deposit Modelling*

9.3.7 The Middle Thames Northern Tributaries Project (Bates and Heppell 2007, 42–43) has suggested a staged approach to modelling: *Baseline survey*: mapping superficial deposits, determine distribution of borehole data, classify deposits in terms of their temporal/spatial characteristics. *Intermediate Survey*: collated borehole data gathered, along with mapping HER/SMR data, integrated into geoarchaeological 'zones'. This includes mapping of destroyed and extant deposits. *More detailed zoning and modelling:* where data is sufficient/site-specific studies. The staged approach allows areas where data is insufficient to be identified, along with areas of interest for further study.

9.3.8 Deposit modelling requires geotechnical borehole data, the amount and quality of data having a significant effect on the results which can be achieved. It would be advantageous to identify the locations and availability of borehole data as a basis for further studies. The BGS archive is the main source of data but there are also likely to be collections within numerous departments within local authorities (potentially difficult to track down and access), and specialists are also likely to have a wide range of data.

*Guidance*

9.3.9 There is a wide range of environmental techniques available. In 2002, English Heritage published http://www.english-heritage.org.uk/publications/environmental-archaeology/ in order to promote good practice, to supplement the advice of specialists. They have also

published Geoarchaeology. Using Earth Science to Understand the Archaeological Record.

9.3.10 Historic environment and other data is increasingly a web-based, but can be problematical after a project has been completed, for example who is responsible for paying for/maintaining the resources. Consideration needs to be given as to the maintenance of the digital resource particularly as it begins to replace paper. The development of ADS and OASIS has made considerable progress towards this. At a minimum all projects in the Greater Thames should be deposited with the ADS in order that data is readily available.

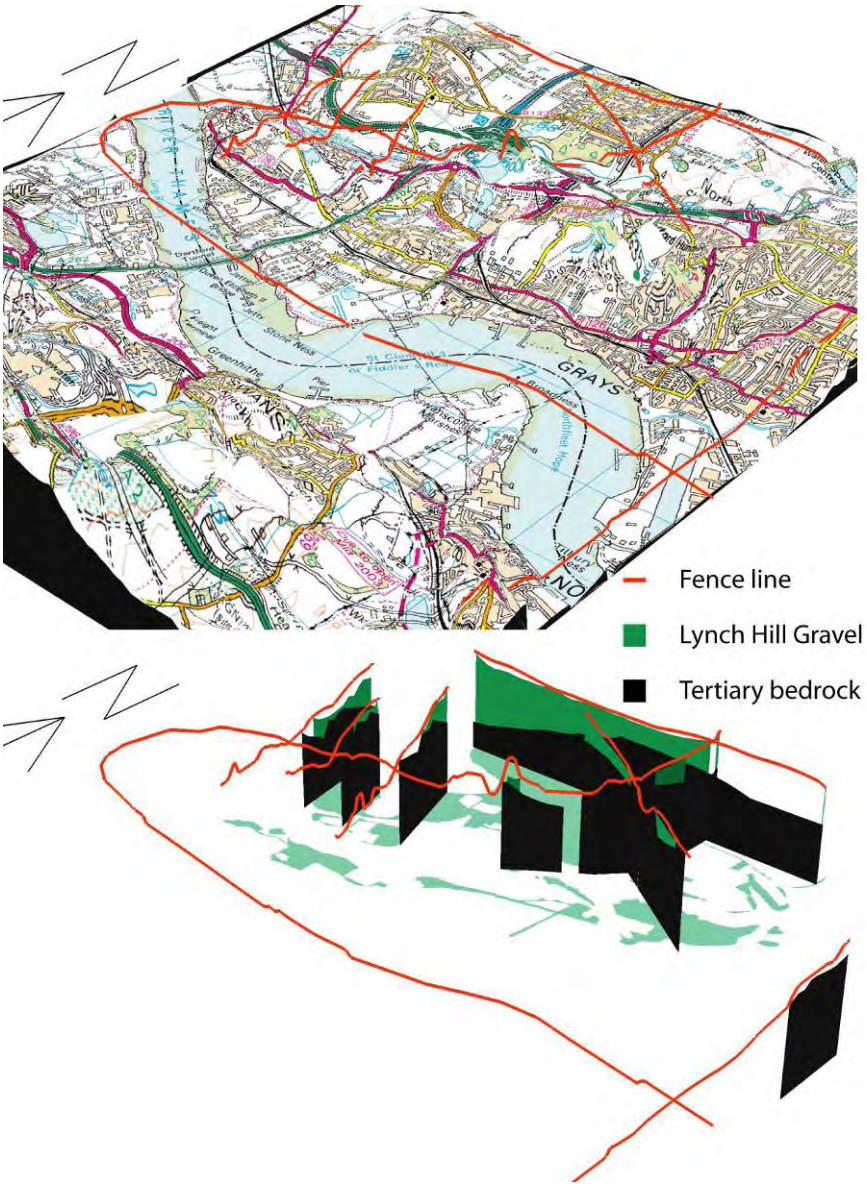



Fig. 33 An example of deposit modelling carried out in the Thames Estuary

## 9.4 Framework Objectives (Methodology, Management and Promotion)

The following section sets out the framework objectives for Methodology, Management and Promotion. Where they remain relevant those from the original framework have been retained.

***Framework Objective 8A***
To exploit the potential of the Thames Estuary as a study area for methodological innovation pertinent to the detection, recording, monitoring and management of estuarine sediments and sites.

This would be taken forward by **specific objectives**:

*Data standards*

8A.SO1 Promotion of data standards for all kinds of archaeological investigation within the region; examples of data standards are now available e.g. through the ADS (ads.ahds.ac.uk/standards).

8A.SO2 Consider the compatibility of our existing datasets around the region.

8A.SO3 Consider means of managing the web-based historic environment resource.

*Stratigraphic studies*

8A.SO4 Extending the use of geotechnical/geophysical techniques to supplement conventional borehole/test-pit data.

8A.SO5 Developing the use of GIS and other software to model palaeosurfaces in three dimensions.

8A.SO6 Refining techniques for recognizing buried landsurfaces and understanding their palaeoenvironmental context.

8A.SO7 Promoting techniques to refine understanding of depositional environments and stratigraphic sequences (e.g. using X-radiography to examine bedding structures and discontinuities).

8A.SO8 Establish what other non-archaeological data sets may be available and if/how they could contribute to research around the estuary (e.g. Lidar).

*Site prospection*

8A.SO9 Developing a continuing systematic programme of aerial photography.

8A.SO10 Establishing an agreed data standard for ground-based survey of the intertidal zone. There has been a review of RCZAS methodology which discusses data standards in consultation with field workers.

8A.SO11 Testing the relevance of magnetic susceptibility, micro-charcoal density and phosphate concentrations from core samples as indicators of nearby human activity.

8A.SO12 Developing regional/local geoarchaeological models.

*Site recording and interpretation*

8A.SO13 Developing techniques permitting rapid recording within low-tide 'windows'. There are likely to be continuing technological improvements in both hardware and software in coming years.

8A.SO14 Studying the taphonomy and composition of assemblages of macrofossils and microfossils in modern estuarine situations to aid interpretation of sub-fossil assemblages.

8A.SO15 Assessing the value of three-dimensional sampling of 'submerged forests' and associated peats for dividing data on vegetation structure, composition and change.

8A.SO16 Considering the use of GIS /databases as an interpretive tool.

*Site monitoring and management*

8A.SO17 Monitoring erosion rates of exposed palaeosurfaces in the intertidal zone at several contrasting locations and other types of site found in the intertidal zone.

8A.SO18 Monitoring the effects of desiccation at low tide, microbial activity and physical erosion on intertidal wooden structures.

8A.SO19 Assessing the efficacy of sand-bagging and other physical barriers on erosion rates at critical intertidal sites.

8A.SO20 Monitoring the effects of re-watering on de-watered sites following managed realignment.

8A.SO21 Developing techniques for carrying out monitoring on former wetland areas (e.g. work at Vourne-Putten and Broekpolder http://www.planarch.org/downloads/library/nar27broekpolderuk.pdf).

8A.SO22 Assessing impacts of flood management options through a review of the existing information and testing hypothesis.

***Framework Objective 8B***

To promote understanding of the archaeology of the Greater Thames and utilize the resource for general educational purposes and informed tourism, alongside academic study, primary and secondary level education so as to broaden understanding and appreciation of the region's past.

This would be taken forward by **specific objectives**:

Developing links between the historic environment of the Greater Thames to a range of National Curriculum subjects.

8B.SO1 Involving museums, which play a key role within the region, in efforts to promote understanding and appreciation of the region's past.

8B.SO2 Enhancing the use of HER/SMRs for educational purposes.

8B.SO3 Creating education packs dealing with various aspects of the region's past.

8B.SO4 Continuing to develop interpretative publications, heritage trails and displays to increase use and appreciation of the archaeological resource

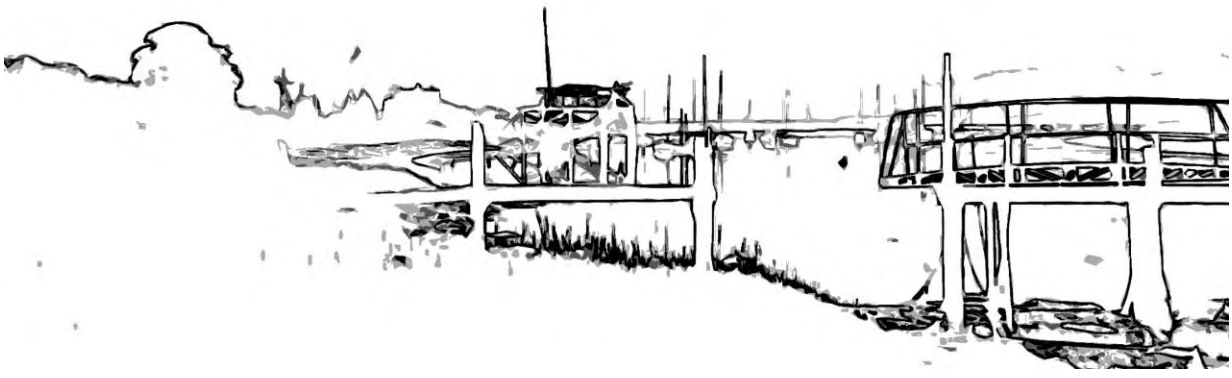
# 10.0 A RESEARCH STRATEGY FOR THE GREATER THAMES ESTUARY

## 10.1 Introduction

10.1.1 This review and update of the Greater Thames Estuary research framework has, like the original publication, been tripartite in structure and previous sections have updated the first two elements, the resource assessment and research agenda. These demonstrate the considerable potential for future historic environment research in the Greater Thames estuary and indeed the significant progress that has been made so far. The Research Strategy set out below takes the framework objectives as its basis and develops these into topics for which specific research initiatives and approaches can be developed that will deliver results.

10.1.2 It should be emphasised that the objectives identified are by no means exhaustive; other initiatives and areas of research will inevitably arise as new discoveries are made, research progresses and as more detailed analysis of our current knowledge base is carried out through the lifetime of the strategy. The strategy should therefore not be considered a prescriptive document but one that identifies some of the areas of research that can be realistically be progressed within the next 5–10 years (e.g. Olivier 1996, 45). The basic principles, content and scope of the strategy are discussed here, but for clarity and ease of reference the detail is presented in tabular form for each theme (Appendix 1), referenced back to the previously identified Framework Objectives and their component Specific Objectives.

10.1.3 Whilst the main focus of the strategy is on historic environment research it also discusses some methodological and management themes. These include topics such as the development of techniques for using GIS data, intertidal survey and characterisation as a means of developing strategic planning objectives. They can contribute or be applied to more than one of the historic environment research themes. This is perhaps well demonstrated by the Greater Thames Mineral Extraction Sites Project, which developed GIS and desk-based analysis to assist in the management of former quarries. This covered geoarchaeology and Pleistocene/Palaeolithic archaeology but was also closely integrated with 19th and 20th century industrial archaeology.



10.1.4 As with the original framework document there is a series of tiers of objectives:

Framework Objectives - The broad questions that should be considered for each theme
Specific Objectives - more specific questions which contribute to a framework objective
Areas of Research - initiatives or approaches to address the framework/specific objectives

10.1.5 A **strategy** has been defined as "...a statement setting out priorities and method" (Olivier 1996, 6). When considering prioritisation of objectives and initiatives there are a number of factors that need to be considered; balancing research priorities and practical considerations. It is also important that the effectiveness of the research framework needs to be demonstrable and as such the strategy needs to consider what is achievable within a timeframe of 5–10 years.

10.1.6 A cyclical model (to identify, evaluate and understand the resource) presents a progression of approaches to research. This has been demonstrated in the case of industrial archaeology which, at the time of the original framework, had " …received little or no systematic study" (Williams and Brown 1999, 35) and hence the focus of the research objectives was to undertake baseline studies (gazetteers / SMR enhancement programmes) that is to identify the resource, to develop a platform for further research. In the case of the intertidal zone, good baseline existed in some areas and as such the priority was developing evaluation strategies and the investigation of specific sites and landscapes.

10.1.7 The process of identification and evaluation (considering the value and significance of historic assets) provides a basis from which impacts can be assessed. Responding to, and indeed anticipating, external pressures that fall outside the 'traditional' planning process but fall within the broader scope of spatial planning is of particular importance around the Greater Thames estuary. Sub-regional planning and other strategic plans will identify geographical areas that may be subject to development or regeneration.

10.1.8 In addition, factors such as sea-level rise, climate change, coastal squeeze and erosion are having a demonstrable impact on the historic environment resource. There is therefore a finite window of time in which research into some of our more vulnerable monuments and landscapes remains possible.

10.1.9 It is anticipated that development-led investigations will continue to produce results which contribute to research in the Greater Thames Estuary. This will address or contribute to some research objectives but the *ad hoc* spatial, temporal and thematic distribution of such activity means that the strategy should promote initiatives to synthesise that data, and consider areas and issues unlikely to be addressed by development/threat led studies.

10.1.10 Review of the resource assessment has demonstrated that, for some themes, significant progress has been made as a result of specific streams of funding being available. For example the Aggregates Levy Sustainability Fund has given rise to projects looking at Pleistocene geology and Palaeolithic archaeology, and drowned landscapes. Projects have also been funded through English Heritage (HEEP), Local Authorities, Non-Governmental Organisations and the European Union. Funding is likely to become a more critical issue over the life of this framework as these sources of income are impacted by likely reductions in public spending as a result of recent

economic history. There is therefore an ever more pressing need to identify our priorities and have a strategy for implementing research that cost-effectively addresses these.

10.1.11 Although the creation, maintenance and enhancement of skills falls outside the remit of the framework revision it is acknowledged that this is critical to the delivery of the strategy and may well be impacted by the financial restrictions alluded to above. Opportunities to maintain and develop skills should be encouraged and supported.

## 10.2 Common Approaches

10.2.1 Through the process of the framework review it has become clear that there are some broadly similar approaches that apply to the majority of themes, particularly when considering the research cycle.

*Fieldwork*

10.2.2 Fieldwork forms the core of historic environment research, the building blocks from which analysis can be advanced. For many of the framework themes there have been extensive desk-based studies carried out, in some cases supported by limited field survey, such as Rapid Coastal Zone Assessment Survey and the field visits carried out in compiling the industrial gazetteers. A greater degree of archaeological fieldwork would make a significant contribution to progressing the strategy, enabling the historic environment community to better establish the value and significance of the resource. This could involve non-intrusive inspection and geophysical prospection, boreholing, test-pitting, evaluation and area excavation.

10.2.3 Incidental and planning-led fieldwork will occur and opportunities need to be exploited but strategy-/research-led archaeological excavation is critical, both to fill our gaps in knowledge and to develop new methodologies in order that opportunities for investigation can be effectively exploited. There are particular challenges faced when considering fieldwork in an intertidal and marine environment that would benefit from the continuing development of approaches. Sites such as 'red hills' and the submerged forest at Erith would benefit from further fieldwork both to develop techniques and address research questions.

10.2.4 The results of all such fieldwork should be available and accessible, through HERs, the NMR and web based initiative such as OASIS and the ADS.

*Baselines*

10.2.5 Baseline information is critical to provide a platform for further research. Whilst significant progress has been made, the review of the framework has identified a need for additional / enhanced baseline information in the case of a number of themes. In the case of intertidal and related archaeology, the completion of RCZAS for the whole region is a priority. Additional thematic studies for the 'gaps' in the industrial archaeology gazetteers (e.g. petrochemical and extractive industries) should be carried out, particularly as brownfield sites are likely to be priorities for redevelopment. Other topics could include World War I remains, which are less well represented in the record than those of World War II, but are present around the estuary, for example in the Medway where they have been recorded during RCZAS.

10.2.6 The baseline for the non-designated elements of the historic built environment would benefit from enhancement.

10.2.7 In the case of all studies, it is important that there needs to be consistency in the composition of the archive in order to enable comparison of data and ease incorporation into the NMR and HER. The GTEASC will encourage the use of existing standards and guidance across the region and co-ordinate the development of others. Examples of existing guidance include those promoted by the IFA (http://www.archaeologists.net), ALGAO (http://www.algao.org.uk) and GLAAS (http://www.english-heritage.org.uk/publications/glaas-standards-for-archaeological-work/) (and in the HELM Guidance Library (http://www.helm.org.uk/).

*Collation, Synthesis and Analysis*

10.2.8 In many cases it is likely that there is sufficient baseline information available to contribute to the research objectives but it has not been collated and/or is not readily available. Collation of data, that is the bringing together of material from disparate sources, is necessary to provide a sound basis for research and management of the resource. This needs to be recognised as an aspiration wherever funding is available.

10.2.9 Research in the Greater Thames Estuary involves a range of disciplines (e.g. geologists, archaeologists, buildings archaeologists and marine archaeologists) each of whom have their own data. There is a need for interdisciplinary co-operation and collaboration to ensure that complementary datasets are available. The collation of borehole and other geotechnical information, for example, would be useful when considering the geological development of the region, Palaeolithic archaeology and palaeoenvironmental studies.

10.2.10 Following on from the collation is the process of synthesis and analysis of the available data. The importance of this applies to all themes; it is critical for understanding elements of the historic environment in their wider context. Opportunities to carry out research into archived sites should also be exploited, particularly where new techniques, such as the development of scientific dating, can be applied.

*Publication and Dissemination*

10.2.11 Collation, synthesis and analysis should assist in the development of publication and dissemination programmes. Indeed the effective dissemination of the developing understanding of the Greater Thames Estuary should be seen as the ultimate objective of the strategy. All synthesis should be published in some form.

10.2.12 In terms of major sites there has been significant progress towards the publication of the Mucking excavations and also the excavations at The Stumble. Future publications should take place, with that of the recent studies on sea-level curves being a priority. These have the potential to contribute to work on climate change and the topographic architecture of the estuary within which people live.

10.2.13 In the rapidly developing media environment new methods of publication and dissemination are constantly evolving and mobile internet access is increasingly common, along with the use of 'smart phones'. The GTEASC will consider how these

new and developing technologies can be used as alternative/additional means of publication and dissemination.

10.2.14 There is an increasing emphasis on web-based delivery of research material, reports and archives, which has been extremely useful in reviewing the framework. Some 'grey literature' was accessible as were a number of project archives, particularly those arising from the ALSF. Conversely, some purely web-based material is no longer available following the completion of projects and the subsequent loss of funding/maintenance of web domains. It is clear that the long-term management of web based delivery needs to be considered for projects. The use of ADS as a permanent archive, supplementing other web-based data, should be encouraged.

10.2.15 The digital version of this research framework will be hosted on the Thames Estuary Partnership website, along with those of the other participating organisations (e.g. the councils and English Heritage). The GTEASC will ensure that the framework is accessible in a continually hosted domain.

10.2.16 The final question to raise when considering the collation to dissemination/publication process outlined above is, how we can realistically facilitate this expansive (and potentially expensive) process.

*Integrated / Joint Projects*

10.2.17 The review of the research framework has demonstrated the importance and benefits of cross-discipline co-operation and collaboration. Such projects have benefits in a number of ways for example cross-fertilization of ideas and approaches. Ultimately utilizing the same opportunities should also enable cost-effective use of the limited resources we are likely to have available.

10.2.18 The opportunities for multi-disciplinary projects should also be pursued. This has proved particularly effective when working on grazing marshes where historical studies, archaeology, geoarchaeology and the natural environment have been integrated. These should be extended around the region. Other examples include the Lea Valley Mapping projects and the Planarch projects, which included partners on the European mainland.

## 10.3 Thematic

10.3.1 The agenda has identified the main areas of research in the Greater Thames area, and the points set out below draw out some of the objectives and project initiatives that the review process identified.

***The Development and Palaeoenvironment of the Thames*** *(Section 2.0, above)*

10.3.2 There is a need for further work on a variety of scales; the extension of wide scale data collation and modelling initiatives (e.g. the MTNT, MVPP) and more site-specific studies to address specific questions which have arisen from regional studies. This should include field investigations.

10.3.3 The Upper Palaeolithic and Mesolithic, for which there is significant potential, would appear to be an area where there has been little progress and there need to be initiatives developed to address this across all of the three regions round the Greater Thames.

10.3.4 Training has also been identified as a necessity when considering early prehistory, particularly for curators.

10.3.5 The systematic capture and collation of extant and new palaeoenvironmental data across the region should take place (like that carried out in London) to form a basis for subsequent analysis. This should include the extension and maintenance of the extant database. Any opportunities to add data should be taken, in accordance with guidelines held on the HELM website.

***Maritime Heritage*** *(Section 3.0, above)*

10.3.6 Dramatic discoveries have been made and, in addition, the last 10 years have also seen an enhancement of basic datasets for example through work carried out for Port of London Authority. There remain areas where our basic datasets need to be improved, for example wrecks and hulks located in the intertidal zone around Essex. Regional studies could also be carried out considering the role of the estuary for commerce and ship/boat-building. Opportunistic recording of wreck sites should also be encouraged.

10.3.7 The improvement of the basic datasets for the maritime resource is necessary, both in terms of archaeological research and to inform the development of Marine Conservation Zones through the Balanced Seas project (http://www.balancedseas.org). It is important that the wider resource, that is beyond designated sites, is represented in such strategies.

10.3.8 Although considered in a number of research frameworks, including that of the Greater Thames, it is generally considered that the Marine Historic Environment has not yet been fully integrated into the whole. The new initiative to develop a Maritime and Marine Historic Environment Research Project (www.southampton.ac.uk/maritime_research_framework) represents significant

progress and will provide a national overview of previous research to enable long term strategic planning and identify research priorities. This initiative should be supported.

***Intertidal and Related Archaeology*** *(Section 4.0, above)*

10.3.9 There has been significant progress on this theme over the last 10 years, for example through the rapid coastal zone surveys that have taken place in north Kent and Essex (Paddenberg and Hession 2008; Heppell 2008). Future initiatives should focus on completing baseline surveys around the Kent coast with synthesis and analysis of the results of extant surveys. The review has also highlighted the importance of monitoring survey and ground truthing, and initiatives to further these should be pursued. There is a plethora of specific topics be usefully pursued that could include landing points, salterns, the oyster industry and seawalls.

10.3.10 The archaeological excavation of intertidal and related archaeological sites can be challenging but of considerable value. Opportunities for carrying out archaeological excavation should be pursued, particularly with regards to salterns, potentially one of our most numerous resources but on the whole poorly understood. Indeed recent work at Stanford-le-Hope, on the south Essex Marshes, has amply demonstrated the complexity of the monuments, established that a range of periods are represented and that they are not necessarily isolated in the landscape. It has shown the importance of the interaction between such monuments and the natural landscape (Oxford Archaeology). Analysis of the results of field investigation will no doubt contribute greatly to our understanding of such monuments but this remains one example of many and further opportunities for excavation should be pursued.

10.3.11 The success of the Thames Discovery Programme (http://www.thamesdiscovery.org/) has shown the high potential the intertidal resource has for public engagement. Opportunities for public engagement in the wider estuary should be pursued, although the topographical differences mean that any such initiatives should carefully consider any health and safety implications.

10.3.12 There is potential for non-archaeological datasets, such as Environment Agency Lidar survey and PLA hydrology, to contribute to archaeological research. Access to this data is key and discussions to take this forward should be pursued.

***Land-use and occupation*** *(Section 5.0, above)*

10.3.13 Many of the dryland topics will be covered by the relevant regional and period based frameworks that also encompass the areas around the Greater Thames Estuary, for instance, that of the East of England, along with development-led research. For the purposes of the Greater Thames Estuary strategy, research should be focussed on specifically estuarine related sites or landscapes, which have a particular significance to understanding the evolution of the Greater Thames Estuary area.

10.3.14 Studies of the specialist settlements around the estuary, such as Barking, which was an important fishing port, should take place and also tie in to wider strategic planning initiatives, Barking is a key planning zone in the Thames Gateway. Other studies should research seaside towns, docks and their ancillary activities. Allied with this, and reflected in the physical expansion of settlement around the estuary is the theme of population movement and associated socio-economics. This is an area that would

benefit from further study. In addition grazing marsh surveys should be extended to cover the estuary, being a key element of land-use.

***Historic Built Environment** (Section 6.0, above)*

10.3.15 Like land-use and settlement, the historic built environment will be included in other regional and period based frameworks. In all regions, including the Thames, it is important that research fosters a more fully integrated approach to all aspects of the historic environment, encompassing archaeological remains, the built environment and landscapes. All of these reflect the history of the Greater Thames Estuary a part of a maritime nation, trade, industry and agriculture.

10.3.16 For the area of the Greater Thames Estuary, initiatives relating to the built environment should focus on those elements specific to the coast, for instance seaside towns, harbour and quayside infrastructure, hotels / B & Bs, warehouses and boatsheds/stores. Designed landscapes also form a significant part of the historic environment of the estuary, particularly following the development of tourism.

10.3.17 London is a world city and this has impacted on the development of the historic built environment of the estuary, for example the docks, ropewalks and ancillary buildings, workers housing. Research into the historic built environment should consider structures such as these and how they relate to the estuary and the wider world.

10.3.18 The historic built environment would benefit from the development of its own national/regional resource assessment and research agenda in order to develop a strategy.

***Historic Defences and Other Military Installations** (Section 7.0, above)*

10.3.19 There has been progress on this theme in the last 10 years, particularly in relation to the most important sites in the estuary (e.g. Chatham Dockyard) and enhancing basic inventories. Synthesis and analysis is a useful next step, along with continuing baseline enhancement and site-specific studies, particularly in those areas where coastal erosion is having a significant impact, for example on the Henrican bulwark fort at Cudmore Grove, Essex.

10.3.20 There remain chronological gaps in inventories, which should be addressed, for example World War I remains are less well represented in the record than those of World War II. Similarly small-scale sites, like the London bunkers, are less well represented and this should be addressed.

10.3.21 For both the military and non-military historic built environment conservation is a major issue, considering the age and type of building materials used. Studies into the scientific and engineering aspects of preservation should be encouraged. The built environment has also enabled the historic and natural environment communities to collaborate on this issue such as the conversion of World War II pillboxes to bat habitats (http://news.bbc.co.uk/1/hi/england/suffolk/4805324.stm).

***Trade, Industry and Transport*** *(Section 8.0, above)*

10.3.22 This theme represents a prime candidate for the synthesis of the sites and buildings that are particular to the Greater Thames Estuary as a result of the significant progress that has been made in the last 10 years through the completion of comparative surveys of many different types of industrial sites. There is a need to review these substantial gazetteers to identify specific initiatives. Publication of the results of the studies of important sites should take place.

10.3.23 Some industries, such as the petro-chemical industry, which have shaped the visual landscape of the estuary remain to be studied, later (20th century) industries should also be researched. It should be noted that industry around the estuary is not restricted to those of post-medieval and modern date but included those from earlier periods which have, in many cases, used the Thames and its tributaries as a power source, demonstrated by the discovery of a horizontal water-wheel of Anglo-Saxon date at Ebbsfleet and also a 12th-century mill at Greenwich.

10.3.24 London's role as a centre for trade and commerce through the world also provides themes for research, such as how the British Empire fed London and recognising how the world is London's hinterland. These are themes which would benefit from a collaborative approach, including historical geographers.

## 10.4 Management and Methodology *(Section 9.0, above)*

*Planning*

10.4.1 The Thames Estuary is an area with specific challenges to face relating to planning policy but one with a coherent natural environment and human landscape, the latter shaped by millennia of human activity and hence the historic environment is key to understanding and developing local communities as outlined in strategic planning documents for the Thames Gateway. It is one of the key components of local distinctiveness and provides a valuable tool for engaging local communities. Understanding the historic environment resource, through the research discussed above can contribute to planning decisions and policies at a variety of scales, from individual sites such as the concrete barges at Rainham, to a strategic landscape level, demonstrated by the importance of the extant and former grazing marshes in the estuary for the delivery of the Thames Gateway Parklands Strategy. This aims to provide a network of high quality landscapes and waterways, capitalising on natural, cultural and historical assets (http://www.communities.gov.uk/thamesgateway/parklands).

10.4.2 Developing an understanding of the significance and value of historic assets beyond those which are nationally designated is necessary to ensure that the wider historic environment can be considered as part of planning decisions and policies. It is important that those advising on and contributing to planning and the historic environment are appropriately skilled.

10.4.3 The vision outlined for the Thames Gateway recommends building on the identity of existing places, for example as the core of sustainable communities, boosting tourism, cultural regeneration and improvements to the built/natural environment. It is not only the designated monuments but also those that are locally significant, which are key to engaging local communities.

*Characterisation*

10.4.4 Characterisation is an approach which links management and research issues, and can be a useful means of engaging with strategic planning (10.1.9 above). There are a multitude of types and scales of characterisation which can contribute to planning policy and decision making. As discussed above, designated sites form a small proportion of historic environment resource. As a landscape-based approach, characterisation takes into account non-designated sites as well as the evolving character of an area.

10.4.5 A range of such studies have taken place around the estuary from the broad brush approach of the Thames Gateway Characterisation (Chris Blanford Associates 2004), Historic Landscape Characterisation and Historic Environment Characterisation which refines these, incorporating other data sets. These projects have covered much the coastlines of Kent and Essex but no such studies have been carried out in Greater London. This should be addressed as a priority.

10.4.6 As clearly illustrated in the resource agenda, historic environment assets are not limited to dryland and intertidal areas but extend into the subtidal zone. As such a similar characterisation based approach is being considered to contribute to Marine planning and the development of Marine Conservation Zones and the Balanced Seas project.

10.4.7 Historic Seascapes Characterisation has been trialled in some regions around the English coast. Such characterisation should be extended around the Thames Estuary. In addition, Marine Regional Environmental Characterisation is being carried out which, like HEC, considers potential historic environment assets and biological communities.

*Methodologies*

10.4.8 This research strategy acknowledges the benefits offered by new methodologies and technologies for investigation and management of the resource as well as communication and dissemination. The promotion of their use in pursuance of research objectives should be encouraged. The review noted that there has been a wide range of good practice guides created in the last 10 years the dissemination of this guidance should be encouraged.

10.4.9 Progressing the research objectives should be facilitated by the development and evaluation of methodological and management techniques. The revised resource assessment has illustrated some of the key areas where progress has been made, such as GIS, GPS, geophysical survey techniques and deposit modelling, the application of which has significantly advanced study within the marginal parts of the Greater Thames Estuary area.

10.4.10 Key examples for further development include:

- Data standards and IT; e.g. interoperability of data across regions, deposition and maintenance of digital data (particularly on the web)
- Geoarchaeological assessments (e.g. model briefs for cross-regional consistency)
- Evaluation of deep sequences (e.g. assessment of the various techniques available and developing guidance)

- Borehole/auguring/test-pits (e.g. assessment of the various techniques available and developing guidance)
- Deposit modelling (as above)

*Training and Skills*

10.4.11 Although it could be considered to be outside the scope of a research framework, it should be acknowledged that the delivery of the framework objectives requires both the retention of existing skills and the development and dispersal of these. This applies to those working in the region (including curators and contractors) and the local researchers and activists who with an interest who can contribute to projects (such as those involved in the TDP FROGS programme).

*Communications*

10.4.12 A communications strategy should include dissemination both within and beyond the heritage sector. This will be facilitated through contributions to conferences such as that held by the Thames Estuary Partnership.

10.4.13 The nature of the Greater Thames Estuary means that some of the areas of research are quite specialised, it is however important to acknowledge that there is need for promotion/ education beyond those with a specialist interest. This will be encouraged through continuing to hold regular conferences such as that held by the Thames Estuary Partnership. The GTEASC has held a number of day seminars on the research carried out around the Thames and these are planned to continue.

10.4.14 An effective wider communications strategy with local communities also has a dual purpose; engaging communities in the own local history, commonalities and distinctiveness and as valuable but under-represented source of information. Oral history has, for example, been used in relation to East London in associated with the development of the Olympics Site. Similar studies have the potential to contribute to other themes in the framework, such as reminiscences of seaside towns or working in industries.

10.4.15 The historic environment of the Greater Thames is a valuable but under-utilized educational resource in primary, secondary and higher education. The development of educational materials should be encouraged, utilizing lessons learned from the ALSF projects. Universities play a significant role in research and the research framework should be promoted in this sector, and to non-archaeological departments which may be able to contribute.

## 10.5 Overview

10.5.1 This review and update of the Greater Thames Estuary Research Framework has illustrated the achievements of the last ten years and directions for the future of historic environment research in the region. This has been carried out in consultation with a wide range of stakeholders under the direction of the Greater Thames Estuary Archaeological Steering Committee. This group includes representatives of the three regions that form part of the Greater Thames Estuary. This group will continue to meet to ensure that the historic environment in the Greater Thames is dealt with consistently and to help guide the future research promoted in this framework. Research is an ongoing process, and it is to be hoped that the achievements of the last ten years can be matched or indeed surpassed in the years to come.

Fig. 34: Sunset over the Blackwater Estuary, Essex (photo courtesy of Peter Murphy)

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## WEBSITES

These website links have been provided for information. We do not have any control over the content, security policy or privacy policy of these sites. The links were correct at the time of writing.

Airfield Research Group http://www.airfieldresearchgroup.org.uk/

Archaeological Data Service http://ads.ahds.ac.uk/

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Brewery History http://www.breweryhistory.com/journal/archive/111/bh-111-015.html#bh-111-015-fn008

British Archaeological Jobs Resource http://www.bajr.org/ (primarily for jobs but has numerous other resources)

British History Online (various secondary sources such as the VCH and Survey of London) http://www.british-history.ac.uk/catalogue.aspx

Council For British Archaeology http://www.britarch.ac.uk/

Defence of Britain Database http://ads.ahds.ac.uk/catalogue/specColl/dob/

Essex County Council Historic Environment Branch http://www.essexcc.gov.uk/vip8/ecc/ECCWebsite/dis/cha.jsp?channelOid=15274

Essex HER http://unlockingessex.essexcc.gov.uk/custom_pages/home_page.asp?

Greater London Archaeological Advisory Service (English Heritage) http://www.english-heritage.org.uk/professional/advice/our-planning-role/greater-london-archaeology-advisory-service/

Greater London Industrial Archaeology Society http://www.glias.org.uk/index.htm

Greater London SMR/HER http://www.english-heritage.org.uk/professional/advice/our-planning-role/greater-london-archaeology-advisory-service/sites-and-monuments-record/

Institute for Archaeologists http://www.archaeologists.net

Institute of Historic Building Conservation http://www.ihbc.org.uk/

Journal of Wetland Archaeology http://huss.exeter.ac.uk/archaeology/jwa/

Kent County Council Heritage Conservation Group http://www.kent.gov.uk/leisure_and_culture/heritage.aspx

Kent HER http://extranet7.kent.gov.uk/ExploringKentsPast/

Listed Buildings Online http://lbonline.english-heritage.org.uk/Login.aspx

Magic (GIS environment information across government, includes SAM's, RPGs etc http://www.magic.gov.uk/

National Monuments Record http://www.pastscape.org.uk/

National Register of Historic Ships
http://www.nationalhistoricships.org.uk/pages/about-the-registers.html

NMR Thesaurus http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=1

OASIS – Grey Literature Library
http://ads.ahds.ac.uk/catalogue/library/greylit/index.cfm?CFID=4288855&CFTOKEN=80519582

Planarch http://www.planarch.org/

Society for Sailing Barge Research http://www.sailingbargeresearch.org.uk/

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