Trench Investigation Report

London Gateway Logistics Park, Stanford le Hope, Essex, Proposed Tongue Land HGV Lorry Park

Trench Investigation Report

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London Gateway Logistics Park, Stanford le Hope, Essex,

Proposed Tongue Land HGV Lorry Park

Archaeological Trench Investigation

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and illustrated by Matt Bradley and Markus Dylewski

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Summary

Oxford Archaeology South (OAS) was commissioned by London Gateway Logistics Park Ltd. to undertake an archaeological evaluation of the site of a proposed Heavy Goods Vehicle (HGV) Lorry Park at the London Gateway Logistics Park (LGLP), adjacent to the London Gateway Port alongside the River Thames near Stanford-le-Hope, Essex, centred on NGR TQ 7110 8190. The proposed location for the Lorry Park (the 'application site') is within an area of the London Gateway site historically referred to as 'The Tongue Land'.

No significant archaeological remains were present within the evaluation trenches. All structures and artefacts encountered were of modern date and demonstrably associated with the former Shell Haven Oil Refinery. The truncation of the site by previous construction works and the landscape context (in reclaimed former marshland) limit both the potential for encountering terrestrial archaeological remains and the likelihood that remains would survive close to the present ground surface.

The evaluation trenching has only investigated the upper part of the alluvial sediment sequence. An impact assessment has provisionally concluded that the development as proposed will have no effect on any archaeological remains that may be deeply buried within the 10m thick Holocene alluvial sequence underlying the modern made ground within the site. The Lorry Park would be subject to ground-raising as part of the development to address flood risk potential, to the same level as the rest of the LGLP, which will protect any deeply buried archaeology from disturbance. The majority of buried services and foundations are expected be laid within the thickness of the modern made ground covering the site, although deep drainage features may cause localised impacts into the upper alluvium. The trenching has shown that the upper alluvium has low archaeological potential and has been heavily disturbed by previous development.

Detailed design information for the Lorry Park is not available at this stage and will be reviewed during the design process to ensure that the assumptions used in this archaeological evaluation remain valid.

1 INTRODUCTION

1.1 Location and scope of work (Fig.1)

1.1.1 DP World London Gateway Logistics Park Limited (LGLPL) proposes to construct a new temporary Heavy Goods Vehicle (HGV) Lorry Park in an area of the London Gateway site known as the 'Tongue Land', adjacent to the London Gateway Port, alongside the River Thames near Stanford-le-Hope, Essex (NGR TQ 7110 8190). Figure 1 shows the location of the site.

1.1.2 The proposed new Lorry Park would provide haulage yards, parking and welfare facilities for hauliers using the Port and Logistics Park. This is a temporary solution while the developer assesses options for a permanent Lorry Park.

1.1.3 LGLPL is proposing to submit an application for planning permission for the proposed project to Thurrock Council under the Town and Country Planning Act 1990.

1.1.4 The site is located on an area of c.7.7 hectares, bounded by the London Gateway Logistics Park (LGLP) development plots to the east, Carter's Lagoon to the west and north, beyond which is the London Gateway Port (LGP) Access Road (to the west) and the LGLP east -west access road (to the north), the Thameshaven Branch of the London to Southend Railway to the south and the LGP. All of these have been developed or redeveloped in recent years as part of the London Gateway development. The River Thames is c 400m south of the site. The nearest historic settlement is Great Garlands Farm, which was formerly visible on the rising ground to the west of the site, although now largely screened from view by the Port and Park Access Road. The nearest urban area is Stanford-le-Hope, situated *c.*1.5km to the north-west of the site. The Corringham/Fobbing Marshes Local Wildlife Site lies 100m to the north at the closest point.

1.1.5 The archaeological potential of the application site was considered to be uncertain. Oxford Archaeology (OA) had been commissioned by LGLPL to conduct a trench investigation to establish the potential for significant archaeology within the site to be affected by construction of the proposed Lorry Park. This was intended to inform a screening process, to establish whether an Environmental Impact Assessment (EIA) was required for the development. Although the proposed development is not covered by existing planning permissions for the London Gateway Port and Park, the trench investigation was completed in accordance with the London Gateway Archaeological Mitigation Framework (AMF, OA 2003), to ensure consistency with previous investigations at the London Gateway site.

1.1.6 An 'Archaeological Project Design' (APD) was prepared in accordance with the format laid out in the London Gateway AMF. However the assessment of archaeological impacts, and mitigation proposals, were presented in outline only, as detailed design information for the Lorry Park is not yet available. Section 4.2 of this report is an updated impact assessment that takes into account the results of the trench investigation.

1.1.7 The APD was prepared by DP World's Archaeological Contractor (Oxford Archaeology) and approved by the LG Archaeological Liaison Officer (Gill Andrews) and the archaeological statutory consultee for the LG Park, Richard Havis (Historic Environment Advisor, ECC Place Services).

1.1.8 As discussed in more detail below, the archaeological impact associated with the Lorry Park development were expected to be very limited: The application site lies in an area

of reclaimed marshland covered with a thick sequence of Holocene alluvium. While there is some potential for marine and coastal archaeology this is a brownfield site, which previously formed part of the Shell Haven Oil Refinery. Levelling and ground disturbance associated with the former refinery means that documented historic landscape features, such as 17th century sea walls, were likely to be very poorly preserved. Marine archaeology, such as boats or wharf structures, could well be present in the deposits infilling historic creeks, but any such remains would be deeply buried. Prior to the creation of the Lorry Park, the ground would be built up to a similar level as the LGLP, preserving any deeply buried archaeology *in situ*. Previous trenching in the adjacent plot to the west (Carter's Lagoon) did not encounter any significant archaeology within the upper part of the alluvium.

1.2 Geology and topography

1.2.1 The application site lies entirely within geological deposits mapped by the British Geological Survey as 'Tidal Flat' deposits (inter-tidal alluvium). The development of these deposits is complex and has a direct bearing on the archaeological potential of the site. An extensive Geoarchaeological 'Deposit Model' has been completed covering the floodplain areas of the LG Port and LG Park, incorporating the results from borehole surveys, an electrical resistivity survey, radiocarbon dating and palaeoenvironmental analysis (OA 2012). The model does not detect archaeological sites directly; rather it provides a framework for predicting the most likely locations for significant sites, and for assessing past and future construction impacts within the floodplain. It allows the depth and potential location of archaeological sites to be predicted and compared against specific construction impacts.

1.2.2 At the end of the Devensian and during the early Holocene the Thames floodplain is likely to have been an extensive gravel braidplain. The deposit model indicates that the development area began to accumulate inter-tidal sediments from the late Mesolithic, from both marine and riverine influences, the channel network probably becoming more constrained and less braided as a result. The process of sedimentation continued throughout the Holocene, producing the current depth of alluvium.

1.2.3 The alluvial sequence in the vicinity of the application site has been examined in detail in Borehole OA06, which was subject to radiocarbon dating and palaeoenvironmental analysis as part of the Geoarchaeological Deposit Model (OA 2012). The present ground surface lies at *c.*2.0mAOD and the alluvium is covered by *c.*1.2m of made ground formed during the development of the Shell Haven Oil Refinery. The Holocene sediment sequence, as recorded in Borehole OA06, consists of *c.*10.78m of silty clay alluvial deposits overlying Pleistocene gravels (the latter continued beyond the base of the borehole at -16.70mAOD). British Geological Survey mapping indicates that the Pleistocene sand and gravel deposits in the site area are probably the downstream equivalent of the East Tilbury Marsh Member or Shepperton Member of the Lower and Middle Thames.

1.2.4 The overall chronology of the Holocene sequence at London Gateway, and associated palaeoenvironmental evidence, is discussed in detail in the Geoarchaeological Deposit Model report. In summary, three main organic-rich peat horizons were identified, each representing a phase of marine regression and landscape stability. These were the only phases that produced suitable organic samples for reliable radiocarbon dating. The earliest phase is not represented in Borehole OA06. The earliest radiocarbon date used in the Deposit Model (8290-7980 cal.BC) was from an organic horizon at 11.59mAOD in Borehole OA15, which is located 500m east of the application site. In conjunction with

several later dates from other boreholes, this shows that the earliest Holocene sediments at London Gateway date from the Early Mesolithic and fit well with a postulated period of landscape stability between c.8000 and 10,000 BP. The next stage of peat formation is dated from samples taken at -9.43mAOD in borehole OA06, at the southern edge of the application site, which gave a combined date of 5990-5830 cal.BC and charcoal from -9.37mAOD in the same core which dated to 5630-5510 cal.BC (Late Mesolithic). A third stage of stability, represented by peat formation, is present at -5.22mAOD, also in Borehole OA06, which gave a date of 4500-4360 cal.BC (Late Mesolithic). A waterlogged leaf fragment from -4.75mAOD in Borehole OA06 gave a date of 2870-2490 cal.BC (Late Neolithic), although waterlogged plant remains from alluvial deposits are often later in date than the deposits they derive from. The layers of alluvium above these lacked organic material suitable for radiocarbon dating but must have been laid down broadly between the Late Neolithic and post-medieval periods.

1.2.5 During the historic period (according to documentary evidence from c.1620 onwards), systematic marshland reclamation and the construction of sea walls largely halted marine influence into the alluvial floodplain and the vertical accretion of the sediment body slowed or stopped. The top of the alluvial sequence has subsequently undergone soil maturation and stabilisation, coupled with drainage and agricultural improvement.

1.2.6 The interface between geologically defined landscape zones often acts as a focus for human settlement. The high archaeological potential of this zone is borne out by the presence of known historic settlement activity in the vicinity. Nearby historic terrace edge settlements, such as the medieval farm complex at Old Garlands/ Great Garland are typically located on areas of river terrace gravel (apparently avoiding the clayey head deposits) at around the 13m contour, presumably to avoid the effects of floods. However, prior to the construction of sea walls in the 17th century they were located close enough to the terrace edge to permit ready access to the river Thames via navigable creeks.

1.2.7 A surviving area of undeveloped grazing marsh, 100m to the north of the application site, illustrates how the landscape of the application site would have looked prior to the development of Shell Haven West in the late 20th century. It contains a well-preserved complex of historic earthworks which extend around the head of Carter's Creek (so-named on the 1898 OS map). These are associated with the marshlands of Old Garlands Farm, an estate with well-documented medieval origins and a deserted medieval and post-medieval wharf known in the 16th and 17th century as 'Feake's Hythe'. Within this area the pattern and extent of creeks and field boundaries has changed relatively little since the medieval period, although the natural saltmarsh environment has been modified by land reclamation and subsequent drainage and agricultural improvement, each phase of which has left its mark on the landscape. The land retains a flat, open aspect. The application historically had a very similar landscape to this, as attested on detailed historic maps going back to 1619. However the Plot was buried in a westward expansion of the Shell Haven Oil Refinery in the latter half of the 20th century. Various landscape features recorded on historic maps in this plot, mainly comprising earthen sea walls and the historic line of Carter's Creek, were levelled and covered over when the refinery was developed.

1.2.8 The application site is located close to the edge of the floodplain but is not itself within the interface zone and lies several hundred metres south-east of *Feake's Hithe*. It was also separated from the river terrace edge by Carter's Creek. While there is little or no potential for settlement archaeology in this plot, the infilled channel of the creek has significant potential for maritime archaeological finds, as it formed a link between

Feake's Hithe and the River Thames. The adjacent section of the Thames Estuary, Lower Hope Reach, has been a busy deep sea anchorage for hundreds of years. Any such finds are likely to be buried at a depth of several metres.

1.2.9 Salterns or other seasonal marshland sites of various dates could be encountered in this plot. There is no indication of medieval/ post-medieval salterns or other seasonal sites in the application site on the historic maps, but Iron Age and Roman saltern mounds, known as 'red hills' are a common feature of the Essex coast and would not be expected to be show up on historic maps (unless re-used as sheepfolds in the post-medieval period).

1.3 Archaeological and historical background

1.3.1 No protected historic landscapes are present within the application site.

1.3.2 Old Garlands Farm, within whose lands the application site was historically located, is one of a group of small estates in the south-east of Stanford-le-Hope Parish. Each estate historically consisted of core settlements located on the river terrace (e.g. Broadhope Farm OA41; Old Garlands Farm OA56) located among their respective 'upland' fields, which at the time of the 1840 Tithe Map (ERO D/C/T362B) lay broadly between High Road and the edge of the river terrace. In addition, each estate included extensive marshland pasture, comprising, 'fresh marsh' (enclosed by a sea wall) and unenclosed 'saltings' or 'waste'. The Old Garlands estate is remarkably well-documented from the medieval period onwards. The records indicate periodic increases in the extent and quality of associated marshland pasture as a result of land reclamation. Old Garlands was held as a freehold manor by successive members of the Garland family in the late 14th and early 15th centuries, the earliest named being 'Richard Garland, painter, of London'. A legal dispute from 1425 provides details of the estate, referring to charters dating from the late 14th century or earlier, at which time the estate consisted of *"one messuage, 38 acres of land, five acres of pasture, 60 acres of marsh and 18s. rents with appurtenances in Corringham and Stanford-le-Hope, Essex, of which the close and house aforesaid are a parcel."*

1.3.3 In 1591 the Old Garlands estate (the western part of London Gateway site, including the application site) was acquired by Sir John Hawkins (then *Comptroller* of the Royal Navy) to endow a hospital in Chatham for sick and elderly sailors, in the aftermath of the defeat of the Spanish Armada. 'The Hospital of Sir John Hawkins, Knight', still exists today, although it sold the Old Garlands estate in 1920. The hospital owned the estate continuously from 1592-1920 and extensive records survive from that period, held in the Rochester-upon-Medway City Archives (Medway CityArk CH108). A conveyance dated 1599 (transferring the farm to ownership of the hospital, following Hawkins death in 1595) refers to the "*manor and capital messuage called Olde Garlandes, 30 acres pasture adjacent to 95 acres greenmarsh and saltmarsh [abuttals], pasture for 26 sheep in Church Marsh, all in Stanford-le-Hope, rent of 5 acres from a fresh marsh in Corringham, and right of passage to and from Mousehole Well to carry water*". The use of three terms to describe different types of marshland here is a practice adopted in the 17th century (Rippon 2000).

1.3.4 A lease dated 1614/15 describes the same estate as the "*messuage called Old Garlandes, 4 closes of upland ground (30 acres), a wick house and 5 marshes (70 acres) all in Stanford-le-Hope and in tenure of Francis Shawe [citizen and cloth-worker of London]*". The term 'wick' in the Essex marshes is specifically associated with dairies, cheese-making sheds and shepherds huts, probably occupied seasonally in most cases (Rippon 2000, 204). The very small neighbouring estate known in the 16th

to 19th centuries as 'Little Garlands' was probably originally part of the same estate but seems to have been separated off at an unknown date in the late medieval period. The core of 'upland ground' belonging to Old Garlands was 38 acres in the late 14th century but was reduced to 30 acres by the end of the 16th century.

1.3.5 No protected archaeological sites are present within the application site. Previous investigations for the London Gateway Access Road and Admin Building developments, and the adjacent section of the Coryton Gas Pipeline (Peachey and Dale, 2005) have uncovered extensive evidence for medieval and post-medieval settlement, in a band along the river terrace edge c. 400m north-west of the application site, which can be identified as the remains of the deserted wharf known as *Feake's Hithe* (Fig. 2). The archaeological and documentary evidence, taken together, suggests that this site was in use from *c*1200 until *c*1800. The earliest artefacts and features previously recovered date from the 12th - 14th century. The most abundant archaeological evidence, however, dates from the 15th - 16th centuries, including evidence for at least one substantial building, cobbled areas, kilns and occupation deposits (Peachey and Dale 2005). In 1577- 9 the settlement was sufficiently significant to send its own representative to the annual inquisitions of the Barstable Hundred Court ('*Facsheve*' ERO Q/SR 70/51). It seems to have been regarded as a hamlet of Stanford-le-Hope parish in that context.

1.3.6 A recent trench investigation on Great Garlands Farm, c.430m north-west of the application site, uncovered the well-preserved remains of a timber wharf, dated by radiocarbon and artefactual evidence to the late 15th or early 16th century (OA 2016) which confirmed the existence of '*Feake's Hithe'*. The wharf seems to have suffered a catastrophic collapse at the end of its life, as the articulated skeleton of a horse was found amongst the collapsed superstructure and the wharf revetment had collapsed inward towards the bank as if under pressure from a high energy flood. This might well have been caused by a storm surge. The records of Old Garlands indicate that floods were a perennial problem for the tenants.

1.3.7 The earliest detailed map, dated 1619, names the site 'Feake's Hithe' but does not show any buildings at the wharf by that date, even though an individual Shepherd's hut in the marshes is depicted on the map. This suggests that the wharf was in decline by the early 17th century. One of the fields on the 1840 Tithe Map is named 'Saw Pit Field', indicating that boat or ship building may have taken place at *Feake's Hithe* at an unknown date in the post-medieval period (Fig.3, 184). The settlement is still named on the Chapman and Andre Map of Essex, published in 1777 (*'Fox Hive'*) but seems to have fallen out of use entirely by the early 19th century, very likely as a result of Carter's Creek silting up. It's wharf functions may have been taken over by an enclosure and wharf on Curry Marsh at the terminal of the Manor Way track (built as the result of a legal dispute in 1636-40).

1.3.8 The north-west corner of the application site coincides with the historic line of Carter's Creek, but lies more than 400m south-east (downstream) from the nearest known archaeology associated with Feake's Hithe. Previous trenching at Carter's Lagoon, immediately west of the application site, produced no archaeology at all, but as with the present investigation only examined the uppermost layers of alluvium which were affected by the lagoon construction.

1.3.9 Earthen sea walls, probably originally built in the 1620s, are shown on a mid-17th century map of the marshlands of Old Garlands and neighbouring estates. Although undated this map was probably drawn up in relation to a legal dispute involving the Hawkins Hospital marshlands in 1636-40. The sea wall is labelled 'the Dutch wall

against the Thames' while Curry Marsh is annotated as 'lately inned by the Dutchmen', in reference to the immigrant Dutch engineers responsible for many English reclamation projects in the early 17th century.

1.3.10 This map names Mr.Robert Salmon as trustee of the Hawkins Hospital lands, who must be one of three merchant venturers of that name to hold the office of Master of Trinity House in the late 16th and early 17th century (father, son and grandson). This eminent nautical dynasty was based at Leigh-on-Sea, a few miles to the east of Old Garlands. Trinity House was (and still is) a charity primarily concerned with the safety, education and welfare of mariners. The Masters of Trinity House were among the *ex officio* members of the Board of Governors of the Hawkins Hospital, from its foundation in 1594, with responsibility for auditing the accounts, among other duties. Other *ex officio* governors included senior officials of the Royal Navy and the Royal Dockyard at Chatham, the Archbishop of Canterbury and the Dean of Rochester. The rest of the board was mainly recruited from kent-based aristocrats. The hospital governors took a close interest in their Essex estates, which involved a group visit on at least one occasion (Medway CityArk CH108). Day-to-day management was undertaken by the Deputy Governor.

1.3.11 Some of the plots within the Old Garlands marshlands are referred to as 'belonging to Rochester Bridge' on the mid-17th century map (Old Garlands was at times divided between two tenements). Institutional arrangements for managing the repair and maintenance of Rochester Bridge pre-date the 12th century. By the 17th century funds were raised using the income from a portfolio of landed estates, which were managed by elected wardens. The Wardens of Rochester Bridge also served on the board of governors of the Hawkins Hospital (Medway CityArk CH108).

1.3.12 In the late 19th and early 20th centuries large explosives factories and oil storage and refinery sites were developed some distance to the south-east of the application site, attracted by the railway, the strategic location of the site in relation to London, the deep sea anchorage at Shell Haven, and the remoteness of the location from centres of habitation. These dramatically altered the visual character of the former marshland landscape. The refinery was subject to very extensive development and expansion during the 20th century and was identified as a key defence site during WW2. Wartime aerial photographs show several anti-glider landing ditches forming cross patterns within the Lorry Park (Fig.2). These were mostly infilled in the immediate post-war period and little or no trace remains on the ground. The Lorry Park site formed part of the Shell Haven West development, was one of the latest parts of the oil refinery to be constructed, starting in the late 1950s.

1.4 Acknowledgements

1.4.1 Oxford Archaeology were appointed to undertake the evaluation by LGPL, who funded the project. Richard Havis, the Archaeological Officer for Essex County Council, monitored the work. The fieldwork was conducted by Andrew Ginns assisted by Rowan Kendrick. The report was written by Andrew Ginns. The project was managed for Oxford Archaeology by Stuart Foreman. Gill Andrews (Consultant Archaeologist) monitored the work on behalf of LGPL.

2 Evaluation Aims and Methodology

2.1 Aims

2.1.1 The aim of the investigation was to understand the likely impact of the development on any significant archaeology contained within the upper alluvial sequence in the application site in order to inform the planning and design process. The depth of investigation was limited to the anticipated depth of construction impacts associated with the development.

2.1.2 It is accepted that significant archaeological remains could be present at greater depth within the *c* 10m thick Holocene alluvial sequence underlying the site. A preliminary impact assessment, included in the APD, concluded that the development as proposed was very unlikely to affect deeply buried archaeological deposits. The full depth of the deposit sequence has been characterised in the Geoarchaeological Deposit Model (see para 4.2.3). The conclusions were based on available preliminary design information and previous assessments of construction impacts arising from completed developments in adjacent plots, including the Admin Building. Section 4.2 of this report comprises an updated impact assessment that takes into account the results of the trench investigation, including consideration of impact levels.

2.1.3 The trenches were concentrated in the north-western part of the plot which has the highest potential for archaeological remains in the upper layers of alluvium, namely the deposits infilling, and along the margins of, the historic 'Carter's Creek'.

2.1.4 While construction of the Lorry Park may expose traces of the levelled 17th-century sea walls, investigation of the sea walls was not a major objective in this phase of trench investigation because:

1) a section through the same sea wall had been recorded previously in the neighbouring Admin Building plot where it survived as an upstanding earthwork. Given the poor preservation of the sea walls in the application site, further investigation would be unlikely to provide additional information.

2) the chronology and significance of the sea walls in the application site is sufficiently understood from documentary research.

2.1.5 The investigation aimed to determine the presence/absence, extent, date range, condition and complexity of any other archaeological remains which may survive, and assess the associations and implications of any remains encountered with reference to the historic landscape. It also aimed to determine the potential of the site to provide palaeoenvironmental evidence, and the implications of any remains with reference to economy, status, utility and social activity, including consideration of the likely range, quality and quantity of the artefactual evidence present.

2.2 Methodology

2.2.1 The likely impact of proposed drainage features in the western part of the development site were investigated by archaeological trenching, sufficient to inform the design process for the Lorry Park. The depth of investigation was generally limited to 1m. Localised deep test pits were excavated in each trench to depths of up to 3.5m, to check for significant archaeological remains or organic deposits. The latter were not suitable for personnel access.

2.2.2 Eight trenches were excavated at the locations shown on Figures 3 and 4 to characterise deposits within the uppermost 1m of the sediment sequence. This depth

reflects the maximum anticipated depth of drainage swales, the most extensive potential construction impact that are deep enough to penetrate modern made ground deposits.

2.2.3 Due to the floodplain environment the trenches were infilled in a rolling programme before they filled with water. Richard Havis (ECC), on behalf of the local planning authority, was kept informed of the works progress on a daily basis and thus had the opportunity to inspect trenches if significant archaeology was found. Record photographs of all of the trenches are included in this report.

3 RESULTS

3.1 Introduction and presentation of results

3.1.1 The results of the evaluation are presented below, and include a brief stratigraphic description of the trenches. The full details of all trenches with the dimensions and depths of all deposits are provided in Appendix A. Given that no significant deposits were encountered, no detailed trench plans or sections are shown. Selected record photographs of each trench are included as Plates 1 to 13.

3.1.2 None of the eight trenches contained features or deposits of certain archaeological origin, other than modern deposits and made ground associated with the former Shell Haven oil refinery. These are not considered to be archaeologically significant.

3.2 General soils and ground conditions

3.2.1 The site is covered by a variable depth of made ground, varying in composition and appearance but distinguished by brick and tarmac inclusions. The base level of the made ground was not always clearly defined due to widespread disturbance caused by features and groundworks associated with the former oil refinery. The lower levels may be reworked or disturbed alluvium rather than made ground as such. The minimum depth at which undisturbed alluvium was encountered in the trenches was 1.6m (0.4mAOD) in Trench 6, but an adjacent Borehole (OA06) recorded a depth of 1.2m (0.8mAOD). More commonly the undisturbed alluvium was encountered at depths in excess of 2.0m.

3.2.2 Borehole OA06, near the southern edge of the application site, recorded the top of the alluvium at c.1.2m (OA 2012) and recorded the total thickness of Holocene alluvium in the part of the London Gateway site as 10.78m, the base lying at *c.*-9.98mAOD.

3.2.3 The upper alluvium as recorded in the trenches consisted of laminated greyish blue silty clays of varying hue, with very dark grey brown mottling, typical of marine and intertidal alluvial deposits. No features, artefacts or traces of preserved wood were observed. The upper alluvium was investigated in seven deep test pits. It was seen to extend from the base of the made ground/ reworked alluvium (*c.*1.6mAOD in Trench 6) to 3m+ depth (*c.*-1.3mAOD) without any significant change. There was no indication of peat layers within the trenches. Peat was recorded at two levels in Borehole OA06 (See para 1.2.4 above), but was too deeply buried to be encountered in the evaluation trenches (the uppermost peat, of Late Mesolithic date, was recorded at -5.22mAOD in Borehole OA06).

3.2.4 The ground conditions generally permitted good archaeological visibility and groundwater flooding was not a significant problem. The deep test pits were not suitable for manual access and were recorded from ground level.

3.3 Trench 1

3.3.1 Trench 1 was aligned north-south and located in the north-west corner of the site. The stratigraphy consisted of a sandy made ground layer (100), degraded tarmac (101) and clayey sand with ballast (102). These layers were above the natural alluvial silty clay (103).

3.3.2 A deep test-pit was dug through the upper alluvium in the middle section of the trench, to a total depth of 3.3m (-1.3mAOD), revealing laminated dark blue-grey clay alluvial deposits.

3.4 Trench 2

3.4.1 Trench 2 was located at the western edge of the site and aligned north-south. The stratigraphy consisted of sand levelling layer (200), and a concrete and tarmac rubble layer (201). These layers were above the natural alluvial silty clay (202).

3.4.2 No exploratory test pit was dug in this trench.

3.5 Trench 3

3.5.1 A NNW-SSE-aligned trench was located near the western edge of the site. The stratigraphy consisted of a clayey sand with ballast made ground layer (300), concrete and brick rubble (301) and the natural alluvial clay (302).

3.5.2 A deep test pit was dug at the north end of the trench to a depth of 3.8m. The alluvial deposits within this pit (303) were a very dark greyish blue, softer and more organic than the alluvium elsewhere in the application site. They are likely to be relatively recent channel deposits infilling Carter's Creek, a watercourse depicted on historic maps dating back to the early 17th century.

3.6 Trench 4

3.6.1 Trench 4 was aligned east-west and located at the northern edge of the site. This trench contained no archaeological remains. The stratigraphy consisted of a redeposited clayey sand with ballast 400, sand and brick rubble (401), brown clay upper alluvium (402) and the natural alluvial silty clay (403).

3.6.2 A deep test pit was dug near to the eastern end of the trench. This pit extended to a depth of 3.1m, it did not reach a depth below that of the natural alluvial clay (403).

3.7 Trench 5

3.7.1 This NW-SE aligned trench was located at the northern edge of the site. The stratigraphy consisted of a redeposited clayey sand layer with ballast (500), overlying tarmac and brick rubble (501), which in turn overlay the natural alluvial silty clay (502).

3.7.2 A deep test pit was dug through the upper alluvium at the west end of the trench, to a depth of 3.2m.

3.8 Trench 6

3.8.1 Trench 6 was east-west aligned and located at the north eastern corner of the site. The stratigraphy consisted of a redeposited clayey sand with ballast made ground layer (600), which overlay sandy made ground (601), brick and concrete rubble (602) and the silty clay alluvium (603).

3.8.2 A deep test pit was dug through the upper alluvium at the west end of the trench, to a depth of 2.7m.

3.9 Trench 7

3.9.1 Trench 7 was an east-west aligned trench and located towards the centre of the site. The stratigraphy consisted of a redeposited clayey sand and ballast made ground layer (700), brick and concrete rubble (701) and the natural silty clay alluvium (702).

3.9.2 A deep test pit was dug through the upper alluvium in the middle section of the trench, to a total depth of 3.4m, revealing similar laminated alluvial deposits throughout.

3.10 Trench 8

3.10.1 This WNW-ESE aligned trench was located towards the centre of the site. The stratigraphy consisted of a redeposited clayey sand and ballast made ground layer (800), which overlay an oxidised brown silty clay alluvial layer (801).

3.10.2 A deep test pit was dug through the upper alluvium in the middle section of the trench, to a depth of 3.8m. Blue-grey alluvial silty clay was encountered at the base of the test pit (802).

3.11 Finds summary

3.11.1 No archaeologically significant artefacts were recovered.

4 Discussion

4.1 Reliability of field investigation

4.1.1 The eight trenches represent a limited sample of the site area, but are sufficient to characterise the near-surface ground conditions and confirm the extent of ground disturbance associated with the former oil refinery. The absence of significant archaeological features is likely to be fair reflection of archaeological potential in the top 3m of the sediment sequence.

4.2 Archaeological impact assessment

4.2.1 The detailed design of the Lorry Park has not yet been completed, but preliminary conclusions can be drawn from comparison with adjacent plots that have been developed previously within the London Gateway Commercial Park, including the Admin Building and Carter's Lagoon.

4.2.2 **Baseline levels:** The existing ground level of the application site lies at *c.*2.0mAOD. The former oil refinery ground surface lies at *c.*1.7mAOD. The maximum recorded level of the Holocene alluvium (the uppermost level at which significant archaeology could potentially occur) is recorded at *c.*0.8mAOD in Borehole OA06 (where the made ground is recorded as 1.2m thick). In the evaluation trenches the top of the undisturbed alluvium was recorded at a minimum depth of *c.*1.6m in Trench 6 (*c.*0.4mAOD). However, the trenches have shown that the upper layer of alluvium is extensively disturbed and reworked to a greater depth by previous construction associated with the former oil refinery, such that undisturbed alluvium was encountered at depths in excess of 2.0m (0mAOD) in 5 out of 8 trenches. The deepest disturbance was recorded in Trenches 7 and 8 (2.35 and 2.40m below ground level respectively).

4.2.3 The trench results indicate that the top 1–3m of the soil sequence (*c.2*mAOD to *c.* -1.0mAOD) has little or no potential for significant archaeological discoveries. Marine and marshland archaeology of Mesolithic to post-medieval date could be present at greater depths but will not be substantively affected by the development.

4.2.4 The level at which contemporary archaeological features occur within the alluvial sequence is likely to vary substantially within the application site due to the presence of an infilled major creek underlying the western half of the site. The base of the Holocene alluvium in Borehole OA06 is recorded at -9.98mAOD, which represents the approximate lowest level at which archaeological finds could occur. There is potential at the base of the sequence for well-preserved Mesolithic land surfaces, inundated by rising sea levels in the early Holocene, demonstrated by radiocarbon dates and the presence of organic-rich peats near the base of the Holocene sequence in Borehole OA06 (see para 1.2.4). The latest radiocarbon date from Borehole OA06 derives from a waterlogged leaf fragment from -4.75mAOD, which gave a date of 2870-2490cal.BC (Late Neolithic), although waterlogged plant remains from alluvial deposits are often later in date than the deposits they derive from.

4.2.5 **Preparatory earthworks:** The application site would be surcharged to a height of *c.*3m above finished levels. This surcharge is predicted to cause a settlement of 500mm of the underlying material. Any archaeology that may be present already lies under pressure from several metres of existing overlying deposits. Compression from surcharging is not expected to have a substantive additional adverse effect. When complete the raised ground will form a protective layer, greatly limiting the potential for

disturbance to the underlying alluvium during construction and service installation work within the application site.

4.2.6 Land-raising is required to raise the level of the Haulage Yard to the level of the Logistics Park (3.6 – 3.9mAOD) to the east. Any excavated spoil generated during land-raising is likely to be re-used within London Gateway-owned land. This will result in raised ground thickness from *c.*1.6m to 1.9m. The total thickness of modern made ground, including the former oil refinery made ground (1.2m thick), would thus be a minimum of *c.*2.8m, which would provide a protective layer for any archaeology that may survive at greater depth.

4.2.7 The earthworks may include construction of landscaping and security bunds along the edges of the proposed development.

4.2.8 **Drainage management:** Drainage infrastructure features, such as swales, manholes and separator pits, are expected to be the deepest excavations involved in development of the Lorry Park. However, such features represent localised impacts which will only affect the uppermost layers of alluvium, which have been shown by this trench investigation to have very low archaeological potential. If more extensive impacts are identified during the detailed design process these would be subject to further assessment and, if necessary, mitigation.

4.2.9 **Scope of construction:** The construction phase of the proposed project is expected to include the following main components:

- Construction of parking bays for use by passing HGV traffic.
- Construction of a haulage yard to accommodate HGVs and associated facilities.
- Construction of welfare and support buildings.

4.2.10 Further details of each construction component will be provided once the scheme design is developed.

4.2.11 **Services:** The maximum specified depth of excavation for buried service trenches (other than drainage) is expected to be 1.5m below finished level, entirely within made ground. Deep excavation features, such as buried fuel tanks, would have the potential to impact buried archaeology in localised areas, if they penetrate through the raised ground.

4.2.12 **Foundations:** Strip foundations are unlikely to exceed a depth of *c.*2m from the finished level, in which case they would be entirely within made ground and have no potential to disturb archaeology.

4.2.13 **Piling:** may be required to support structures (e.g., lighting columns), which may be driven into the terrace gravels to a variable depth. The piled foundations may therefore extend through the alluvial deposits and would potentially affect buried landscapes and archaeological features that may be present within the area of each pile.

4.2.14 **Band drains:** Band drains may be inserted as part of the ground raising, which would penetrate into the alluvial sediments, causing very localised but widespread direct impacts, and will affect the drainage characteristics of the sediments.

4.2.15 The impact of piling and band drainage on the London Gateway floodplain deposits in general has been addressed through completion of the Geoarchaeological Deposit Model (OA 2012). No further mitigation would be required in relation to the application site.

4.3 Conclusions

4.3.1 No significant archaeological remains were encountered within the evaluation trenches. Based on the results of the evaluation, no impact on archaeological remains is anticipated from the development.

4.3.2 There remains the possibility that significant remains are present at greater depth within the Holocene alluvial sequence, but any such remains will be below the proposed level of construction impact arising from the proposed Lorry Park development and would be preserved *in situ* beneath a protective layer of made ground.

4.3.3 Since detailed design information for the Lorry Park is not available at this stage, provisional assumptions have been made about the depth and extents of development impact, based on preliminary design information and completed developments in adjacent plots. Should the impacts be deeper or more extensive than expected and extend into undisturbed alluvium (below *c.*0.8mAOD), then further assessment and/or mitigation would be required.

Appendix A. Trench Descriptions and Context Inventory

Trench 1						
General description					**Orientation**	N-S
Trench devoid of archaeology. Consists of made ground overlying natural alluvial silty clay which has building rubble within its upper 0.30m.					**Avg. depth (m)**	1.05
					Width (m)	2.10
					Length (m)	30.00
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
100	Layer	-	0.30	Sand Levelling Deposit	-	-
101	Layer	-	0.20	Degraded Tarmac	-	-
102	Layer	-	0.80	Clayey Sand with Ballast	-	-
103	Layer		2.00+	Blue Grey Alluvium		

Trench 2						
General description					**Orientation**	N-S
Trench devoid of archaeology. Consists of made ground overlying silty clay which has building rubble within its upper 0.30m.					**Avg. depth (m)**	0.95
					Width (m)	2.10
					Length (m)	30.00
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
200	Layer	-	0.35	Sand Levelling	-	-
201	Layer	-	0.20	Concrete and Tarmac	-	-
202	Layer	-	0.45+	Made Ground	-	-

Trench 3						
General description					**Orientation**	NNW-SSE
Trench devoid of archaeology. Consists of made ground overlying alluvial silty clay which has building rubble within its upper 0.50m.					**Avg. depth (m)**	1.00
					Width (m)	2.10
					Length (m)	30.00
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
300	Layer	-	0.30	Clayey Sand with Rubble	-	-
301	Layer	-	0.20	Concrete and Tarmac	-	-
302	Layer	-	0.40	Made ground - Blue Grey Alluvial Clay with building	-	-

				rubble inclusions		
303	Layer		2.00+	Dark Blue Grey Alluvium		

Trench 4						
General description					**Orientation**	E-W
Trench devoid of archaeology. Consists of made ground overlying natural alluvial silty clay which has building rubble within its upper 0.30m.					**Avg. depth (m)**	1.12
					Width (m)	2.10
					Length (m)	30.00
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
400	Layer	-	0.50	Clayey Sand with Ballast	-	-
401	Layer	-	0.40	Sand and Brick Rubble	-	-
402	Layer	-	0.20	Brown Clay Made Ground	-	-
403	Layer		2.00+	Blue Grey Alluvium		

Trench 5						
General description					**Orientation**	NNW-SSE
Trench devoid of archaeology. Consists of made ground overlying natural alluvial silty clay which has building rubble within its upper 0.30m.					**Avg. depth (m)**	1.10m
					Width (m)	2.10
					Length (m)	30.00
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
500	Layer	-	1.10	Clayey Sand with Ballast	-	-
501	Layer	-	0.30	Tarmac and Brick Rubble	-	-
502	Layer	-	1.80+	Blue Grey Alluvium	-	-

Trench 6						
General description					**Orientation**	E-W
Trench devoid of archaeology. Consists of made ground overlying natural alluvial silty clay which has building rubble within its upper 0.30m.					**Avg. depth (m)**	1.10
					Width (m)	2.10
					Length (m)	30.00
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
600	Layer	-	0.20	Clayey Sand with Ballast	-	-

601	Layer	-	0.30	Sand Levelling Deposit	-	-
602	Layer	-	0.60	Brick + Concrete Rubble	-	-
603	Layer		1.60+	Blue Grey Alluvium		

Trench 7						
General description					**Orientation**	E-W
Trench devoid of archaeology. Consists of made ground overlying natural alluvial silty clay which has building rubble within its upper 0.30m.					**Avg. depth (m)**	1.05
					Width (m)	2.10
					Length (m)	30.0
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
700	Layer	-	0.40	Clayey Sand with Ballast	-	-
701	Layer	-	0.65	Brick + Concrete Rubble	-	-
702	Layer	-	2.35+	Blue Grey Alluvium	-	-

Trench 8						
General description					**Orientation**	WNW-ESE
Trench devoid of archaeology. Consists of made ground overlying natural alluvial silty clay which has building rubble within its upper 0.30m.					**Avg. depth (m)**	1.12
					Width (m)	2.10
					Length (m)	30.00
Contexts						
Context no	**Type**	**Width (m)**	**Depth (m)**	**Comment**	**Finds**	**Date**
800	Layer	-	0.66	Clayey Sand with Ballast	-	-
801	Layer	-	0.74	Brown Clay Made Ground	-	-
802	Layer	-	2.40+	Blue Grey Alluvium	-	-

Appendix B. Bibliography and References

OA 2015 London Gateway Lorry Park; Archaeological Project Design for a Trench Investigation

Oxford Archaeology, July 2010, London Gateway Main Port and Park Access Road: Archaeological Investigation Report, prepared by Oxford Archaeology for DP World

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Oxford Archaeology, 1992, Fieldwork Manual, (Ed. D Wilkinson, first edition, August 1992)

Peachey, M and Dale, R, 2005 A late Medieval site at Great Garlands Farm, Essex Archaeology and History, volume 36

Saunders, A, Stanford-le-Hope, A History of the Church and Village

Stanford-le-Hope Tithe Map (1840) ERO D/C/T362B

Appendix C. Summary of Site Details

Site name: London Gateway Logistics Park, Stanford le Hope, Essex, Proposed Tongue Land HGV Lorry Park

Site code: CSTONG16

Grid reference: TQ 7110 8190

Type: Evaluation trench investigation

Date and duration: 11/04/2016 – 13/04/16

Area of site: 7.7 hectares

Summary of results: No significant archaeological remains were encountered within the evaluation trenches. Based on the results of the evaluation, and previous geoarchaeological investigations, no impact on archaeological remains is anticipated from the Lorry Park development.

There remains the possibility that significant remains are present at greater depth within the 10m thick Holocene alluvial sequence, but any such remains will be below the proposed level of construction impact arising from the development and would be preserved *in situ* beneath a protective layer of made ground.

Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited with Thurrock Museum in due course.

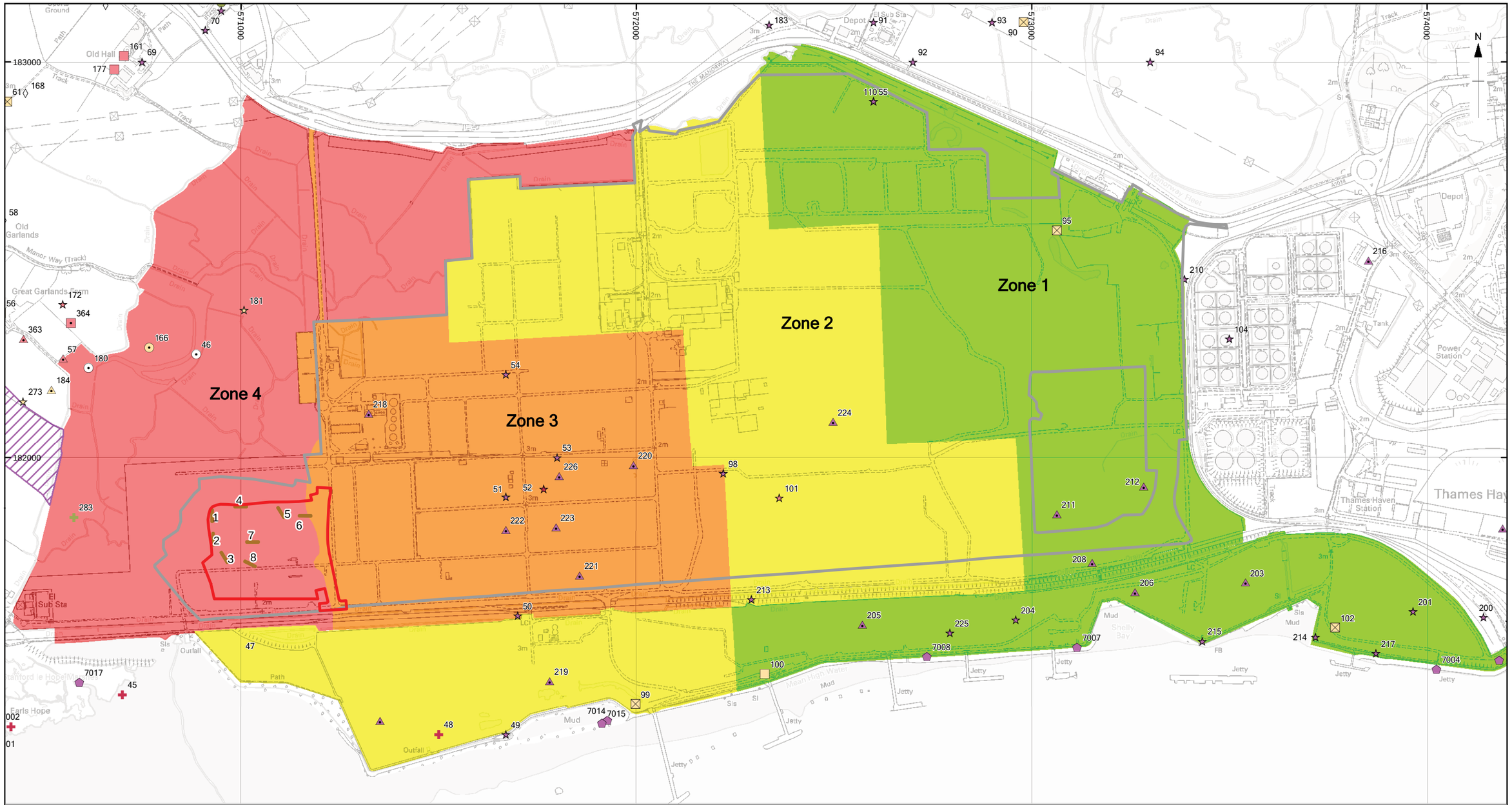

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Figure 1: Zones of archaeological potential within the London Gateway development area, in relation to the Lorry Park development area

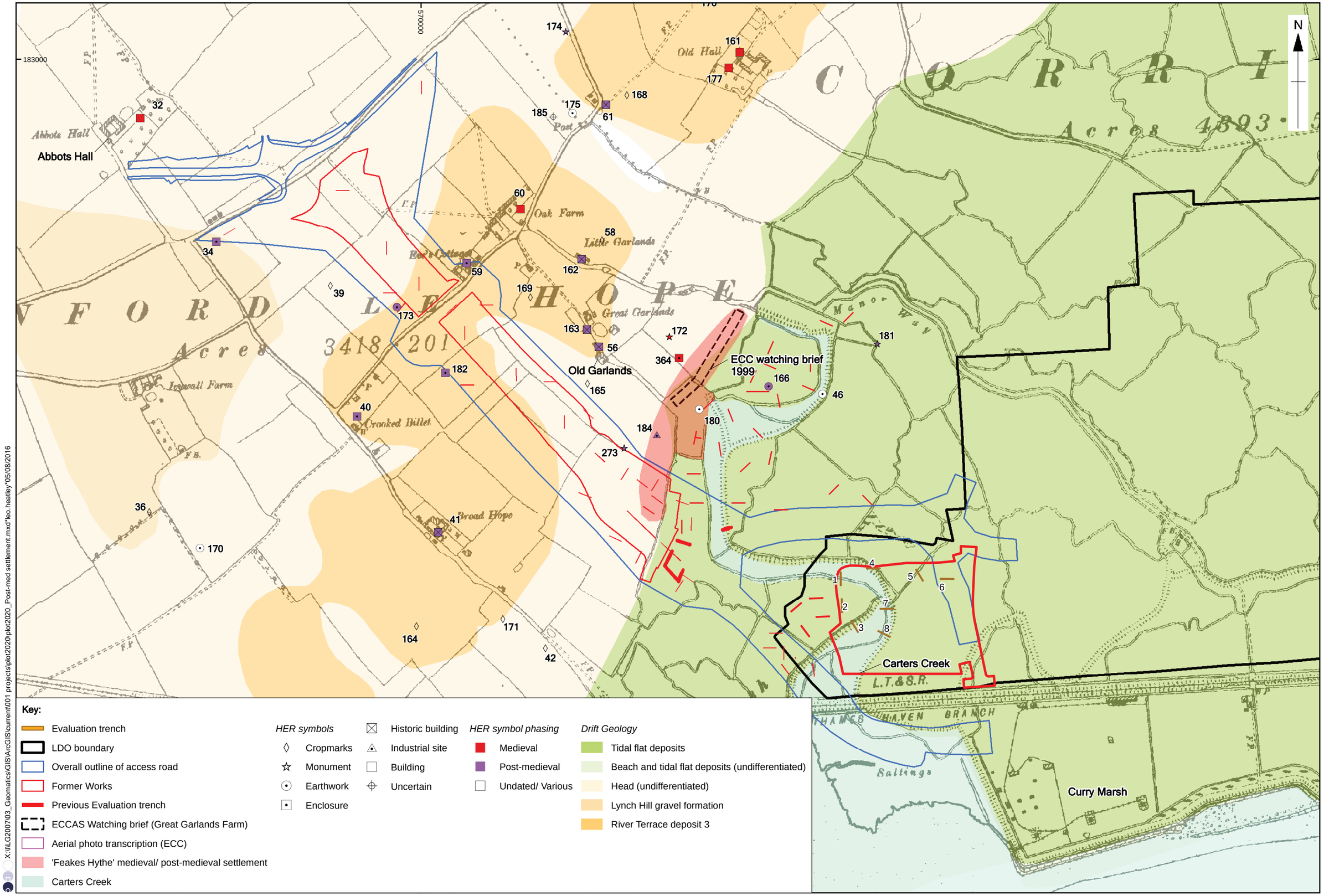

Figure 2 Projected extent of medieval/ post-medieval settlement 'Feakes Hythe'. The extent of associated marine finds near the head of Carter's Creek are uncertain

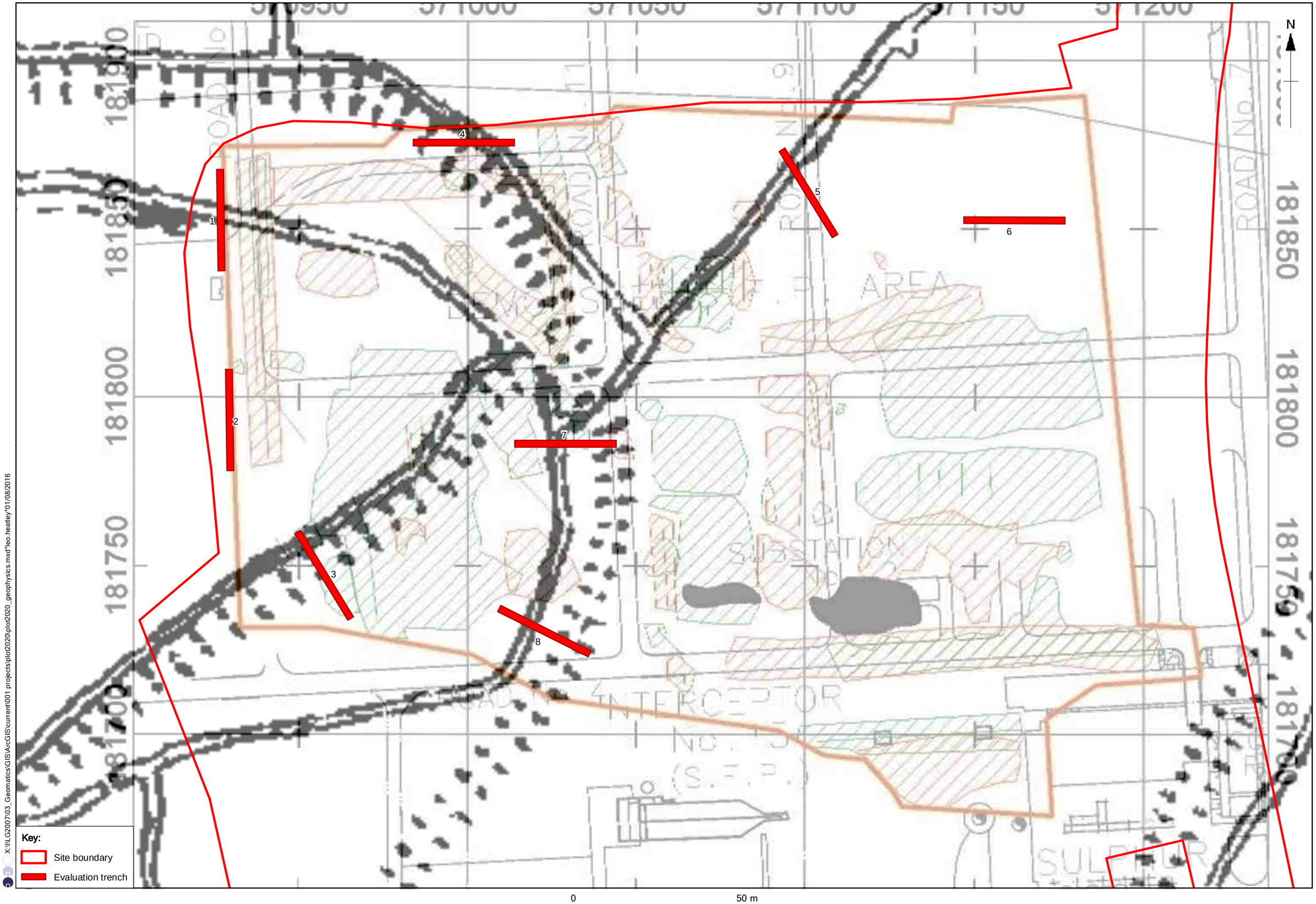

Figure 3 Evaluation trenches over interpreted geophysical survey results

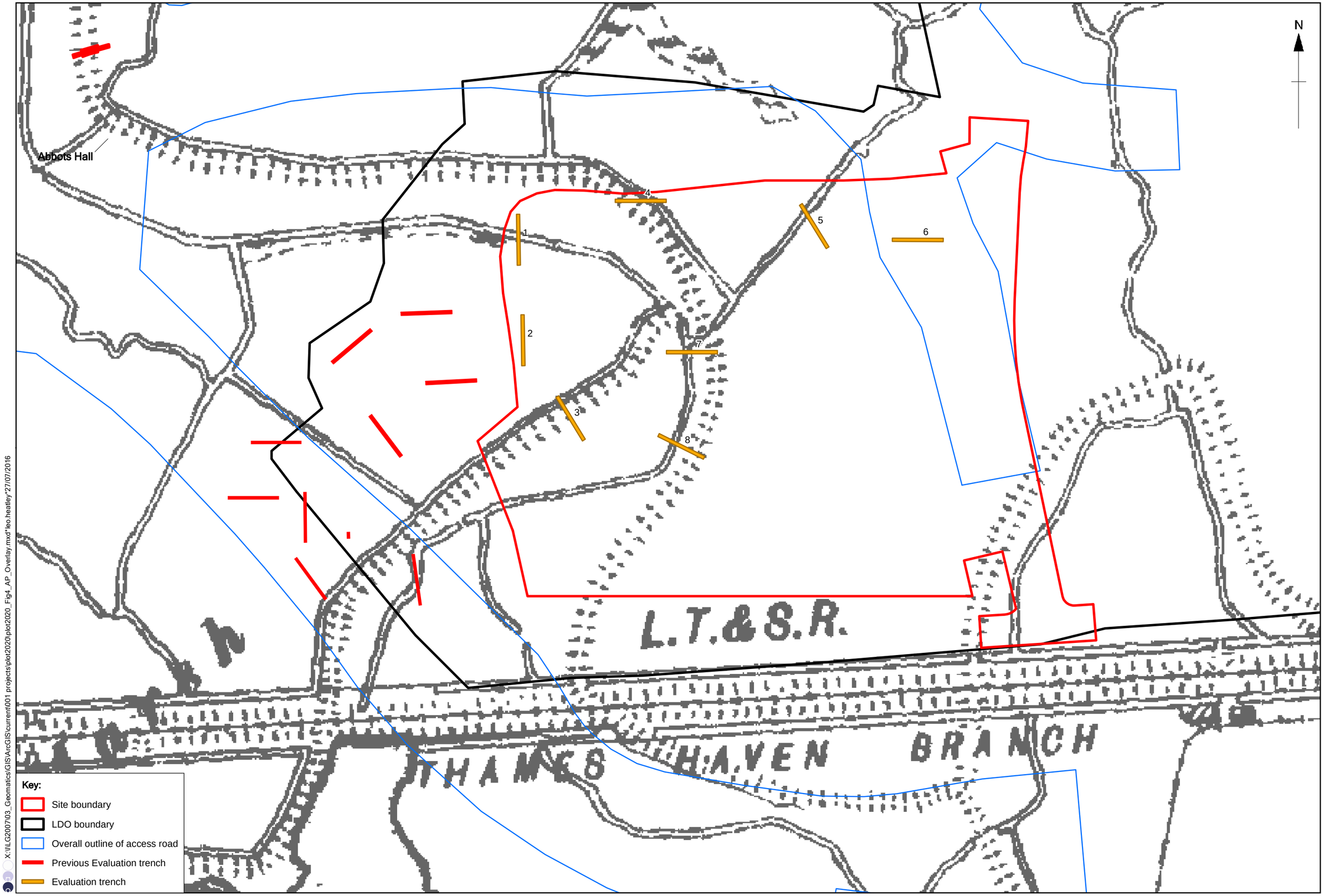

Figure 4 Trenches overlaid on historic aerial photograph showing former oil refinery during demolition

Plate 1: Trench 1 general view

Plate 2: Trench 1 section

Plate 3: Trench 2 general view

Plate 4: Trench 3 general view

Plate 5: Trench 4 general view

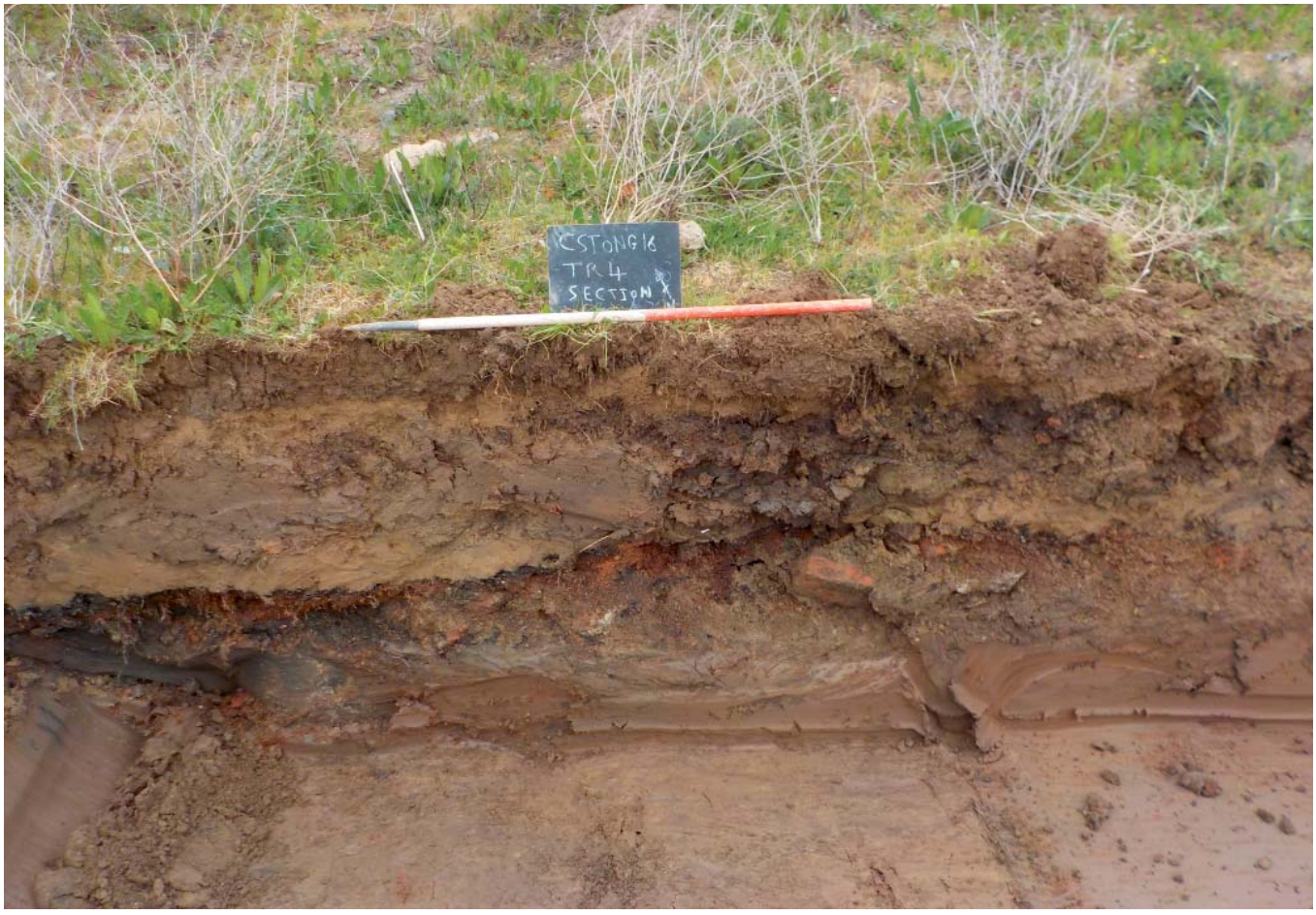

Plate 6: Trench 4 section

Plate 7: Trench 5 general view

Plate 8: Trench 5 section

Plate 9: Trench 6 general view

Plate 10: Trench 7 general view

Plate 11: Trench 7 section

Plate 12: Trench 8 general view

Plate 13: Trench 8 section

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