Archaeological Trench Investigation

# London Gateway, CECL Pipeline Diversion

## Archaeological Trench Investigation Report

oxfordarchaeology
southsouthsouth

September 2016

**Client: DP World London Gateway**

Issue No: 1
OA Job No: 6192
NGR: 570200, 182200

| | |
|---|---|
| Client Name: | DP World |
| Client Ref No: | |
| Document Title: | London Gateway CECL Pipeline Diversion |
| Document Type: | Trench Investigation Report |
| Issue/Version Number: | 2.0 |
| Grid Reference: | NGR 570200, 182100 |
| Planning Reference: | |
| Site Code: | COLP15 |
| Invoice Code: | COLPEV |
| Receiving Museum: | Thurrock Museum |
| Museum Accession No: | |

| Issue | Prepared by | Checked by | Edited by | Approved for Issue by | Signature |
|---|---|---|---|---|---|
| 1 | Vix Hughes | Stuart Foreman | Edward Biddulph<br><br>Senior Project Manager (PX) | Ken Welsh<br><br>Regional Manager Oxford Archaeology South |  |

| | |
|---|---|
| Document File Location | X:\I\LG2007\01a_APDs_REPORTS\CECL_Pipeline_Diversion |
| Graphics File Location | \\10.0.10.86\invoice codes a thru h\C_invoice codes\COLPEV |
| Illustrated by | Markus Dylewski and Gary Jones |



Janus House
Osney Mead
Oxford OX2 0ES
t: +44 (0) 1865 263800 e: info@oxfordarch.co.uk
f: +44 (0) 1865 793496 w: oxfordarchaeology.com
Oxford Archaeology Limited is a Registered Charity No: 285627

# London Gateway CECL Pipeline Diversion

*Archaeological Trench Investigation Report*

*Written by Stuart Foreman and Vix Hughes*

*Illustrated by Markus Dylewski and Gary Jones*

## Table of Contents

## List of Figures

## List of Plates

## *Summary*

*Oxford Archaeology South was commissioned by London Gateway Port Ltd to undertake an archaeological evaluation of the site of a proposed gas pipeline diversion crossing the main Port and Park Access Road leading to the London Gateway Port, alongside the River Thames near Stanford-le-Hope, Essex, centred on NGR 570200, 182100. The gas pipeline is owned by the Coryton Energy Company Ltd (CECL).The pipeline diversion works and associated working areas ('the application site') lie in an area of farmland at Great Garlands Farm, located outside the London Gateway Port to the west.*

*Eleven trenches were excavated and two significant concentrations of archaeology were identified. The relevant trenches were expanded to form small excavation areas, in order to clarify the extent of the remains. The excavation areas were designated Sites A and B:*

*Site A is located on the north-east side of the LG Port and Park Access Road, 100m south-east from High Road. The earliest features in this area comprise a series of probable later prehistoric field boundary ditches, which appear to form a junction. While no artefactual dating evidence was recovered from these, one of the ditches (2613) clearly pre-dated the Romano-British features in Site A. Previous excavations along the Access Road encountered occasional field boundary ditches (on various alignments) that produced small quantities of Iron Age pottery, indicating that the surrounding area was an enclosed agricultural landscape during the Iron Age.*

*Site A also contained a dense concentration of other features. Most of these are likely to be of early Romano-British date, although a later prehistoric date cannot be ruled out. Site A produced more Late Bronze Age/Early Iron Age pottery (16 sherds) than Romano-British pottery (1 sherd), but most of it was redeposited in a late Romano-British or later context. Securely dated Romano-British features include a large pit, interpreted as a well and associated with a probable access path/ramp built from re-used Roman tile. This feature is of considerable interest as it appears to have become the focus of a small cremation burial ground, and may have been a significant local landscape feature. Four cremations were identified and others may be present beyond the limits of excavation. The extreme scarcity of Romano-British pottery from Site A, even though there were plentiful Roman finds of other types (eg. Roman roof tile, iron-smithing waste), suggests that this was not a focus of domestic settlement. Being in a coastal location the site could have have been connected with salt production.*

*Site B is located on the south-west side of the LG Port and Park Access Road, 100m north-east from Rainbow Lane. This area contained later prehistoric and Roman enclosure ditches and a pond. The trenches in this area were placed to investigate a large rectilinear cropmark enclosure, which is at the south-eastern edge of a dense and extensive cropmark complex which extends on either side of Rainbow Lane. Most of the features appear to be of Late Bronze Age/Early Iron Age date but a single Roman boundary ditch was also identified.*

*The archaeological remains lie just below the ploughsoil and are thus vulnerable to earthworks and plant movement arising from the development. Based on the results of the evaluation, a number of potential archaeological impacts are anticipated if the*

*pipeline diversion proceeds as proposed. The report considers the likely impact of two pipeline route options and various construction methods currently under consideration. Disturbance to the two identified sites is likely to occur during the diversion works but can be mitigated by sensitive design, controls during the groundworks and, where necessary, archaeological monitoring and recording. Detailed design information is not available at this stage and will need to be reviewed to ensure that the assumptions used in this archaeological evaluation remain valid.*

# 1 INTRODUCTION

## 1.1 Project background

1.1.1 This report describes the results of an archaeological trench investigation, designed to inform proposals for the construction of a permanent pipeline diversion. This will upgrade an existing gas main owned by the Coryton Energy Company Ltd (CECL) that passes underneath the London Gateway (LG) Port and Park Access Road in Stanford-le-Hope, Essex (Fig. 1). The upgrade is required to increase the pipeline wall thickness at the road crossing to provide an improved design safety factor and comply with the requirements of IGE/TD/1 Edition 5, which is the design code for high pressure gas pipelines utilised in the UK.

1.1.2 The diversion will require the construction of a temporary compound and access routes from High Road. Two potential diversion routes were considered in scoping the investigation, and the tender stage design drawings. Further description of the pipeline diversion works is provided in Section 5.4 below (Figs 15 and 16). These earthworks have the potential to affect significant archaeological deposits.

1.1.3 The aim of the trench investigation was to understand the likely impact of the diversion on any significant archaeology that may be present. This report also makes recommendations regarding mitigation and protection measures to be adopted with regard to two significant archaeological sites discovered during the trench investigation (Section 5.5, Sites A and B).

## 1.2 Planning context

1.2.1 The London Gateway Port and Park developments are the subjects of a Harbour Empowerment Order (HEO) and Local Development Order (LDO) respectively. With respect to archaeological impact, the HEO requires works to be carried out in accordance with an Archaeological Mitigation Framework (AMF), whilst works pursuant to the LDO are to be in accordance with an Archaeological Project Design which was submitted for approval prior to commencement.

1.2.2 The LG Port and Park Access Road was permitted under a separate consent. For consistency that consent was also made subject to the provisions of the HEO AMF. Such an approach is again proposed with respect to the planning application which is soon to be submitted for the pipeline diversion. Accordingly, it is proposed that a planning condition be attached to, and consent given, in respect of the pipeline diversion works, requiring compliance with the AMF and the submission of an APD.

1.2.3 As required by the AMF the scope of the archaeological investigation reported herein has been agreed at each stage by Richard Havis, Senior Historic Environment Advisor, Essex County Council (ECC) who monitors compliance with the AMF on behalf of Thurrock Council, and Gill Andrews (LG Archaeological Liaison Officer).

## 1.3 Site location, geology and topography

1.3.1 The area of the project (i.e. the “application site”) is in arable fields on either side of the LG Port and Park Access Road, in the south-eastern part of the parish of Stanford-le-Hope, Essex (NGR 570200, 182100; Fig. 1). The drift geology is mapped by British Geological Survey as Pleistocene Undifferentiated Head and River Terrace 3 deposits.

1.3.2 The trenches are located between Rainbow Lane to the south-west, Great Garlands Farm to the north-east, High Road to the north-west and the London Gateway Port Admin Building plot to the south-east. The River Thames is visible *c* 500m south of the

site. The nearest settlement is Great Garlands Farm, to the east of the site. The site lies on predominantly arable land, with field margins consisting of hedgerows and drainage ditches.

1.3.3 The fields are crossed by several overhead electricity cables. Buried services include the existing CECL Gas Main, as well as drainage, water and electrical utilities along the line of High Road.

# 2 Baseline Data

## 2.1 Previous archaeological surveys

2.1.1 Extensive cultural heritage studies have been undertaken in relation to the LG development. This section summarises the baseline information in the vicinity of the proposed pipeline diversion, with particular reference to the LG Port and Park Access Road, which the pipeline diversion route crosses, and which was subject to extensive archaeological mitigation prior to construction of the new road.

2.1.2 The LG Access Road route and adjacent fields have been the subject of an Environmental Impact Assessment (DPW 2009) and three APDs covering the following elements:

- *Route-wide Evaluation Surveys* (OA 2010a) - The scope of work included earth resistance and electrical resistivity surveys, analysis of Lidar data and a series of evaluation trenches. A separate report has been prepared detailing the results (OA 2010b). The results are summarised where relevant below.
- *Access Road Phase 1 Mitigation* (OA 2012b) - The archaeological scope comprised trenches to investigate the archaeological potential of deep alluvial deposits at the south-eastern end of the route, and the recording of historic earthwork features.
- *Access Road Phase 3 Mitigation* (OA 2012c) - The archaeological scope comprised extensive shallow 'strip, map and sample' (SMS) excavations in the north-western route section. An interim report on mitigation for the Access Road Phases 1 and 3 has been completed (OA 2014).

## 2.2 Geoarchaeological context

2.2.1 The general distribution of known archaeological sites in the vicinity of the proposed CECL Pipeline Diversion is shown on Figure 2, overlaid on British Geological Survey mapping. The area is mapped by the BGS as Lynch Hill Gravels/London Clay, overlain by Head Brickearth deposits. The CECL pipeline diversion crosses two geological zones with differing archaeological potential: Areas of River Terrace 3 gravel deposits near High Road and Undifferentiated Head deposit further to the south-east. The pipeline diversion works also lie close to the interface between the Thames floodplain (Tidal Flats) and river terrace edge.

2.2.2 The 'Undifferentiated Head' and 'River Terrace 3 deposits, together referred to as the 'terrace deposits', are a series of sediment units, formed from c 200,000BC onwards. These deposits have a different formation history to the lower floodplain. They have the potential to contain archaeology from the Late Palaeolithic through to the present day, at relatively shallow depths within the sediment profile. During the Holocene, shallow soils have developed above them. Archaeological features in this zone occur immediately below the ploughsoil, and are unlikely to be particularly well-preserved, as a result of truncation by ploughing and aerobic soil conditions.

2.2.3 Overlaying 19th century historic maps onto modern BGS mapping (Fig. 2) shows that the medieval/ post-medieval settlements in the immediate vicinity of the route, such as

Broadhope Farm (OA41, no longer extant), Old/ Great Garlands Farm (OA56), and Old Hall, Corringham (OA161) are located on slightly higher, drier areas of terrace gravel, whereas areas of Head are occupied by fields and woodland. The lanes linking the settlements also show a marked preference for following the terrace gravels. The interface zone between the Thames floodplain and river terrace has also acted as a focus for settlement. A wharf was located at the head of Carter's Creek in the medieval and post-medieval periods.

## 2.3 Archaeological and historical background

2.3.1 The terraces of the River Thames are extremely rich in archaeological remains, and the general vicinity of the LG Access Road and CECL Pipeline Diversion is no exception. Most notably, the Mucking excavations (1965-78), 3km to the west of the route, revealed a complex series of superimposed landscapes, dating from the Neolithic to the medieval period, with substantial settlements and cemeteries of Bronze Age through to Anglo-Saxon date, extending over 18 hectares (Clark 1993).

2.3.2 On the gravel terrace, extensive areas of historic settlement can clearly be recognised on either side of the LG Access Road, in particular in the cropmark data. A wide band of soilmarks and cropmarks crosses the upper part of the terrace, predominantly in areas mapped as River Terrace Deposits (gravel) describing a network of ditches, probably settlement and field enclosures, with trackways between them. The CECL Pipeline Diversion works lie close to one of these complexes near Rainbow Lane (Fig. 2). The latter cropmarks were undated prior to the present evaluation, although they appeared typical of later prehistoric and Romano-British rural settlement features (particularly when taken together with cropmarks to the west and east).

2.3.3 However, all the surveys and subsequent excavations revealed a very low density of archaeological features within the road corridor itself. The results were consistent with a largely agricultural landscape of trackways and field boundaries, of various periods, falling between more intensively settled areas.

2.3.4 The excavation areas stripped during the LG Access Road Phase 3 mitigation were very substantial and permit a reliable characterisation of landscape evolution within the limits of the road corridor. The features encountered were truncated by plough action, and any occupation horizons had been removed, as is typically the case in arable landscapes with shallow soil sequences. However, the survival of ephemeral later prehistoric features in most areas indicated that erosion had not been excessive. The absence of early prehistoric, Roman and Anglo-Saxon remains within the stripped area is therefore likely to reflect a genuine absence of significant domestic occupation of those periods. However, this is clearly not the full picture given the extensive cropmark complexes on either side of the road corridor, some of which extend into areas affected by the CECL Pipeline Diversion. The following sections discuss the currently available archaeological and historical evidence by period.

### The prehistoric period

2.3.5 Evidence for early prehistoric activity was limited to struck flints from a wide range of dates from the Mesolithic to the Bronze Age, most of which were residual in later contexts.

2.3.6 The earliest *in situ* archaeology encountered in the Access Road strip comprised an apparently isolated middle Bronze Age pit to the north-east of High Road, which contained 90 pottery sherds from a single Deverel-Rimbury style cordoned urn (*c* 1600 - 1000BC) and a group of middle Bronze Age fired clay cylindrical objects identified as oven furniture (pedestals). Similiar cylindrical objects from Bronze Age sites in southern

England have been found in largest quantity on pottery production sites, but they seem to have been used as generic hearth or oven furniture and can occur in a variety of contexts. Given the coastal location this particular site might perhaps have been connected with salt production. The pit also produced a small assemblage of burnt bone (not identifiable to species).

2.3.7 Iron Age features were slightly more widespread, but consisted mostly of ditches, possibly forming an extensive rectilinear field system, rather than domestic features. A tight cluster of small pits or postholes near the north-east of High Road appeared to be of Iron Age date. The features may have been postholes forming a small structure, but they formed no clear pattern. Excluding the Deverel-Rimbury vessel described above, 74 sherds of later prehistoric pottery, mainly of Iron Age date, were recovered in total, from 18 widely distributed contexts, predominantly from pit and ditch fills.

**The Roman and Anglo-Saxon periods**

2.3.8 No substantive evidence for Romano-British or Anglo-Saxon settlement was found within the Access Road excavation areas. A substantial cropmark complex located near Rainbow Lane suggests that a significant settlement, probably of Bronze Age, Iron Age and perhaps Roman date, lay *c* 300m to the south-west of the Access Road, but the road alignment was designed to avoid it. The CECL pipeline works will extend closer to the cropmark complex than the Access Road excavations and are thus more likely to encounter features associated with it. One of the trenches in the present investigation (Trench 32) was designed to investigate a rectilinear enclosure at the south-eastern edge of the cropmark complex.

2.3.9 Within the Access Road corridor, a single undated deposit of unidentifiable burnt bone was recovered from an isolated small pit. If it is a part of a human cremation burial or pyre deposit, a later prehistoric or Roman date would be most likely.

**The medieval and post-medieval periods**

2.3.10 The application site historically fell within the lands of ‘Old Garlands’, a small historic freehold estate in the south-east of Stanford-le-Hope Parish. Before the early 20th century Old Garlands was one of a group of small marshland estates in this area with medieval origins (Broadhope Farm and Old Garlands in Stanford-le-Hope, and Old Hall in Corringham), each of which comprised a farm complex located among its ‘upland’ fields. In addition, each estate included large areas of marshland pasture extending into the Thames floodplain comprising ‘fresh marsh’ (enclosed by a sea wall) and unenclosed 'greenmarsh', ‘saltings’ or ‘waste’. The proposed pipeline diversion works lie entirely within the upland fields of Old Garlands, 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. The works could also affect outlying features associated with a medieval/post-medieval wharf, known in the 16th-17th century as *'Feake's Hithe'* (Fig. 2).

2.3.11 The Old Garlands estate is well documented from the late medieval period. In the late 14th and early 15th century it comprised '*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*' (Court of Common Pleas, CP 40/659, rot. 530). It was held as a freehold estate, at times divided into two tenements, by successive members of the Garland family, the earliest certain being *‘Richard Garland, painter, of London’*, active in the late 14th century.

2.3.12 In 1591 the Old Garlands estate 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 estate was acquired by Hawkins

from local landowner Eugeny Gatton of Mucking Hall in a form of mortgage foreclosure. 'The Hospital of Sir John Hawkins, Knight', still exists today, although it sold the Old Garlands estate in 1920. The hospital was in possession of the estate continuously from 1592-1920 and extensive records survive from that period, held in the Rochester-upon-Medway City Archives (Medway CityArk CH108).

2.3.13 The Access Road excavations (Area A) uncovered significant evidence for medieval and early post-medieval settlement activity, concentrated in two separate areas. A series of small enclosures was found lined along the north-west side of High Road. These contained several pits which produced pottery dating predominantly from the late 13th-early 14th century, although a few contexts in this area contained pottery of late 16th-17th century date. The ceramic building material recovered also suggests some post-medieval activity at this location. The pottery assemblage from this site was very small and contained a limited range of material. The enclosures lay adjacent to a former settlement named '*Eve's Cottage*', as shown on the 1898 Ordnance Survey map (Fig. 2). The evidence suggests that this house plot on the north side of High Road in the 19th century may have originated in the late 13$^{th}$/early 14th century as a more extensive row of cottages, or similar low status rural dwellings. A targeted watching brief during the removal of the existing High Road recorded the continuation of these enclosures, but did not identify any evidence for features pre-dating the road. This site should not be affected by the Pipeline Diversion works as it is confined to the north side of High Road.

2.3.14 A second group of medieval and early post-medieval features in Access Road Area H appears to be the southern periphery of the deserted medieval/post-medieval wharf, known in the 16th century as *'Feake's Hithe'*, which is centred *c* 200m north of the Access Road (Fig. 2). The pottery from this area fell into two period groups: A medieval phase dating from the late 13th - early 14th century and an early post-medieval phase dating from the late 15th - 16th century. The latest artefacts date from *c* 1600AD. Four ditches were recorded in this area, all aligned parallel to the terrace edge, of which three contained medieval pottery and one produced no datable artefacts. A medieval pit was found to contain a complete articulated calf skeleton. Two large post-medieval pits or ponds were also identified in this area. The pottery assemblage from this site is larger than the assemblage from High Road, and appears more diverse, with some unusual vessels, including possible continental imports.

2.3.15 The absence of 14th and early 15th century artefacts from any of the above excavations may reflect a reduction in economic activity in the period following the Black Death in 1348. The peasant's revolt of 1381 is also likely to have had a particularly damaging effect on the villages surrounding Fobbing, where the rebellion started. Out of just over 100 rebels indicted at Chelmsford in July 1381 for the initial attack on poll tax collectors in Brentwood that triggered the revolt, about half were from Fobbing and at least 20 more from Stanford-le-Hope, Corringham, Mucking and Horndon (Barker 2014).

2.3.16 There is archaeological evidence from a watching brief by ECC on the Coryton Gas Pipeline, and from the London Gateway Access Road excavations, that during the 16th century *'Feake's Hithe'* was a busy wharf with at least one substantial building and a variety of craft and agricultural activities clustered in a band around the head of Carter's Creek. One of the fields on the 1848 Tithe Map at this location is called 'Saw Pit Field', supporting archaeological evidence that ship or boat building activity took place here. Documentary evidence suggests that the wharf was inhabited in that period. William Roger and John Rattell of *'Fakesheve'* are listed among representatives from the Parish

of Stanford-le-Hope in the Inquisitions of Barstable Hundred Court in 1577 and 1579 (ERO Ref: Q/SR 70/51).

2.3.17 A complex of extant earthworks, forming sea walls and platforms, clustered around the head of Carter's Creek, are likely to date from the 15th - 17th century, being shown on two 17th century maps of the marshlands of Old Garlands (one dated 1617, the other undated but probably drawn up in relation to a legal dispute in 1636-40). Recent trench investigations on this site, in relation to a proposed Lorry Park development within Great Garlands Farm, uncovered timber structures identified as part of a collapsed wharf, probably dating from the 16th century, and three loose timbers thought to be discarded roughed-out ships timbers (OA 2016).

2.3.18 The end date for *Feake's Hithe*, as indicated by archaeological evidence (*c* 1600) seems broadly coincident with the acquisition of the Old Garlands estate by the Hawkins Hospital in 1591, and/or with extensive systematic reclamation of the marshlands in the Fobbing/ Stanford-le-Hope area by Dutch engineers in *c* 1623. The latter could have been responsible for the abandonment of the wharf as the creek silted up. The manner in which the wharf collapsed suggests that it may have been destroyed by a high energy flood, such as a tidal storm surge, and not rebuilt on the same site, which increases the likelihood that sunken boats or other contemporary wreckage are preserved in silted channels along the river terrace edge (OA 2016). However, the CECL pipeline diversion works do not extend into the Thames floodplain, so there is no risk of waterlogged marine finds of this type.

2.3.19 The pipeline diversion works could encounter terrestrial features along the terrace edge, similar to those found in the LG Access Road and Coryton Gas Pipeline excavations. The map of Old Garlands Marshlands dated 1617 is very indistinct and it is not possible to tell whether buildings were present at the wharf by that date. A later map dating from *c* 1640 map is very clearly drawn and certainly does not show any buildings at the wharf site, even though it does depict an individual shepherd's hut in Old Garlands Marsh. It thus seems likely that the wharf site was no longer inhabited by this time, although the place name lived on until the 18th or 19th century and it may have continued in use as a landing place as late as the late 18th century. The settlement is named *'Fox Hive'* on the 1777 Map of Essex by Chapman and Andre.

2.3.20 The 18th century estate records include a draft 'to be let' notice for Old Garlands Farm, dated *c* 1750, which by this date is described as 'messuage, barn, stable, 30 acres upland, 87 acres fresh marsh land and 15 acres salt/waste land'. This appears very similar in terms of area to the 1599 and 1614/15 descriptions, but the bulk of the marshland is described as 'fresh marsh' in the *c* 1750 document, whereas it was described as 'greenmarsh' in 1599, presumably reflecting the reclamation of the area in *c* 1623. Flooding was clearly a perennial risk. The tenants of Old Garlands Farm in 1735 complained of the disastrous effect on their livestock and corn of severe Thames floods (Medway CityArk CH108).

2.3.21 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 application site. These were mostly infilled in the immediate post-war period and little or no trace remains on the ground.

**Landscape continuity**

2.3.22 The landscape of the south Essex claylands and gravel terraces is characterised by extensive co-axial, rectilinear field systems. The date at which this landscape was first enclosed has been the subject of debate, but there is evidence that the general pattern of local trackways and boundaries originates in the late Iron Age or Roman period.

2.3.23 Evidence for field boundaries and trackways within the Access Road excavations fell into two main phases: tenuously dated but convincing Iron Age field boundaries, and the medieval/ post-medieval field system which has survived in use to the present. The evidence for continuity in land-use between these periods is equivocal. The Iron Age boundaries at the north-west end of the Access Road were on a north-south alignment, markedly different from the surrounding post-medieval boundaries and the line of High Road. Investigation of the relationships between the Iron Age and post-medieval phases, particularly in the High Road section, failed to establish conclusively whether the prehistoric ditches respect the line of the road or underlie it. The differing alignments suggest that there is no continuity between the prehistoric and post-medieval field systems in this area. In contrast, at the south-east end of the Access Road excavations (Areas C-H) the Iron Age and post-medieval boundaries follow parallel alignments, but this may be coincidence, as the boundaries of both periods appear to derive their orientation from the adjacent river terrace edge.

# 3 Evaluation Aims and Methodology

## 3.1 Aims

3.1.1 Construction of the diversion will inevitably have an adverse impact on known buried archaeological features, identified either as cropmarks and/or during excavations along the LG Access Road. Prior to the evaluation archaeological features appeared to be generally sparsely distributed, but included significant later prehistoric features and field systems, as well as more extensive evidence for medieval and post-medieval rural settlement activity.

3.1.2 The investigation aimed to determine the presence/absence, extent, date range, condition and complexity of any 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.

3.1.3 In addition the investigation aimed to understand the likely impact of the pipeline diversion on any significant archaeology that may be present in the areas affected, and make recommendations regarding appropriate mitigation measures.

## 3.2 Methodology

3.2.1 A series of 11 trenches, each 2m wide, up to *c* 0.5m deep and of variable length, were excavated in accordance with the method detailed in the APD (OA 2015), to characterise deposits of all dates within the main groundworks for the proposed

pipeline diversion and associated temporary access routes. As shown on Figure 3, the trenches were numbered 23-33 inclusive, in sequence from concurrent trenching of the proposed Great Garlands Lorry Park site (OA 2016).

3.2.2 Following the discovery of significant archaeological sites in Trenches 26 and 32, by agreement with Richard Havis and Gill Andrews extension areas were excavated around each of these two locations to clarify the extent and nature of the discovered archaeological features, labelled Site A (Trench 26 extension, Figs 3 and 6, Plates 1-6) and Site B (Trench 32 extension, Figs 3 and 11, Plates 7-8).

# 4 Results

## 4.1 Introduction and presentation of results

4.1.1 The location of the CECL Pipeline trenches and trench extension areas is shown on Figure 3, which includes a summary plan of all archaeological features, including those not illustrated in detail. Detailed trench plans and feature sections are illustrated for those trenches that contained significant archaeology (Trenches 25, 26, 27, 32 and 33, Figures 4-14). Plates 1-10 show selected significant features discovered during the trenching.

4.1.2 Figures 15 and 16 include plans of previous excavation results along the Port and Park Access Road route, which are directly relevant to the trenching results. These drawings show various constraints on the investigation work, which included live overhead cables and buried services, land drains and protected badger setts. Figures 15 and 16 also show the proposed extents of (respectively) the northern and southern route options for the CECL Pipeline Diversion.

4.1.3 Trenches 1-22 (not illustrated) relate to the adjacent trench investigation for the proposed Great Garlands Lorry Park, which was undertaken concurrently with the CECL Pipeline Diversion trenches, but is reported separately as it relates to a separate planning application (OA 2016).

## 4.2 General soils and ground conditions

4.2.1 As expected on the basis of the British Geological Survey map, the north-western trenches encountered Pleistocene River Terrace Gravels underneath the ploughsoil, which was typically *c* 0.38-0.45m thick. The south-eastern trenches encountered Head deposits beneath a similar thickness of ploughsoil. The archaeological features were found cut into the surface of the natural geology and truncated by plough erosion. All of the trenches were excavated on the river terrace edge, away from the Thames floodplain. Thus no Holocene alluvium was encountered.

## 4.3 General distribution of archaeological deposits

4.3.1 A series of 11 trenches, each 2m wide, up to *c* 0.5m deep and of variable length, were excavated at the locations shown on Figure 3, in bands on either side of the LG Port and Park Access Road. Most of the trenches contained occasional boundary ditches or no archaeology at all. However, two of the trenches (25 and 32) encountered significant concentrations of archaeology. The densest of these was in Trench 25, which was initially excavated as a 2m x 30m trench, but was expanded to a 35m x 14m excavation area to clarify the extents of a concentration of later prehistoric and Roman archaeological features. The original trench and the extension were designated Site A. Trench 32 was initially excavated as a 50m x 2m trench. The north-west end was expanded to form a 24 x 23m open area, to clarify the extent of a cluster of predominantly prehistoric features encountered in Trench 32. The extension and original trench together were designated Site B.

## 4.4 Trench 23 (Fig. 3)

4.4.1 No archaeology was present in this trench.

## 4.5 Trench 24 (Fig. 3)

4.5.1 This trench contained two small features, neither of which produced artefacts, comprising a small NE-SW ditch of uncertain date and function (2406), and a possible pit (2403).

## 4.6 Trench 25 (Figs 4-5)

4.6.1 Trench 25 contained several ditches, pits and postholes:

- A deep V-shaped north-south ditch (2516) which corresponds to a crop mark feature. It contained tile fragments and a sherd of Roman samian ware pottery.
- A small north-south ditch (2504) which produced no finds but was parallel and adjacent to the Roman ditch (2516) and may have formed part of the same boundary.
- A small NW-SE aligned ditch terminal (2510) contained worked and burnt flint, and may be of later prehistoric date.
- A small NW-SE aligned linear gully (2514) which had a modern ceramic field drain at the base.
- Two small pits (2506, 2508) are also undated as no finds were recovered.

## 4.7 Trench 26 (Site A, Figs 6-8, Plates 1-6)

4.7.1 Trench 6 contained a concentration of significant archaeology and was expanded to clarify the extent and character of the remains. The expanded area is designated 'Site A'.

4.7.2 The most prominent feature in this area is a large, elongated pit (2640), associated with a linear structure constructed from re-used Roman roof tiles (2630), which may have been built as a path to provide access to the pit. In plan the large pit had an hourglass shape (4.4m wide x at least 8m long), which suggests that it may have been formed from two or more overlapping pits originally, although there was no clear indication of a relationship or recut in section and they seem to have been infilled as one feature. The sides as recorded were moderately shallow, the base was irregular, and the total surviving depth (excluding ploughsoil) was 1.20m. The excavators noted that water welled up under pressure when a sandy layer under the gravel was reached during the excavation, suggesting the presence of a seep. The pit may therefore have been used as a well or waterhole.

4.7.3 The primary fills of pit/well 2640 largely consisted of sterile gravelly deposits from which no artefacts were recovered. Fill 2637, a middle fill of the feature, produced 15 sherds of Late Bronze Age/ Early Iron Age (LBA/EIA) pottery. However this material must have been redeposited in the late Roman period or later, as the context had been deposited after the structure incorporating Roman tiles, was built.

4.7.4 The middle fills of the pit consisted of layers of dark, organic, charcoal-rich material, suggesting periodic dumps of refuse, although the very small amount of contemporary Roman pottery present suggests that this material does not derive from a typical domestic site. A single sherd of late Iron Age/ early Roman pottery was recovered from context 2639. More commonly, finds comprise fragments of fired clay/and or briquetage, although these were mostly worn, small pieces with few identifiable structural elements. As with the pottery, much of the identifiable briquetage appeared to be of Bronze Age type, redeposited in a Roman or later context. Burnt human and animal bone fragments were present in the soil sample flot from context 2639, which is likely to be redeposited from a cluster of cremation burials identified *c* 0.6m north of pit 2640. Iron slag was also present in the later pit fills (contexts 2637, 2639, 2644), including several large fragments from iron smithing hearth bottoms.

4.7.5 The linear tile-built structure appears to have been functionally connected to the pit/well 2640, and is interpreted as a path and platform providing access to the well. The tile structure (2630) was *c* 5m long in total, and aligned NW-SE (on the long access of pit/well 2640). It generally survived as a single layer of re-used Roman roof tiles, all of which were broken/ incomplete and most of which were of mid-late Roman types. In one location a second layer of tiles was placed on top. The tiles seem to have been laid to form a slight downward ramp towards the pit/well when originally built. At their narrowest point at the north-west end the tiles were laid two abreast (0.6m wide). The south-east end was not fully exposed but seems to have widened to four tiles wide at the south-east end, thus forming a double-width platform at the edge of pit/well 2640. This overlapped the pit edge by *c* 0.5m. When the pit/well fell out of use, the overlying tiled platform subsided into it, coming to rest at a *c* 20 degree angle. The subsided tiles were found overlying the lower fills of the pit. This relationship might suggest that the tile path/platform was constructed after the pit had been open for some time and become partially infilled, but perhaps more likely reflects the inward collapse of a vertical–sided pit. As the surrounding gravel is too loose to maintain a vertical face unsupported, the pit/well may have been timber-lined originally (in the absence of waterlogging, any trace of timber lining has long since decayed).

4.7.6 The tile path (2630) at the north-west end of the feature, beyond the extents of pit/ well 2640, was laid on a slight downward slope in a shallow gully c. 4.5m long, which was exposed directly beneath the ploughsoil at the north-west end but covered by a thin clay layer in the south-eastern section. This layer was so compact that it was described as ‘baked’ by the excavator. This could be explained by compression if the tiles were used as a path. Traces of a yellow clay seems to have been used as a bedding layer infilling the gully and gaps in between the tiles.

4.7.7 Other features in Area A include a cluster of at least 4 cremation burials, a junction of boundary ditches, FIVE pits and 32 postholes. As only a sample of the postholes were excavated it is possible that some might turn out to be further cremation burials, which are similar in size and shape in plan.

4.7.8 The four cremation burials (Fig. 6, contexts 26015, 26017, 26019, 26021) were found 0.6m to the north of pit 2640. They were identified on the basis of fragments of charcoal and burnt bone in the exposed tops of the features. They were not excavated and so are not certainly dated. A few fragments of cremated human and animal bone that were found in the adjacent pit/ well (2640, context 2637) were probably redeposited from these or similar cremations in the immediately surrounding area.

4.7.9 A pair of roughly parallel ditches (2613 and 2667) were found *c* 15.5m apart, on a WSW-ENE alignment. One of these (ditch 2667) formed a junction with a third ditch on a NW-SE alignment (2635). While no artefactual dating evidence was recovered from any of these, ditch 2613 was cut by the Romano-British pit/well (2640) and must therefore be late Roman or later in date.

4.7.10 A further five pits and 32 postholes were recorded in Area A. The investigated pits and postholes did not produce any dateable artefacts and for the most part do not form any obvious coherent structures. However, one probable NNW-SSE line of postholes may have formed a fence line (Fig. 6). One of the undated pits (2617) was located at the north-west end of the Roman tile-built feature and could be associated with it.

## 4.8 Trench 27 (Figs 9-10)

4.8.1 Four features were recorded in this trench:

- A small north-south aligned ditch (2701), containing baked sandy clay fragments,

possibly derived from an oven or furnace. The date is uncertain at this stage as no diagnostic artefacts have been recovered.

- An associated east-west aligned gully (2710) contained further fired clay fragments.
- A small oval pit (2703) containing burnt flint is likely to be of prehistoric date.
- A modern NE-SW aligned ditch (2705) was identified but not investigated as it had been investigated previously during the main Access Road excavations.

## 4.9 Trench 28 (Fig. 3)

4.9.1 A single modern NE-SW aligned ditch (2801) was identified but not investigated, as it had been investigated previously during the main Access Road excavations.

## 4.10 Trench 29 (Fig. 3)

4.10.1 Two ditches were recorded in this trench:

4.10.2 The first was a shallow concave NW-SE aligned ditch (2901) which produced no finds. The shallow profile suggests that it could be a plough furrow or similar, rather than a ditch.

4.10.3 The second was a deep, V-shaped, NW-SE aligned ditch (2903), which contained medieval/post medieval tile and iron fragments.

## 4.11 Trench 30 (Fig. 3)

4.11.1 No archaeology was present in this trench.

## 4.12 Trench 31 (Fig. 3)

4.12.1 This trench contained a single shallow, NW-SE aligned ditch terminal (3101). Finds from the fill consisted of burnt flint and undiagnostic ceramic 'crumbs'. The fill is very pale and heavily oxidised. A later prehistoric date seems most likely.

## 4.13 Trench 32/Site B, Figs 11-12)

4.13.1 Trench 32 was extended to investigate Site B. It contained the following features:

4.13.2 The earliest feature was a very large (15m wide) pit (3201), only partially exposed within the excavation area, which is interpreted as a pond/waterhole. The fills were lacking in organic material, with no sign of waterlogging. It contained flint flakes, burnt flint and LBA/EIA pottery sherds. After it was infilled the pond was cut through by a large later prehistoric enclosure boundary (3206 / 3209).

4.13.3 A substantial straight boundary ditch, 3209, was on a NW-SE alignment. A parallel smaller ditch (3206) produced LBA/ EIA pottery sherds. The ditches did not overlap in section and could either have been contemporary cuts in a double-ditched boundary, or successive recuts. The total width of the boundary (the combined width of the two ditches) was substantial (4.2m) and the larger inner ditch 3209 extended to a surviving depth of 1.15m. This substantial prehistoric boundary clearly corresponds with the projected line of a sub-rectangular cropmark enclosure, known from aerial photographs (Fig. 2).

4.13.4 A large irregular pit (3221), located on the west side of ditch 3209, and thus inside the enclosure, produced LBA/EIA pottery sherds.

## 4.14 Trench 33/Site A, Figs 13-14

4.14.1 This 10m long extension of Trench 26/ Area A, to the south-east of a modern field boundary, encountered the edge of a shallow pit (3306), which contained fragments of

fired clay or briquetage. The pit was at the north-western end of the trench, and probably represents a continuation of the Iron Age or early Roman activity in Trench 26/ Area A. The remainder of the trench contained no archaeology, and thus seems to indicate the south-eastern extent of the significant archaeology in Area A.

# 5 Discussion

## 5.1 Reliability of field investigation

5.1.1 The evaluation trenching provides a reliable indication of archaeological impacts within the currently defined limits of the pipeline diversion works. However the extent of the construction impacts cannot be defined precisely at this stage. Any changes to the design will be subject to further assessment if they affect areas not covered by this or previous investigations. The trenching supplements extensive previous surveys and excavations, carried out in connection with the LG Port and Park Access Road.

## 5.2 Significance of the archaeology

5.2.1 Regionally significant archaeology has been identified at two locations within the areas affected by the CECL Pipeline Diversion Works, labelled Sites A and B (Fig. 2).

5.2.2 **Site A** (Fig. 6). The earliest features in this area comprise a series of probable later prehistoric field boundary ditches, which appear to form a junction. While no artefactual dating evidence was recovered from these within Area A, one of the ditches (2613) clearly pre-dated the Romano-British pit/ well (2640). Previous excavations along the Access Road encountered occasional field boundary ditches (on various alignments) that produced small quantities of later prehistoric (LBA/EIA) pottery, indicating that this area was an enclosed agricultural landscape in the early 1st millennium BC.

5.2.3 Site A also contained a fairly dense concentration of other features. Most of these are likely to be of Romano-British date, although a LBA/ EIA date cannot be ruled out. Site A in fact produced more later prehistoric pottery (16 sherds) than Romano-British pottery (1 sherd), but most of it was redeposited in a Romano-British or later context. The extreme scarcity of Romano-British pottery from Site A, even though there are fairly plentiful Roman finds of other types (eg Roman roof tile, iron-smithing waste), suggests that this was not a focus of domestic settlement.

5.2.4 The definite Romano-British features include a large pit (2640), interpreted as a well associated with a probable access path/ramp built from re-used Roman tile of mid-late Roman date. This feature is of considerable interest as it appears to have become the focus of a small cremation burial ground, and may have been a significant local landscape feature. It is suggested that the feature may have started life as a gravel quarry, was subsequently used as a well and ended its life as a rubbish pit. Water sources such as wells and springs often became a focus for ritual and funerary activities in the later prehistoric and Romano-British periods. Most of the Roman tile dates from the mid-late Roman period.

5.2.5 A cluster of at least four cremation burials was identified, and further burials are likely to be present in the immediately surrounding area. The burials are of uncertain date as they were not excavated (they lie outside the extents of the pipeline diversion access route and will be preserved *in situ*). However, a Romano-British date seems most likely. A few fragments of redeposited cremated human and animal bone were found in the deposits infilling pit/well 2640.

5.2.6 Other features comprise five small pits and 32 postholes. The excavated pits and postholes did not produce any dateable artefacts. The postholes include a probable

NNW-SSE fence line, but otherwise do not form obviously recognisable structures (Fig. 6). As only a sample of the postholes was excavated it is possible that some of them might in fact be more cremation burials, which are of similar size and shape in plan.

5.2.7 The density of archaeological features in Site A is in marked contrast to the sparse archaeology found in the neighbouring evaluation trenches and adjacent sections of the Access Road excavations. The nearest substantive evidence for later prehistoric and Roman settlement in the immediately surrounding area is a dense and extensive cropmark complex *c* 500m to the south-west of Site A on either side of Rainbow Lane (Fig. 2). In contrast the extensive Access Road excavations, which lie in between Site A and the cropmark complex, found very little archaeology of later prehistoric or Romano-British date, other than a few widely spaced ditches containing very small quantities of LBA/EIA pottery. This suggests that the Access Road route crossed an area that would have been an enclosed agricultural landscape during those periods.

5.2.8 Site A appears to represent a relatively localised focus of mainly early Romano-British activity, comprising a probable well, a cremation burial ground of uncertain extent, and various posthole structures of uncertain form, all of which developed at a pre-existing later prehistoric field boundary junction. The absence of pottery and presence of briquetage and iron-smithing waste suggests that it was not a domestic site, but it could have been a specialist site, perhaps associated with the salt industry. Iron Age and Roman salterns formed an extensive and distinctive industry in the marshlands of south Essex in the Iron Age and Romano-British periods. Several examples of these “redhills” and associated economic activities were excavated in 2009 during the creation of Stanford Wharf Nature Reserve in Stanford-le-Hope, as part of the London Gateway development (Biddulph et 2012). Briquetage, commonly associated with salt evaporation, was found in the fills of the well but, as with the pottery from Area A, appears mostly to be of later prehistoric type, redeposited in a Roman context. The presence of this material does suggest that later prehistoric salt-making took place in the vicinity.

5.2.9 **Site B** (Fig. 11) This area exposed a concentration of later prehistoric (LBA/EIA) features, including a large probable pond (3201), a pair of parallel boundary ditches forming part of the same large enclosure boundary (3209 / 3206), and a fairly large pit, found on the inside edge of the enclosure ditch (3221). All of these features produced LBA/EIA pottery sherds. These are not closely dateable but probably date broadly from the early 1st Millennium BC.

5.2.10 The large boundary ditch (3209 / 3206) corresponds closely with the projected north-eastern side of a sub-rectangular enclosure, *c* 60m x 60m in extent, which is known as a cropmark on aerial photographs (Fig. 3). It is impossible to determine the function of the sub-rectangular enclosure without more extensive excavation. It contained at least one pit (3221). Fairly sparse artefacts were recovered from the prehistoric features in Site B (32 sherds of LBA/EIA pottery in total). Within the limited excavation area there was no sign of building remains or other diagnostic settlement features. However, the main boundary ditch (3209) is much more substantial than the prehistoric boundary ditches found in the Access Road excavations, and thus is unlikely to be a simple field boundary. It could be either a LBA/EIA settlement enclosure, or a livestock enclosure on the periphery of the major cropmark complex referred to above, which lies just 300m to the south-west of Site B, on either side of Rainbow Lane (Fig. 3).

5.2.11 The south-eastern extension of Site B (Trench 32) also contained a Romano-British boundary ditch (3203) on a different alignment from the prehistoric boundary (SE-NW)

which contained a very charcoal-rich fill and a few sherds of Late Iron Age/ Early Roman pottery.

## 5.3 Projected extents of significant archaeology

5.3.1 Figures 15 and 16 shows projected areas surrounding Sites A and B, that are known or very likely to contain significant archaeology, based on the trench investigation results.

5.3.2 **Site A** has archaeological features throughout, so significant archaeology is likely to extend in all directions. However the nearest evaluation trenches to the north-west, and the Access Road excavations to the south-west, contained very few archaeological features, and features seemed to be thinning out along the south-west and north-west edges within the excavated area. Trench 33, which was placed to establish the south-eastern extent of Site A, seems to have been successful as it contained one feature at the north-western end of the trench, but was otherwise empty. To the north-east, it is clear from the distribution of features that significant features, probably including further human cremation burials, are very likely to extend for an undefined distance beyond the excavation area. Site A was extended slightly beyond the CECL boundary in this direction to investigate the extent of the feature cluster, but did not find the edge.

5.3.3 **Site B** contained later prehistoric and Roman features which have been adequately investigated and characterised within the defined impact area for the pipeline diversion works. However the pond and boundary features certainly extend beyond the site boundaries. In particular the interior of the large LBA/EIA cropmark enclosure (as shaded on Figures 15 and 16) is very likely to contain further significant features and may require protection during the pipeline diversion works. A clear edge to the prehistoric features was identified on the north-east side of Site B (outside the prehistoric enclosure).

5.3.4 Any expansion of the proposed pipeline works in these area would impact adversely upon the prehistoric and Roman features in these areas and should be prevented by clear demarcation of the archaeological areas.

## 5.4 Impact assessment

5.4.1 Figures 15 and 16 (based on design drawing LG-IAC-ROA-PAR-C6514-DRA-CIV-004) show the proposed application site within a red line, and the existing pipeline and proposed diversion routes. The project site area will consist of the actual construction area, site compound, haul roads, pipe lay down areas and access points. Drawing LG-IAC-ROA-PAR-C6514-DRA-CIV-004 presents the worst-case scenario; the actual footprint employed will be significantly smaller. The archaeological impacts will remain uncertain until the design is finalised. Two potential pipeline diversion routes were considered in scoping the trench investigation, as shown on Figures 15-16. For planning purposes, it is assumed that the route may vary within the parameters shown on these drawings during the detailed design process. Different methods of pipeline installation are under consideration, including open cut, horizontal directional drilling (HDD) and auger drilling, which have different land-take requirements. Figures 15 and 16 both show the HDD method, as the most extensive land-take and potentially the worst case scenario in terms of archaeological impact. The archaeological impacts and mitigation outlined below will need to be reviewed in light of the final route, and the final extent of associated groundworks. If the groundworks extend outside areas covered by this and previous trench investigations, it may give rise to a requirement for further archaeological investigations.

5.4.2 **Shallow temporary groundworks** – The largest part of the area is required for temporary shallow groundworks such as the site compound, haul roads, pipe lay down areas and access points.

5.4.3 Options for site access are currently being investigated and will depend on the methodology proposed by the contractor. One of the options being discussed is accessing the application site from the High Road via either the Port and Park Access Road or the Manorway (A1014).

5.4.4 Haul roads will be constructed on either side of the Port and Park Access Road to allow access from the High Road and the construction area. Should it not be viable to construct a separate haul route to the eastern side, a footway/cycleway to the east of the Port and Park Access Road may be used to access the eastern portion of the pipeline diversion. A secure site compound, construction workers' car park and storage areas will also be contained in the application site area. The haul roads will be removed following the completion of the pipeline works.

5.4.5 **Site A**, a concentration of later prehistoric and Romano-British archaeology, lies on the line of the provisionally defined eastern haul road. As the archaeology is buried just beneath ploughsoil at a depth of *c* 0.5m it is clearly at risk of disturbance, even from shallow groundworks. Movement of heavy plant, particularly in wet ground conditions, can be very damaging to near-surface archaeological sites. Re-routing the eastern haul route to avoid the known archaeology would carry the risk of encountering further archaeology. It is therefore recommended that the proposed haul route be retained on its present line. However, protection measures will be needed to minimise disturbance to the site, as detailed in Section 4.4 below.

5.4.6 **Site B**, a concentration of later prehistoric archaeology, lies in an area earmarked provisionally for laying out pipes. The archaeological features in Site B lie at shallow (c.0.5m) depth, just beneath the ploughsoil. In this case it is possible that the area can be avoided entirely during the diversion works.

5.4.7 **The "trenchless" pipeline section** - A trenchless approach is one option for crossing the Port and Park Access Road. This will most likely be made using an auger or microtunnel. However, the contractor may also select the horizontal directional drill (HDD) method. The precise trenchless crossing technique to be employed will be determined by the contractor during the detailed design. The pipeline will be deeply buried under the Port and Park Access Road.

5.4.8 **The "open trench" pipeline section** - An open trench method will be used for the remainder of the pipeline route. In both the trenchless and open trench sections, upon completion of the installation of the pipeline the drill pits, sump pits and ground surface will be fully reinstated.

5.4.9 Archaeological surveys and trenching have not revealed any significant near-surface archaeology within the two pipeline diversion route options examined, in either the trenchless or open trench sections. However, the trenching coverage is not continuous and localised feature groups may be present.

5.4.10 The pipe trench in both sections will penetrate deeply into or through the Quaternary period River Terrace Gravels (where present), and thus have the potential to encounter Pleistocene faunal remains and Palaeolithic artefacts. The thickness of the terrace gravels at this location is uncertain but likely to be variable. Course gravel deposits are generally indicative of high energy fluvial deposition, often associated with cold climate conditions. Such deposits are very unlikely to contain *in situ* Palaeolithic archaeology, although redeposited artefacts may occur. Fine-grained deposits within the terrace

gravels are more likely to have been laid down by fluvial processes in an interglacial environment. The latter would be more likely to contain potentially *in situ* Palaeolithic artefacts and Pleistocene faunal remains. A watching brief would be maintained during excavation of the open trench section, in areas where the trench cuts through River Terrace Gravels, paying particular attention to any fine-grained deposits encountered.

## 5.5 Mitigation and protection requirements

5.5.1 Richard Havis (ECC Senior Historic Environment Advisor) inspected the archaeological trenches on behalf of the local planning authority. Preliminary discussions to define appropriate mitigation measures for the two discovered sites (Sites A and B, Figs 15 and 16), Plates 1-10) were held during a site meeting in September 2015.

5.5.2 **Open pipe trench section** - The drilling locations in the open trench sections will comprise a watching brief. This will investigate and record any significant near-surface archaeology that emerges during the pipe trench excavation, as well as more deeply buried Pleistocene/ Palaeolithic deposits that may be encountered within the River Terrace Gravels.

5.5.3 **Trenchless pipeline section** - As the trenchless method will not result in exposure of archaeological deposits there is no requirement for a watching brief in the trenchless sections. However, the drilling locations at each end of the trenchless section will have similar impacts and mitigation requirements to the open trench sections (see para 5.5.2).

5.5.4 **Shallow temporary groundworks** - The site compound, haul roads, pipe lay down areas and access points all have the potential to disturb near-surface archaeological features. The main aim of the mitigation measures in areas of shallow temporary groundworks is to prevent ground disturbance in areas containing known or suspected significant archaeological features, such that any archaeological features present will be preserved *in situ*. It is proposed that the following measures will be adopted by the appointed contractor to protect known significant archaeology and areas which could potentially contain significant archaeology:

5.5.5 Bog mats will be laid and a ‘no-dig’ method will be adopted where necessary. All efforts will be made to minimise the footprint and depth of the groundworks, especially in the vicinity of known significant archaeological sites (Sites A and B, Figs 3, 15 & 16). Fencing and signage will be installed to protect and demarcate the latter.

5.5.6 The existing pipeline route, and other existing buried services, such as the water mains along the south side of High Road, are disturbed ground, with very limited potential for surviving archaeology, and will therefore be excluded from the archaeological watching brief and protection measures.

5.5.7 In the case of the pipeline diversion **open trench** sections, any archaeology present will be wholly removed by excavation of the pipe trench. An archaeological watching brief will therefore be maintained during excavation of the pipe trench.

5.5.8 In the **trenchless crossing** route section a watching brief will be maintained during excavation of the drilling locations at each end, but not on the drilled pipeline section itself. Extensive soil stripping has previously been carried out within the Port and Park Access Road route, which revealed no significant archaeology within the relevant sections of the proposed pipeline diversion routes. There is therefore no requirement for specific protection measures in this route section. Since archaeological levels will not be exposed in the drilled sections, there is no requirement for a watching brief either.

5.5.9 Any design changes involving groundworks will be subject to archaeological assessment by Oxford Archaeology (LG Archaeological Contractor) and approved by Gill Andrews (LG Archaeological Liaison Officer), Rachael Jones (DP World London Gateway Environment Manager) and Richard Havis (ECC). Excavation plant and other vehicles will not be permitted to track through the protected areas shown on Figures 15 and 16, except as specifically agreed with the same parties.

5.5.10 Excavation plant will not be permitted to operate in areas containing significant archaeology in wet ground conditions, as there is a risk that wheel/track rutting may cause damage to buried archaeological remains.

5.5.11 Before any plant or vehicles are permitted to run through the protected areas, the edge of the works will be demarcated with suitable fencing and signage to prevent accidental damage to the archaeology by plant and vehicles straying outside the defined working area.

5.5.12 The archaeological watching brief will be maintained during any groundworks that have the potential to disturb significant archaeological remains. The watching brief will be carried out in accordance with a site-specific APD, prepared in accordance with standards and procedures detailed in the AMF.

5.5.13 **Spoil storage:** To minimise potential disturbance to archaeological deposits and facilitate agricultural reinstatement, the temporary spoil storage areas will be maintained, through careful management, within the smallest practicable footprint. To minimise the spoil storage areas required, the footprint and depth of the excavation works will also be carefully controlled. Topsoil stripping in subsoil storage areas will be at the minimum level consistent with the 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites' (DEFRA 2009).

# Appendix A. Trench Descriptions and Context Inventory

Trenches 1-22 refer to the Great Garlands Lorry Park trench investigation, which were undertaken concurrently with the CECL Pipeline investigation but are reported separately (OA 2016)

| **Trench 23** | | | | | | |
|---|---|---|---|---|---|---|
| General description | | | | | Orientation | NW-SE |
| This trench was devoid of archaeology and no finds were recovered. The soil sequence comprised topsoil and plough-disturbed subsoil overlying river terrace gravel. Modern land drains present. | | | | | Avg. depth (m) | 0.5 |
| | | | | | Width (m) | 2.1 |
| | | | | | Length (m) | 61.5 |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 2301 | Layer | - | 0.30 | Ploughsoil | - | - |
| 2302 | Layer | - | 0.20 | Subsoil | - | - |
| 2303 | Layer | - | - | Natural gravel | - | - |

| **Trench 24** | | | | | | |
|---|---|---|---|---|---|---|
| General description | | | | | Orientation | NW/SE |
| This trench contained two features, a small linear and a pit or three throw, neither of which produced artefacts. The soil sequence comprised topsoil overlying variable clay with flint head deposits with gravel patches. A single edge damaged or utilised blade was found while cleaning the surface of the natural geology, probably of early prehistoric date. | | | | | Avg. depth (m) | 0.35 |
| | | | | | Width (m) | 2.1 |
| | | | | | Length (m) | 31 |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 2401 | Layer | - | 0.35 | Ploughsoil | - | - |
| 2402 | Fill | - | 0.13 | Fill of ditch 2403 | - | - |
| 2403 | Cut | - | 0.13 | Cut of shallow, irregular linear feature | - | - |
| 2404 | Fill | - | 0.05 | Upper fill of pit 2406 | - | - |
| 2405 | Fill | - | 0.22 | Lower fill of pit 2406 | - | - |
| 2406 | Cut | | 0.70 | Small irregular pit, possible tree throw | - | - |

| **Trench 25** | | |
|---|---|---|
| General description | Orientation | N-S/E-W (L-shaped) |
| Trench contained three undated linear features, a Roman ditch, an undated possible posthole and two natural features. One struck and traces of burnt flint were recorded. A single sherd of Roman pottery (samian ware dating from AD160-200) was recovered from a Roman ditch. | Avg. depth (m) | 0.35 |
| | Width (m) | 2.2 |
| | Length (m) | 55 |

| Trench 25 | | | | | | |
|---|---|---|---|---|---|---|
| The soil sequence comprised topsoil overlying variable clay with flint head deposits with gravel patches. | | | | | | |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 2501 | Layer | - | 0.35 | Ploughsoil | - | - |
| 2502 | Layer | - | 0.13 | Plough disturbed subsoil at west end only | - | - |
| 2503 | Fill | - | 0.25 | Fill of ditch 2503 | - | - |
| 2504 | Cut | 0.80 | 0.25 | Small ditch | - | - |
| 2505 | Fill | - | 0.25 | Fill of pit 2506 | - | - |
| 2506 | Tree throw | 1.00 | 0.26 | Irregular natural feature | - | - |
| 2507 | Fill | | 0.20 | Fill of pit 2508 | - | - |
| 2508 | Tree throw | 0.75 | 0.20 | Irregular natural feature | - | - |
| 2509 | Fill | | 0.20 | Fill of small ditch terminus | 1 struck flint | prehistoric? |
| 2510 | Cut | 0.35 | 0.20 | Ditch terminus | - | - |
| 2511 | Fill | | 0.38 | Fill of posthole 2512 | - | - |
| 2512 | Cut | 0.50 | 0.38 | Posthole | - | - |
| 2513 | Fill | | 0.20 | Fill of ditch 2514 | - | - |
| 2514 | Cut | 0.70 | 0.20 | Ditch 2514 | - | - |
| 2515 | Fill | | 0.55 | Fill of large ditch | 1 sherd samian ware pottery | AD160-200 |
| 2516 | Cut | 1.60 | 0.55 | Substantial ditch containing Roman pottery | | |

| Trench 26 (Area A) | | |
|---|---|---|
| General description | Orientation | NW-SE |
| This trench was initially excavated as a 2m x 30m trench, but was expanded to a 35m x14m excavation area, to clarify the extents of a concentration of significant archaeology. The original trench and the extension were designated Area A.<br>Area A contained a complex of later prehistoric boundaries possibly forming a function, overlain by a group of Roman features including a well or waterhole associated with a tile path or platform, numerous postholes, ditches and a group of four cremation burials.<br>Finds included 15 sherds of late Bronze Age pottery (apparently redeposited in a Roman context), 1 sherd of Roman pottery. Two | Avg. depth (m) | 0.45 |
| | Width (m) | 14 |
| | Length (m) | 35 |

**Trench 26 (Area A)**

prehistoric struck flints were recovered. A large assemblage of Roman tile forming a path leading to the well/waterhole was mostly left in situ.

The cremation burials were not excavated. Some loose fragments of human bone were recovered from the well. The fill of the well also produced fragments from iron-smithing hearth bottoms.

The soil sequence comprised topsoil overlying river terrace gravel.

Contexts

| context no. | type | Width (m) | Depth (m) | comment | finds | date |
|---|---|---|---|---|---|---|
| 2600 | Layer | - | - | Ploughsoil | | |
| 2601 | Fill | - | 0.28 | Fill of 2602 | | |
| 2602 | Cut | 0.6 | 0.28 | Posthole | | |
| 2603 | Fill | - | 0.3 | Fill of 2604 | Burnt Stone | |
| 2604 | Cut | 0.5 | 0.3 | Posthole | | |
| 2605 | Fill | - | 0.23 | Fill of 2606 | | |
| 2606 | Cut | 0.5 | 0.23 | Posthole | | |
| 2607 | Fill | - | 0.23 | Fill of 2608 | | |
| 2608 | Cut | 0.52 | 0.22 | Posthole | | |
| 2609 | Fill | - | 0.18 | Upper fill of 2610 | CBM | Roman |
| 2610 | Cut | 0.4 | 0.38 | Posthole | | |
| 2611 | Fill | - | 0.2 | Lower fill of 2610 | | |
| 2612 | Fill | - | 0.17 | Upper fill of 2613 | CBM | Roman |
| 2613 | Cut | 0.8 | 0.35 | Ditch | | |
| 2614 | Fill | - | 0.2 | Lower fill of 2613 | | |
| 2615 | Fill | - | 0.2 | Upper fill of 2617 | CBM | Roman |
| 2616 | Fill | - | 0.2 | Lower fill of 2617 | | |
| 2617 | Cut | 3.5 | 0.25 | Pit | | |
| 2618 | Fill | - | 0.11 | Upper fill of 2618 | | |
| 2619 | Fill | - | 0.08 | Lower fill of 2620 | | |
| 2620 | Cut | 0.4 | 0.2 | Ditch | | |
| 2621 | Fill | - | 0.3 | Fill of 2622 | | |
| 2622 | Cut | 0.3 | 0.35 | Posthole | | |
| 2623 | Fill | - | 0.35 | Fill of 2624 | | |
| 2624 | Cut | 0.4 | 0.35 | Posthole | | |
| 2625 | Cut | 0.88 | 0.32 | Ditch | | |
| 2626 | Fill | - | 0.1 | Lower fill of 2625 | | |
| 2627 | Fill | - | 0.27 | Upper fill of 2626 | | |

| Trench 26 (Area A) | | | | | | |
|---|---|---|---|---|---|---|
| 2628 | Structure | 0.64 | 0.04 | Possible surface of tiles | | |
| 2629 | Layer | 1.02 | 0.18 | Layer over 2628 and 2630 | CBM | Roman |
| 2630 | Structure | 0.9 | 0.15 | Possible surface of tiles | | |
| 2631 | Structure | 2.3 | 0.05 | Possible surface of tiles | Pottery/CBM | Roman tile Residual LBA/EIA pottery |
| 2632 | Cut | 1.25 | 0.33 | Foundation slot | | |
| 2633 | Fill | - | 0.08 | Lower fill of 2632 | | |
| 2634 | Fill | - | 0.24 | Upper fill of 2632 | | |
| 2635 | Cut | 0.55 | 0.78 | Pit | Pottery | |
| 2636 | Fill | - | 0.18 | Lower fill of 2635 | | |
| 2637 | Fill | - | 0.65 | Upper fill of 2635 | Pottery/CBM/Slag | LBA/EIA/Roman |
| 2638 | Layer | 0.7 | 0.9 | Layer over 2631 and under 2630 | | |
| 2639 | Fill | - | 0.17 | Fill of 2640 | CBM/Slag/Flint/Human Remains | Roman/EPH |
| 2640 | Cut | 7.5 | 1.2 | Pit | | |
| 2641 | Fill | - | 0.75 | Lower fill of 2640 | | |
| 2642 | Fill | - | 0.05 | Fill of 2640 | | |
| 2643 | Layer | 0.34 | 0.22 | Layer over 2630 and under 2629 | | |
| 2644 | Fill | - | 0.7 | Upper fill of 2640 | Bone/CBM/Slag | Roman |
| 2645 | Cut | 1.2 | - | Pit | | |
| 2646 | Fill | 1.2 | - | Fill of 2645 | | |
| 2647 | Cut | 0.52 | - | Linear | | |
| 2648 | Fill | 0.52 | - | Fill of 2647 | | |
| 2649 | Cut | 1.6 | 0.6 | Irregular natural feature | | |
| 2650 | Fill | - | 0.6 | Fill of 2649 | CBM | Roman |
| 2651 | Cut | 2.6 | 0.45 | Pit, possible natural feature | | |
| 2652 | Fill | 2.8 | 0.45 | Fill of 2651 | CBM | Roman |
| 2653 | Cut | 0.5 | - | Ditch | | |
| 2654 | Fill | 0.5 | - | Fill of 2653 | | |
| 2655 | Cut | 0.36 | - | Posthole | | |
| 2656 | Fill | 0.36 | - | Fill of 2655 | | |

| Trench 26 (Area A) | | | | | | |
|---|---|---|---|---|---|---|
| 2657 | Cut | 0.48 | - | Posthole | | |
| 2658 | Fill | 0.48 | - | Fill of 2657 | | |
| 2659 | Cut | 0.5 | - | Posthole | | |
| 2660 | Fill | 0.5 | - | Fill of 2659 | | |
| 2661 | Cut | 0.36 | - | Posthole | | |
| 2662 | Fill | 0.36 | - | Fill of 2661 | | |
| 2663 | Cut | 0.55 | - | Posthole | | |
| 2664 | Fill | 0.55 | - | Fill of 2663 | | |
| 2665 | Cut | 0.62 | - | Posthole | | |
| 2666 | Fill | 0.62 | - | Fill of 2665 | | |
| 2667 | Cut | 0.6 | 0.15 | Ditch | | |
| 2668 | Fill | - | 0.15 | Fill of 2667 | Pottery/Flint/CBM | Roman/EPH |
| 2669 | Cut | 0.62 | - | Pit | | |
| 2670 | Fill | 0.62 | - | Fill of 2669 | | |
| 2671 | Cut | 1.46 | - | Ditch | | |
| 2672 | Fill | 1.46 | - | Fill of 2671 | | |
| 2673 | Cut | 0.74 | - | Ditch | | |
| 2674 | Fill | 0.74 | - | Fill of 2673 | | |
| 2675 | Cut | 0.54 | - | Posthole | | |
| 2676 | Fill | 0.54 | - | Fill of 2675 | | |
| 2677 | Cut | 0.8 | - | Posthole | | |
| 2678 | Fill | 0.8 | - | Fill of 2677 | | |
| 2679 | Cut | 0.82 | - | Posthole | | |
| 2680 | Fill | 0.82 | - | Fill of 2679 | | |
| 2681 | Cut | 1.94 | - | Pit | | |
| 2682 | Fill | 1.94 | - | Fill of 2681 | | |
| 2683 | Cut | 0.3 | - | Posthole | | |
| 2684 | Fill | 0.3 | - | Fill of 2683 | | |
| 2685 | Cut | 0.83 | - | Posthole | | |
| 2686 | Fill | 0.83 | - | Fill of 2685 | | |
| 2687 | Cut | 0.37 | - | Posthole | | |
| 2688 | Fill | 0.37 | - | Fill of 2687 | | |
| 2689 | Cut | 1.25 | - | Pit | | |
| 2690 | Fill | 1.25 | - | Fill of 2689 | | |
| 2691 | Cut | 0.55 | - | Posthole | | |
| 2692 | Fill | 0.55 | - | Fill of 2691 | | |

| Trench 26 (Area A) | | | | | | |
|---|---|---|---|---|---|---|
| 2693 | Cut | 0.4 | - | Posthole | | |
| 2694 | Fill | 0.4 | - | Fill of 2693 | | |
| 2695 | Cut | 0.31 | - | Posthole | | |
| 2696 | Fill | 0.31 | - | Fill of 2695 | | |
| 2697 | Cut | 0.43 | - | Posthole | | |
| 2698 | Fill | 0.43 | - | Fill of 2697 | | |
| 2699 | Cut | 0.27 | - | Posthole | | |
| 26000 | Fill | 0.27 | - | Fill of 2699 | | |
| 26001 | Cut | 0.47 | - | Posthole | | |
| 26002 | Fill | 0.47 | - | Fill of 26001 | | |
| 26003 | Cut | 0.49 | - | Posthole | | |
| 26004 | Fill | 0.49 | - | Fill of 26003 | | |
| 26005 | Cut | 0.53 | - | Posthole | | |
| 26006 | Fill | 0.53 | - | Fill of 26005 | | |
| 26007 | Cut | 0.35 | - | Posthole | | |
| 26008 | Fill | 0.35 | - | Fill of 26007 | | |
| 26009 | Cut | 0.81 | - | Posthole | | |
| 26010 | Fill | 0.81 | - | Fill of 26009 | | |
| 26011 | Cut | 0.69 | - | Posthole | | |
| 26012 | Fill | 0.69 | - | Fill of 26011 | | |
| 26013 | Cut | 0.3 | - | Posthole | | |
| 26014 | Fill | 0.3 | - | Fill of 26013 | | |
| 26015 | Cut | 0.52 | - | Cremation pit | | |
| 26016 | Fill | 0.52 | - | Fill of 26015 | | |
| 26017 | Cut | 0.42 | - | Cremation pit | | |
| 26018 | Fill | 0.42 | - | Fill of 26017 | | |
| 26019 | Cut | 0.49 | - | Cremation pit | | |
| 26020 | Fill | 0.49 | - | Fill of 26019 | | |
| 26021 | Cut | 0.44 | - | Cremation pit | | |
| 26022 | Fill | 0.44 | - | Fill of 26021 | | |
| 26023 | Cut | 0.61 | - | Ditch | | |
| 26024 | Fill | 0.61 | - | Fill of 26023 | | |
| 26025 | Cut | 0.63 | - | Posthole | | |
| 26026 | Fill | 0.63 | - | Fill of 26025 | | |
| 26027 | Cut | 0.31 | - | Ditch | | |
| 26028 | Fill | 0.31 | - | Fill of 26027 | | |

| Trench 26 (Area A) | | | | | | |
|---|---|---|---|---|---|---|
| 26029 | Cut | 0.38 | 0.19 | Posthole | | |
| 26030 | Fill | - | 0.19 | Fill of 26029 | | |
| 26031 | Layer | 4.2 | 0.6 | Layer | | |
| 26032 | Cut | 9.5 | 0.9 | Pit | | |
| 26033 | Cut | 0.79 | - | Small linear | | |
| 26034 | Fill | 0.79 | - | Fill of 26033 | | |
| 26035 | Cut | 2.1 | - | Irregular linear | | |
| 26036 | Fill | 2.1 | - | Fill of 26035 | | |

| Trench 27 | | | | | | |
|---|---|---|---|---|---|---|
| General description | | | | | Orientation | NW-SE |
| This trench contained three linear features and one oval pit, of which two of the gullies produced a significant assemblage of Bronze Age fired clay oven furniture and briquetage. A piece of burnt and struck flint was recovered from the pit.<br>The soil sequence comprised ploughsoil overlying river terrace gravel. | | | | | Avg. depth (m) | 0.40 |
| | | | | | Width (m) | 2.0 |
| | | | | | Length (m) | 30 |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 2700 | Layer | - | 0.35 | Ploughsoil | - | - |
| 2701 | Cut | 0.50 | 0.10 | N-S linear gully, perpendicular to 2710 | - | - |
| 2702 | Fill | - | 0.10 | Fill of 2701 | Fired clay oven furniture and briquetage | Bronze Age |
| 2703 | Cut | 0.82 | 0.07 | Base of oval pit | - | |
| 2704 | Fill | - | 0.07 | Fill of 2703, contained charcoal | 1 burnt and worked flint | Prehistoric? |
| 2705 | Cut | 1.40 | - | Modern ditch previously investigated in Access Road excavation. Not excavated. | - | Modern |
| 2706 | Fill | - | - | Fill of 2705. Not excavated. | - | - |
| 2707 | - | - | - | Not used | - | - |
| 2708 | Cut | - | 0.13 | Same as gully 2701. Recorded as separate cut on section but no difference in fill or relationship visible in section | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2709 | Fill | - | 0.13 | Fill of 2708 | - | - |
| 2710 | Cut | - | 0.12 | E-W gully cut, perpendicular to 2701 | - | - |
| 2711 | Fill | - | 0.12 | Fill of 2710 | Fired clay and oven furniture | Bronze Age |

| **Trench 28** | | | | | | |
|---|---|---|---|---|---|---|
| General description | | | | | Orientation | NW-SE |
| This trench contained a single modern ditch, previously investigated in the Access Road excavation. No finds recovered but modern glass was noted in the fill.<br>The soil sequence comprised ploughsoil overlying variable clay with flint head deposits with gravel patches. | | | | | Avg. depth (m) | 0.38 |
| | | | | | Width (m) | 2.0 |
| | | | | | Length (m) | 50 |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 2801 | Layer | - | 0.38 | Ploughsoil | - | - |
| 2802 | Cut | 1.85 | - | SW-NE linear ditch | - | - |
| 2803 | Fill | - | - | Fill of 2802, not excavated | glass | Modern |

| **Trench 29** | | | | | | |
|---|---|---|---|---|---|---|
| General description | | | | | Orientation | NE-SW |
| This trench contained a single modern ditch, previously investigated in the Access Road excavation. No finds recovered but modern glass was noted in the fill.<br>The soil sequence comprised ploughsoil overlying variable clay with flint head deposits with gravel patches. | | | | | Avg. depth (m) | 0.36 |
| | | | | | Width (m) | 2.0 |
| | | | | | Length (m) | 30 |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 2900 | Layer | - | 0.36 | Ploughsoil | - | - |
| 2901 | Cut | - | 0.18 | Plough furrow? | - | - |
| 2902 | Fill | - | 0.18 | Fill of 2901 | - | - |
| 2903 | Cut | - | 1.46 | Field drainage/boundary ditch | - | - |
| 2904 | Fill | - | 0.36 | Base fill of 2903 | Bone, metal, charcoal | Post-medieval or modern |
| 2905 | Fill | - | 0.36 | Upper fill of 2903 | Bone, metal, charcoal | Post-medieval or modern |

| Trench 30 | | | | | | |
|---|---|---|---|---|---|---|
| General description | | | | | Orientation | E-W |
| Trench devoid of archaeology. No finds recovered.<br>The soil sequence comprised topsoil overlying river terrace gravel. | | | | | Avg. depth (m) | 0.38 |
| | | | | | Width (m) | 2 |
| | | | | | Length (m) | 30 |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 3000 | Layer | - | 0.30 | Ploughsoil | - | - |
| 3001 | Layer | - | 0.20 | Natural gravel | - | - |

| Trench 31 | | | | | | |
|---|---|---|---|---|---|---|
| General description | | | | | Orientation | NE/SW |
| Trench contained a single linear ditch, which produced a fragment of undiagnostic burnt flint and fired clay.<br>The soil sequence comprised topsoil overlying variable clay with flint head deposits with gravel patches. | | | | | Avg. depth (m) | 0.36 |
| | | | | | Width (m) | 2 |
| | | | | | Length (m) | 20 |
| Contexts | | | | | | |
| context no | type | Width (m) | Depth (m) | comment | finds | date |
| 3100 | Layer | - | 0.36 | Ploughsoil | - | - |
| 3101 | Cut | - | 0.12 | Cut of shallow gully | - | - |
| 3102 | Fill | - | 0.13 | Fill of ditch 3101 | Fired clay and burnt flint | Prehistoric? |

| Trench 32 (Area B) | | |
|---|---|---|
| General description | Orientation | NW/SE |
| This was initially excavated as a 50m x 2m trench. The NW end of the trench was expanded to form a 24 x 23m open area, to clarify the extent of a cluster of predominantly prehistoric features exposed in Trench 32. The extension and original trench together were designated Area B.<br>Area B contained a sequence of intercutting large enclosure ditches, an extensive soil spread and a pit, most of which produced Late Bronze Age/ Early Iron Age artefacts. The fire clay assemblage includes briquetage hearth and oven furniture, possibly derived with salt evaporation activity. The large enclosure ditch corresponds with the eastern edge of a rectilinear cropmark complex which extends to the west of Rainbow Lane. A Roman ditch was present in the SE section of Trench 32.<br>The soil sequence comprised topsoil overlying variable clay with flint head deposits with gravel patches. | Avg. depth (m) | 0.36 |
| | Width (m) | 2 (Tr32)<br>24 (Area A) |
| | Length (m) | 50 (Tr32)<br>23 (Area A) |
| Contexts | | |

| context no | type | Width (m) | Depth (m) | comment | finds | date |
|---|---|---|---|---|---|---|
| 3200 | Layer | - | 0.36 | Ploughsoil | - | - |
| 3201 | Cut | 9.0 | 0.29 | Shallow depression, possibly natural, which contained extensive soil deposit 3202; 9m x 14.5m in plan. Located on a slight slope so unlikely to be a pond | - | - |
| 3202 | Fill | - | 0.29 | Fill of depression 3201.Silty sand with little organic content | Pottery, fired clay, worked and burnt flint | Late Bronze Age/ Early Iron Age |
| 3203 | Cut | 2.48 | 0.46 | Substantial ditch containing Roman pottery | - | - |
| 3204 | Fill | - | 0.26 | Base fill of ditch 3203 | Pottery, bone | Late Iron Age/early Roman |
| 3205 | Fill | - | 0.27 | Upper fill of 3203 | Pottery, bone | Mid/late 1st century AD |
| 3206 | Cut | 1.60 | 0.40 | Shallow enclosure boundary ditch, parallel and adjacent to large ditch cut 3209 | - | - |
| 3207 | Fill | - | 0.20 | Upper fill of 3206 | Pottery, worked flint, fired clay (oven/hearth furniture) | Late Bronze Age/ Early Iron Age |
| 3208 | Fill | - | 0.20 | Fill of 3206 | Pottery | Late Bronze Age/ Early Iron Age |
| 3209 | Cut | 3.20 | 1.15 | Large enclosure ditch cut. The upper fill 3210 contained Late Bronze Age/ Early Iron Age artefacts. The earlier fills were devoid of finds. | - | - |
| 3210 | Fill | - | 0.60 | Upper fill of 3209 | Pottery, worked flint, fired clay | Late Bronze Age/ Early Iron Age |
| 3211 | Fill | - | 0.30 | Fill of ditch 3209, eroded from NE side, overlies 3214 | - | - |
| 3212 | Fill | - | 0.25 | Fill of ditch 3209, eroded from SW side, overlies 3214 | - | - |
| 3213 | Fill | - | 0.30 | Fill of ditch 3209, overlies 3211 | - | - |
| 3214 | Fill | - | 0.40 | Base fill of ditch 3209 | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3215 | Layer | 0.70 | 0.25 | Band of trample or bioturbation extending 0.70m from NE side of enclosure ditch 3206. Track or hedgeline? | - | - |
| 3216 | Fill | - | 0.40 | Fill of pit 3217 | Pottery, worked flint, fired clay | Late Bronze Age/ Early Iron Age |
| 3217 | Cut | 1.50 | 0.45 | Pit cut, somewhat irregular and extent unclear as only revealed in sondage. Not defined in plan | - | - |
| 3218 | Fill | - | 0.45 | Fill of 3219, sandy clay with organic inclusions | - | - |
| 3219 | Cut | - | 0.45 | Possible ditch, or a series of shallow intercutting pits, seen in a sondage dug to investigate a large spread to the SW of enclosure ditch 3209. Not defined in plan. | - | - |
| 3220 | Fill | - | 0.45 | Possible ditch fill of 3221 | - | - |
| 3221 | Cut | - | 0.45 | Possible ditch, or a series of shallow intercutting pits, seen in a sondage dug to investigate a large spread to the SW of enclosure ditch 3209. Not defined in plan | - | - |

**Trench 33**

| General description | Orientation | NW-SE |
|---|---|---|
| This trench was dug as an addition to those defined in the WSI, to investigate the extents of a concentration of archaeology in Trench 26 (Area A). The trench extended in a south-easterly direction and was continued until the concentration of features ran out. The trench was separated from Area A by a modern field boundary/ drainage ditch. The trench contained a pit and a ditch, both of which contained later prehistoric fired clay/ briquetage.<br>The soil sequence comprised ploughsoil overlying River Terrace gravel. | Avg. depth (m) | 0.35 |
| | Width (m) | 2.2 |
| | Length (m) | 8.0 |

Contexts

| context no | type | Width (m) | Depth (m) | Comment | finds | date |
|---|---|---|---|---|---|---|
| 3300 | Layer | - | 0.38 | Ploughsoil | - | - |
| 3301 | Fill | - | 0.17 | Upper fill of pit 3303 | Fired clay | Late Bronze Age/ Early Iron Age |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3302 | Fill | - | 0.23 | Fill of Pit 3303Lower fill of pit 3303 | Fired clay | Late Bronze Age/ Early Iron Age |
| 3303 | Cut | - | 0.40 | Pit cut | | |
| 3304 | Fill | - | | Upper fill of ditch 3306 | briquetage | Late Iron Age/ Roman or later |
| 3305 | Fill | - | | Lower fill of ditch 3306 | | |
| 3306 | Cut | - | | Ditch – Partly truncated by a large well/waterhole in Area A to the NW | | |

# APPENDIX B. FINDS REPORTS

## B.1 Pottery

*By Edward Biddulph*

B.1.1 A total of 80 sherds of pottery, weighing 987g, was recovered from the evaluation. A further 11 sherds (22g) were collected from bulk samples. The assemblage was quantified within context groups and examined to identify diagnostic forms and fabrics. These are described in Tables 1 and 2. The post-medieval pottery was identified by John Cotter.

| Context | Count | Weight (g) | Comment | Spot-date |
|---|---|---|---|---|
| 0 | 19 | 194 | Flint-tempered pottery. 1 x cordoned body sherd, 2 x jar rims | LBA/EIA |
| | 13 | 377 | Tin-glazed earthenware dish; London stoneware; creamware (c. 1760-1870); Staffs-type pearlware (c. 1780-1840); Staffs comb-slipped ware | Post-medieval |
| 2515 | 1 | 18 | Drag. 31 rim sherd, Central Gaulish samian ware | AD 160-200 |
| 2631 | 1 | 9 | Flint-tempered body sherd | LBA/EIA |
| 2637 | 15 | 142 | Simple jar or bowl rim, coarse flint-tempered fabric; 2 x flint/sand/?grog-tempered body sherd; 2 x body sherds in fine flint-tempered fabric; other flint-tempered fabric present | LBA/EIA |
| 3200 | 2 | 14 | ?Lid rim in fine oxidised ware; fine oxidised ware, probably Roman | AD 40-410 |
| 3202 | 5 | 30 | Flint-tempered body sherd; 4 x flint-and-sand-tempered body sherds | LBA/EIA |
| 3204 | 2 | 15 | 2 x body sherds: oxidised fabric (glauconitic, micaceous/voids (?shell); grog-tempered ware | Late Iron Age/early Roman |
| 3205 | 3 | 23 | 2 x oxidised grog-tempered fabric; 1 x sand-tempered reduced ware, plus grog and ?shell | Mid/late 1st century AD |
| 3207 | 6 | 31 | Flint-tempered body sherds x 5; base sherd x 1 | LBA/EIA |
| 3208 | 2 | 16 | Flint-tempered body sherds | LBA/EIA |
| 3210 | 2 | 43 | Flint-tempered body sherd; trace of cordon on both` | LBA/EIA |
| 3216 | 2 | 4 | Flint-tempered body sherds | LBA/EIA |
| 3220 | 7 | 71 | Flint-tempered body sherds | LBA/EIA |

*Table B.1.1: Summary of pottery from COLP15*

| Context | Sample | Count | Weight (g) | Comment | Spot-date |
|---|---|---|---|---|---|
| 2639 | 6 | 1 | 1 | Chip – grog/sand-tempered fabric | Late Iron Age/early Roman |
| 3202 | 7 | 10 | 21 | Flint-tempered fragments, including fine flint-and-sand-tempered fabric | LBA/EIA |
| TOTAL | | 11 | 22 | | |

*Table B.1.2: Pottery from samples, COLP15*

B.1.2 The earliest-dated pottery comprises flint-tempered fabrics, which were recovered from contexts 2631, 2637, 3202, 3207, 3208, 3210, 3216, 3220 and 2639 and broadly dated to the late Bronze Age/early Iron Age (LBA/EIA). The fabrics vary in coarseness and composition – the material ranges from fairly fine to very coarse, and includes fabrics tempered with flint and sand, as well as flint alone – but diagnostic pieces point to a

prehistoric date. An unstratified rim sherd is paralleled by late Bronze Age jars from Mucking (Barrett and Bond 1988, fig. 24.42-44), while cordoned body sherds – one unstratified, the other from context 3210 – are consistent with the period.

B.1.3 Pottery of late Iron Age or early Roman date (*c* AD 43-70/100) was recovered from three contexts: 2639, 3204, and 3205. All three groups contained pottery tempered at least in part with grog, which is a characteristic component of pottery of the later 1st century BC and early/mid 1st century AD in the region (Thompson 1981). Context 3204 also contained a sherd in a glauconitic fabric, which may be residual. Much of the middle Iron Age assemblage at Stanford Wharf Nature Reserve was glauconite-tempered (Biddulph and Stansbie 2012, 76), although the use of the fabric at Little Waltham, where the fabric was recorded in quantity, continued into the late Iron Age (Drury 1978, 56). Sand-tempered pottery in context 3205 appears to push the date of deposition of that group into the Roman period.

B.1.4 Later Roman activity is represented by a rim sherd from in context 2515 of a Drag. 31 samian ware dish, which dates deposition to the mid/late 2nd century or later. Pottery from context 3200 could not be closely dated within the Roman period.

B.1.5 A range of 18th-19th century pottery was recovered as unstratified material.

B.1.6 The pottery from the Lorry Park spans the prehistoric to post-medieval periods, though the emphasis is on the late Bronze Age/early Iron Age and to a lesser extent the late Iron Age/early Roman period.

B.1.7 With a mean sherd weight of 12.3g, the overall condition of the pottery was reasonably good, although removing the post-medieval pottery reduces the value to 9.1g, pointing to an assemblage of small and fragmented sherds. While the condition of the pottery suggests that the pottery had been subject to disturbance and redeposition, the quantities and range of the material recovered point to areas of prehistoric and early Roman activity lying close to the area of investigation.

B.1.8 No further work is required on this material but it is recommended that the pottery from the evaluation be integrated with any additional pottery collected from the site and recorded fully as part of a wider programme of analysis.

## B.2 Ceramic building material

*By Cynthia Poole*

B.2.1 A total of 125 fragments of ceramic building material, weighing 26,655g, was recovered from 15 contexts mostly concentrated in Area A/trench 26 of the evaluation. This includes 7 indeterminate scraps (9g) collected from bulk samples. The assemblage has been quantified and recorded to identify diagnostic forms, fabrics and other significant features. The forms are quantified by context in Table 1.

B.2.2 All the tile was Roman except for two fragments of flat roof tile of medieval-postmedieval date from trench 29.

B.2.3 The tile fabrics were generally fired to red or orange and all were sandy varieties dominated by quartz in variable density and grain size. The clay was commonly noted as being micaceous and sometimes laminated. Coarser inclusions comprised ferruginous grits, clay pellets or grog and occasional large flint grits or pebbles. The fabrics are similar to those found at Stanford Wharf Nature Reserve (Shaffrey 2011), though no direct comparisons have been made.

B.2.4 Brick, tegula and indeterminate flat tile dominate the assemblage. Smaller quantities of flue tile and imbrex are also present. No complete tiles are present in the retained assemblage and apart from thickness, the only complete dimensions was the length of a tegula and a brick, which measured 390mm and 260mm long respectively. However a large quantity of complete or near complete tiles were re-used in structures 2630 and 2625. Unfortunately no detailed record was made of the tiles in these structures before reburial and therefore it is not possible to compare the retained assemblage with that used in the tile structures in any detail. From the site photos 2265 comprised four partial tiles and 2630 included at least 17 individual tiles, composed certainly of tegulae and possibly brick. It is not possible to tell just from the photos whether some of the large plain slabs are brick or deflanged tegulae. A fragment of combed box tile is also visible in the photos, so it is possible flat slabs of box flue was also built into the structure.

B.2.5 The retained tegulae generally have a regular finish with knife trimmed edges, smooth upper surfaces and fairly regular rough sanded bases. Thickness ranged from 14-26mm. Most of the surviving tegula flanges were rectangular in form with either vertical or angled inner edge, though two had a curved profile. The plain flat tile was most consistent in finish and thickness with the tegulae, rather than other tile forms. One plain fragment with a large peg or nail hole 16mm diameter centred 40mm from the tile edge is certainly a tegula fragment. Three tegulae had cutways, one both upper and lower. The upper cutaway was of standard rectangular form measuring 50mm long. Its lower counterpart was 60-65mm long and was type D as defined by Warry (2006). Two other lower cutaways were present: a second of type D and one of type C5. According to Warry these are both later types, based on his analysis of tegulae development. The type C group broadly date from mid-2nd to mid-3rd century and the type D from from mid-3rd to 4$^{th}$ century. The relatively short complete length is also consistent with a later date.

B.2.6 The brick all ranged in thickness from 35-45mm and the general finish appeared to be slightly rougher compared to the tegulae. The single complete dimension of 260mm for a brick is consistent with the size of a *pedalis*, or the width of a lydion.

B.2.7 The flue tile was all of standard box flue or *tubuli* type with combed keying on the face. They measured from 19 to 25mm thick and the largest surviving piece measured over 200mm long and over 150mm wide. Nearly all were made in the finest fabric containing very little fine or no sand and had a neat even finish with smooth or knife trimmed edges. One had a rectangular vent 65mm long cut in the plain face. The combed keying was generally made with medium combs 42-47mm wide with between 6 and 9 teeth or more. A narrower comb of 28mm width had only 4 teeth creating a very coarse combing. The bands of keying were often vertical or parallel to the edges, though diagonal and zigzag or criss-cross bands were also present, which is the pattern visible on the flue tile in photos of 2630.

B.2.8 Markings included accidental imprints and signature marks. Imprints included smeared finger marks from handling on one and a long monocot leaf impression on the underside of a brick. There may also be an impression, possibly a foot, on one of the tegula in structure 2630 though the mark may just be damage being difficult to judge on the basis of a photo. All other markings were signature marks, mostly occurring on tegulae: three formed arcs or hoops of one or two finger marks starting at the tile edge, one on a brick formed a horseshoe shape with two fingermarks and another with two finger grooves a curved arc, starting c. 100mm above the base edge of the tile. Some of the tegulae in structure 2630 also have evidence of signatures: one has a very clear single groove forming a hoop and another has a shallower arc of two finger grooves.

| | | Roman | | | | | | | Post-Roman | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Contexts** | | **Brick** | **Flat tile** | **Tegula** | **Imbrex** | **Flue** | **Indet** | **Mortar** | **Roof: flat** | **Total** |
| 2515 | Nos | 1 | | | | | | | | **1** |
| | Wt (g) | 233 | | | | | | | | **233** |
| 2609 | Nos | | 2 | | | | | | | **2** |
| | Wt (g) | | 375 | | | | | | | **375** |
| 2612 | Nos | | | | | | 1 | | | **1** |
| | Wt (g) | | | | | | 2 | | | **2** |
| 2615 | Nos | 3 | 12 | 6 | | 2 | | 2 | | **25** |
| | Wt (g) | 1927 | 1452 | 2938 | | 1 | | 18 | | **6336** |
| 2629 | Nos | 12 | 6 | 20 | | 10 | | | | **48** |
| | Wt (g) | 5700 | 1110 | 3121 | | 995 | | | | **10926** |
| 2637 | Nos | 3 | 5 | 5 | | | 3 | | | **16** |
| | Wt (g) | 1451 | 492 | 560 | | | 218 | | | **2721** |
| 2639 | Nos | | | | | | 7 | | | **7** |
| | Wt (g) | | | | | | 9 | | | **9** |
| 2644 | Nos | 5 | | 2 | | 1 | | | | **8** |
| | Wt (g) | 1700 | | 262 | | 194 | | | | **2156** |
| 2650 | Nos | 3 | | | 3 | | | | | **6** |
| | Wt (g) | 1610 | | | 336 | | | | | **1946** |
| 2652 | Nos | | 1 | | | | | | | **1** |
| | Wt (g) | | 5 | | | | | | | **5** |
| 2668 | Nos | 2 | 1 | | | | | | | **3** |
| | Wt (g) | 79 | 48 | | | | | | | **127** |
| 2904 | Nos | | | | | | | | 1 | **1** |
| | Wt (g) | | | | | | | | 56 | **56** |
| 2905 | Nos | | | | | | | | 1 | **1** |
| | Wt (g) | | | | | | | | 128 | **128** |
| 3301 | Nos | 1 | | 1 | 1 | | | | | **3** |
| | Wt (g) | 271 | | 238 | 87 | | | | | **596** |
| 3302 | Nos | 1 | | 1 | | | | | | **2** |
| | Wt (g) | 978 | | 61 | | | | | | **1039** |
| **Total** | **Nos** | **31** | **27** | **35** | **4** | **13** | **11** | **2** | **2** | **125** |
| **Total** | **Wt (g)** | **13949** | **3482** | **7180** | **423** | **1190** | **229** | **18** | **184** | **26655** |

*Table B.2.1: Summary of ceramic building material forms from COLP15*

B.2.9 The tile assemblage recovered during excavation represents only an element of the overall tile assemblage, as the structures that remained in situ represent the greater part and primary use of the tile on the site. It is likely that much of the tile found in Area A originated from structure 2630, as the higher sections of this feature appear to be missing the tile surface. From the proportions of forms it is clear that tegula and brick were preferentially brought to the site for re-use. It is probable the tile structures on site were built of reused tile as tegulae clearly formed a significant proportion of the structure. Though it is not uncommmon for tegulae to be used as a form of brick or paving, such constructions generally utilised recycled roofing material, that had served its primary function and this is likely to be case for structure 2630. A significant quantity (45% by weight, 27% by count) of the tile had been burnt or heat discoloured suggesting it may already have been reused in ovens or hearths presumably before reaching the site as there appears to be no evidence for such structures in the excavated area (unless 2630 was in fact the base of some such feature heavily robbed out).

B.2.10 The proportion of box flue tile in the assemblage is rather surprising but no doubt reflects the presence of masonry structures with one or more heated rooms in the locality. It is probable the box flues were broken up to provide flat tile slabs for general construction use.

B.2.11 The quantity of tile and the range of forms suggests the presence of masonry buildings with heated rooms somewhere in the locality that formed the source of the building materials. It has been suggested that the rural settlement at Mucking may have had Roman buildings of some wealth as evidenced by the flue tiles (Jones forthcoming).

B.2.12 The limited intrinsic dating evidence of the tile suggests the material was obtained from buildings originally constructed in the 3rd or possibly 4th century AD. Allowing for a lapse of time during its primary use, the tile structure at the site is unlikely to have been constructed before the later 3rd or 4th century. The form and function of the structure is not entirely clear, though a path or stepped path leading to the pit or waterhole seems most probable. However other functions cannot entirely be ruled out such as the flue of some form of oven, as the tile structure has not been studied in sufficient detail to rule out the presence of burning or heat discolouration of the tiles.

B.2.13 No further recording is required on this material, but it is recommended that the tile from the evaluation should be analysed in relation to the site stratigraphy and structures in more detail and be integrated with any additional material collected from the site and as part of a wider programme of analysis.

## B.3 Fired clay

*By Cynthia Poole*

B.3.1 A modest assemblage of fired clay was recovered by hand excavation during the excavation and a small proportion from sieved residues. The quantities, whilst not large, are above average for an evaluation. The condition of the material was variable, but included a significant number of diagnostic or identifiable forms. Abrasion varied considerably with the heaviest tending to occur on structural material from ovens and hearths and least on portable items of furniture, suggesting these were rapidly discarded into features following breakage or disuse. Whilst the overall mean fragment weight is fairly low at 8.5g and as preliminary indicator could suggest little identifiable material was present, if sieved material is excluded it doubles to 16g, which is more consistent with the quantity of diagnostic pieces.

B.3.2 The assemblage has been fully recorded on an Excel spreadsheet as it was immediately apparent that a significant range of material was present. The record includes standard quantification divided by form and fabric, general condition, surfaces and finish, dimensions as appropriate and organic impressions, supported by additional notes and descriptions. A small quantity of amorphous scraps has been discarded from a single sieved sample, but otherwise all material has been retained and it is recommended that all retained material should be archived and no further discard should take place.

B.3.3 The fired clay comprised 423 fragments (3694g) from 22 contexts concentrated predominantly in Trench 26/Area A and Trench 32/Area B. The assemblage is summarised by context in Table 1. Much fired clay cannot be dated, especially structural material, and is reliant on associated dateable artefacts to be phased. However a significant number of fired clay items in this assemblage are of diagnostic Late Bronze Age forms including small perforated plates and cup pedestals with tapered and splayed bases. Other pieces, which may be slightly later in date possibly Early Iron Age include a perforated plate of thicker and larger form to the LBA variety and a possible

pedestal with spatulate end. In addition to the distinctive portable furniture there are a few fragments of briquetage vessels, though they are too small to assign to any known form. Significant quantities of structural material were also found predominantly in area A. These included pieces with wattle impressions, which are likely to derive from oven superstructure. Although salt working structures are generally referred to as hearths, they are usually semi-enclosed structures and their construction is more complex than that of a simple domestic hearth.

B.3.4 The majority of the fired clay is made in a fine sandy micaceous clay containing variable densities of coarser quartz sand and occasional small grits 1-3mm of chalk, flint and quartzite (fabric Q). A proportion of these also contained added organic temper generally in the form of fine chaff or chaff and crushed straw (Fabric QV). A few pieces were made in a smooth silty micaceous clay (Fabric A), one example having additional chaff temper. A coarse flint tempered fabric (B) was used exclusively for furniture comprising a pedestal and some fragments of flat plaques. At other sites coarse burnt flint tempered fabrics have been used for the LBA perforated plates and the fragments of plaques may in fact be pieces of perforated plate missing the diagnostic features.

B.3.5 Similar items of briquetage have been found in Essex and Kent, though the most closely comparable group occurs at Mucking, where pedestals of similar form have been identified (Jones 1977). Comparative material especially the small perforated plate and pedestal forms is also found on the other side of the Channel in north-west Europe (Fries-Knoblach 2001, fig. 9).

B.3.6 The assemblage of fired clay is a significant group of material containing a number of diagnostic pieces of Late Bronze Age-Early Iron Age type associated with saltworking. Although saltworking sites are well known throughout Essex in the form of the 'Red Hills' much of the evidence from these is of middle – late Iron Age and Roman date, whilst evidence of earlier salt production is much rarer. In this respect this group of material provides important new evidence for early salt production in this area, which is certainly of local and regional significance and possibly nationally. It is recommended that this group should be be published and fully illustrated.

| Context | Nos | Wt (g) | Spot date | Summary of material |
|---|---|---|---|---|
| 2509 | 1 | 3 | - | Oven/hearth structure? |
| 2609 | 1 | 2 | - | Oven/hearth structure? |
| 2629 | 13 | 184 | - | Oven/hearth structure? |
| 2637 | 17 | 435 | - | Salt-working hearth structure? |
| 2639 <6> | 220 | 814 | - | Salt-working hearth structure |
| 2644 | 1 | 73 | - | Oven wall structure with wattle impressions |
| 2650 | 7 | 634 | - | Oven wall structure with wattle impressions |
| 2652 | 6 | 180 | - | Oven wall structure with wattle impressions |
| 2662 | 8 | 55 | - | Oven wall structure with wattle impressions |
| 2668 | 8 | 42 | - | Indeterminate – probably oven/hearth structure |

| Context | Nos | Wt (g) | Spot date | Summary of material |
|---|---|---|---|---|
| 2702 | 45 | 232 | LBA | 'cup' pedestals with splayed base; fragments of briquetage vessels; some possible hearth lining. |
| 2711 | 5 | 25 | LBA | Cup pedestal |
| 3102 | 6 | 8 | - | Amorphous fragments probably from oven/hearth structure |
| 3202 | 39 | 112 | LBA | Pedestal stem (?tapered type), ?spatulate ended pedestal, plaques (?perforated plates) |
| 3205 | 1 | 169 | - | Oven/hearth structure |
| 3207 | 8 | 169 | LBA | Small perforated plates; ?cylindrical perforated block pedestal; luting |
| 3210 | 9 | 72 | - | Oven/hearth structure |
| 3216 | 3 | 8 | BA-IA | Briquetage vessel |
| 3220 | 6 | 179 | - | Tapered cup pedestals, ?perforated plaque, oven/hearth structure |
| Tr32 u/s | 11 | 221 | LBA-EIA | Perforated plates of LBA & ?IA type, cup pedestals with splayed foot; oven/hearth structure |
| 3302 | 1 | 28 | - | Oven structure |
| 3304 | 6 | 35 | - | Oven structure |
| **Total** | **423** | **3694** | **-** | |

*Table B.3.1: Summary of fired clay by context*

## B.4 Metals

*Ian R Scott*

B.4.1 There are three pieces form a single context and small fragment of copper alloy sheet that was unstratified.

B.4.2 **Context 2905**:

(1) Nail or chisel fragment. The object has a round battered head and an incomplete stem of square cross section. It is quite heavily encrusted with corrosion products It could be a the top of the large nail or spike, but alternatively it could be the head of a small cold chisel. Fe. L extant: 72mm.

(2) Rod or wire fragment. Curve fragment of circular section, either thick wire or thin rod. Fe. Note measured.

(3) Nail, with small head and squre section stem. Encrusted. Probably hand wrought. Not closely datable. L: c 60mm. Unstratified

(4) Small fragment of thin copper alloy sheet, approximately rectangular in shape. Not measured

B.4.3 None of the iron finds is closely datable or diagnostic, and the small unstratified copper alloy fragment is similarly undiagnostic and not closely datable.

## B.5 Slag

*Identified by Geraldine Crann*

B.5.1 A small slag assemblage, likely to be hearth bottoms and related waste, was recovered from contexts in Trench 26. No further work is recommended at this stage but the slag should be included in any future analysis undertaken following further work on the site.

| Context | Description |
|---|---|
| 2637 | 1 piece possible hearth bottom, 797g |
| 2639 | 1 small fragment from environmental sample <6>, 17g |
| 2644 | 12 pieces possible hearth bottom, 3719g |

*Table B.5.1: Summary of slag by context*

## B.6 Struck flint

*By Michael Donnelly*

B.6.1 A small assemblage of 14 struck flints was recovered from this evaluation. The evaluation also recovered 158 pieces of burnt unworked flint weighing 576g and seven pieces of natural flint misidentified as burnt stone.

B.6.2 There are no fully culturally diagnostic pieces but the assemblage does contain a mix of squat hard-hammer flakes of probable later Prehistoric date with a small collection of blade forms of earlier date. No cores or related curatorial debitage are present and the sole tool was a single side scraper on a squat hard-hammer struck flake of a quality usually associated with later prehistoric knapping.

B.6.3 The small number of blades were found in various contexts (2639, 2668, 3202, 3216 & 3302). These pieces most likely date to the Mesolithic or earlier Neolithic periods although some could possibly be outliers in later assemblages.

B.6.4 The assemblage generally displays low to moderate levels of edge damage and light or no cortication. This would suggest very little movement of this material.

B.6.5 Burnt flint concentrations in contexts 2639 and 3202 related to contexts that also produced struck flint. Some of these struck pieces were completely uindiagnostic but those from context 3202 could be argued as typifying later prehistoric assemblages. Such a date would be in keeping with the use of the burnt flint from these and other contexts as pot boilers, possibly associated with burnt mounds, or also potentially with their use in heating water related to salt production and a potential Iron Age date. Alternatively, the struck flint in these contexts could be residual.

B.6.6 In terms of the probable Mesolithic material, such limited small-scale knapping events or flint use sites would appear to make up the bulk of activity during these periods, particularly along stretches of land very suitable for hunting, gathering and fishing activities. The more formal sites that we more readily associate with this period would have probably been quite rare. As such, this continued discovery of what may be seen as a 'background noise' of early prehistoric flint-related activity may actually be quite significant. The blades could be early Neolithic in date and similar levels of land use may also be envisaged then, although these may also be associated with pit clusters and more formal monuments such as causewayed camps (Edmonds *et al* 1999; Garrow *et al* 2006).

B.6.7 The Bronze Age material found here and at other locations along this stretch of coast during the many phases of work at London Gateway could also be seen in a similar light

with opportunistic use of flint for very short-lived tasks coupled with denser assemblages (not encountered during this particular evaluation) associated with domestic activity, potentially involving the use of flint nodules to heat water.

| Context | type | sub-type | notes | date |
|---|---|---|---|---|
| 2401 | blade | inner | Edge damaged or utilised blade, soft hammer struck | Early prehistory (EPH) |
| 2509 | flake | preparation | | |
| 2639 | blade-like flake | inner | Probable bladelet but heavily burnt | EPH? |
| 2668 | blade | preparation | | EPH |
| 2704 | Irregular waste | | Burnt struck flint fragment | |
| 3203 | flake | inner | | |
| 3202 | flake | preparation | | |
| 3202 | flake | inner | Squat hard-hammer struck flake with cortical platform | LPH |
| 3202 | blade-like flake | preparation | Hard-hammer struck with cortical platform | LPH? |
| 3202 | flake | distal trimming | Bullhead bed flint, hard-hammer struck, cortical platform, possibly utilised | LPH |
| 3210 | side scraper | distal trimming | Bullhead bed flint, squat hard-hammer struck, signs of use, steep regular retouch right hand side | LPH? |
| 3210 | flake | inner | | |
| 3216 | blade | inner | Genuine prismatic blade form | EPH |
| 3302 | blade | side trimming | Quite thick blade bur probably early | EPH? |
| Un strat | burnt | unworked | 2 pieces weighing 18g | LPH? |
| 2509 | burnt | unworked | 2 pieces weighing 21g | LPH? |
| 2603 | burnt | unworked | 1 pieces weighing 6g | LPH? |
| 2639 | burnt | unworked | 79 pieces weighing 230g | LPH? |
| 3102 | burnt | unworked | 2 pieces weighing 19g | LPH? |
| 3202 | burnt | unworked | 65 pieces weighing 209g | LPH? |
| 3205 | burnt | unworked | 1 pieces weighing 4g | LPH? |
| 3220 | burnt | unworked | 1 pieces weighing 10g | LPH? |

*Table B.6.1: Summary of worked and burnt flint*

## B.7 Stone

*By Ruth Shaffrey*

B.7.1 A total of four pieces of stone were retained. These comprise one piece of unworked stone from the surface and three fragments of lava (3204). The lava fragments are almost certainly from rotary querns and their date range is Roman onwards. As their form is undiagnostic, it is not possible to narrow their likely date down further, but lava rotary querns are more likely to be recovered from Roman contexts.

## B.8 Human remains

*By Lauren McIntyre*

B.8.1 Fragments of cremated bone were recovered from sample flots taken from context (2639), Trench 26, Area A, during the archaeological evaluation at London Gateway

Lorry Park. Context (2639) is the upper fill of a large pit/possible waterhole. Pottery from this context indicates that the deposit dates to the early Roman period.

B.8.2 The cremated bone fragments were recovered from the upper pit fill (2639). The pottery from the earlier fills of this feature has been spot dated to the late Bronze Age/early Iron Age. A possible access ramp/walkway was constructed from Roman roof tiles at one end of this feature, while the pit was still partially open. The remainder of the pit was filled in during the early Roman period, with a backfill deposit (2639). This context was also rich in charcoal, fired clay fragments and iron slag, some of which are likely to derive from hearth bottoms.

B.8.3 This feature lies 0.6m to the south of four cremation burials identified in the extension to Trench 26. The cremated bone fragments are therefore likely to be redeposited from cremation burials located in the immediate surrounding area. The fragments would have been redeposited in the pit during infilling.

B.8.4 The deposit was processed by wet sieving, then sieved and sorted into >10mm, 10-4mm and 4-2mm fractions. The remains were examined in accordance with the recommendations set out by the IFA and BABAO (Brickley and McKinley 2004).

B.8.5 A summary of the osteological findings for deposit 2639 is presented in Table 1. The total weight of the cremated deposit was 3.1g. Fragments were predominantly a buff white colour, with lesser quantities of blue/grey and brown fragments. Nearly two thirds of the fragments (64.5% of the total bone weight) were less than 10-4mm in size, and two fragments (1.1g, 35.48% of the total bone weight) were over 10mm in size. Fragments of skull (vault) and torso (rib), were identified, making up a total of 41.94% of the cremated bone. The minimum number of individuals represented in the deposit was one, and the thickness of the identified bone fragments was in keeping with that of an older juvenile or adult individual. It was not possible to estimate sex. One unidentified fragment of long bone shaft was observed with periosteal new bone formation (periostitis) on the cortical surface.

B.8.6 One fragment of burnt non-human animal bone (0.4g, 12.9% of the total bone weight) was observed amongst the human material. This was identified as pig, specifically the distal end of a lateral metapodial (Strid, pers. comm.). The fragment was blue/grey in colour.

B.8.7 At 3.1g, the total weight of cremation deposit 2639 is substantially below the expected range for a cremated adult, which is between 1000g and 2400g, with an average of c. 1650g (McKinley 2000a, 269). The feature was not truncated by later features, although the uppermost part was cut by modern plough erosion. Despite this, the feature has survived to a reasonable depth. It is highly likely that these cremated bone fragments originally derived from the cremation burials located less than 1m to the north of the pit, likely being redeposited during infilling.

B.8.8 Cremated bone may range in colour from brownish-black (slightly charred) to white (fully calcined bone: McKinley, 2000b: 405). These colour changes are determined by firing temperature, duration of exposure of the body to flames, and oxygen supply (McKinley, 2000a: 66). While modern crematoria are able to maintain constant, optimal conditions (e.g. temperature, air circulation, fuel), these are more difficult to control when dealing with a pyre cremation (McKinley, 2000b: 404). For example, the length of time that the pyre can burn, and the attained temperature are often dependent on the quantity of fuel utilised (McKinley, 2000b: 269). Pyre technology, e.g. the method and form of construction, and degree of oxygen circulation, also influences the efficiency of

cremation (McKinley, 2000b: 269). This may lead to less uniform combustion of the corpse, which is reflected in the colour variation of the remaining skeletal fragments.

B.8.9 The majority of bone fragments recovered from context (2639) were buff-white in colour, although almost 20% were blue/grey, and a small number were brown. This may indicate that the degree of combustion was variable in terms of temperature and heat distribution. However, as the recovered quantity of bone was so small, this supposition is tentative.

B.8.10 The bone fragments represent a minimum of one individual, although the small quantity of bone present and considerable fragmentation made identification of repeatable elements problematic. The general thickness of identifiable skeletal elements indicates that this individual was either adult or an older sub adult. Unfortunately, no other diagnostic ageing or sexually dimorphic skeletal markers were identifiable.

B.8.11 Periostitis was noted on one fragment of unidentified long bone shaft. The rounded cross section and relative thickness of this bone fragment may suggest that it is either from the humerus or femur. Periosteal new bone (or periostitis) is formed as a response to non-specific inflammation of the overlying soft tissue as a result of trauma or other pathological conditions e.g. metabolic conditions such as scurvy, neoplastic disease, or specific infectious disease (Resnick and Niyawama, 1995; Roberts, 2000: 148; Weston, 2012: 492-3). In dry bone, periostitis may be identified as fine pitting, longitudinal striations, or plaque-like bone formations on the original cortical surface (Ortner, 2003: 206-7). Prevalence and severity of periosteal new bone formation in archaeological populations is generally utilised as being indicative of adaptation/maladaptation to environmental conditions, in particular poor sanitation, malnutrition and general health stressors (Roberts and Manchester, 1995). In this instance, there is insufficient evidence to determine whether this individual was suffering from a specific disease or other pathological condition.

B.8.12 Only a single fragment of animal bone was identified within the cremated remains. This was a cremated pig bone. Animals were sometimes placed on the funeral pyre as food offerings during the Iron Age and Roman periods (Philpott 1991: 195). Pig, along with sheep or goat, ox and domestic fowl remains are most commonly found in Romano-British cremation burials (Philpott, 1991: 196). The presence of pig bone therefore indicates the presence of pyre goods.

B.8.13 Sufficient data has been obtained from cremation deposit (2639), allowing where possible, observations to be made regarding pyre technology, funerary rite, demography, and palaeopathology; thus no further osteological analysis of these fragments is recommended. However, if further burials (such as the four identified during this evaluation) are recovered from this site in the future, deposit (2639) should be considered as part of the wider burial landscape, with a review of similar burials in type and date, within the region.

| Deposit | Skeletal region | >10mm | 10-4mm | Colour, MNI, age, sex, pathology |
|---|---|---|---|---|
| 2639 | Skull | 0.9g (vault fragment) | / | 71% bone fragments buff white in colour<br><br>19.35% bone fragments blue/grey in colour<br><br>6.45% bone fragments brown in colour<br><br>MNI = 1<br>Adult or older juvenile<br>?sex<br><br>Possible periostitis observed on 1x unidentified long bone fragment |
| | Axial | 0.2g (rib fragment) | 0.2g (rib fragment) | |
| | Upper limb | / | / | |
| | Lower limb | / | / | |
| | Unid. Long bone | / | 0.4g | |
| | Unid. Joint surface | / | / | |
| | Unid. other | / | 1.0g | |
| | (UNID. TOTAL) | / | (1.4g) | |
| | **TOTAL** | **1.1g** | **1.6g** | **2.7g** |

*Table B.8.1: Summary of cremation deposit 2639*

## B.9 Animal bone

*Identified by Lena Strid*

B.9.1 The animal bone assemblage is generally in poor condition, with the exception of the rabbit bones in context 2905 which are likely to be of relatively recent date. No further work is recommended at this stage, but the bone from the evaluation should be integrated into any further analysis arising from future archaeological work on the site.

| Context | Description |
|---|---|
| 2629 | 5 fragments sheep tooth, 4g |
| 2644 | 6 fragments cattle mandible, 54g |
| 2905 | 1 rabbit femur and metatarsal, 7g |
| 3204 | 7 fragments of 2 separate large mammal long bones, 38g |
| 3205 | 1 fragment cattle mandible and 1 fragment cattle mandibular molar, 10g |

*Table B.9.1: Animal bone from COLP15*

# APPENDIX C. ENVIRONMENTAL REPORTS

## C.1 Charred plant remains and charcoal

*By Sharon Cook (CPR) and Julia Meen (Charcoal)*

C.1.1 Two bulk samples were taken during archaeological evaluation works at the CECL Pipeline site, London Gateway:

C.1.2 Sample <6> (2639) was taken from a burnt dump deposit within the NW end of pit/waterhole 2640, partially overlying a linear arrangement of tiles. Pottery within this deposit dates it to the Late Iron Age – Early Roman period. The sample was 40l in volume and the deposit was a (10YR 3/1) very dark grey sandy silt loam.

C.1.3 Sample <7> (3202) was taken from a deposit within a natural depression which contained pottery dating from the Late Bronze Age. The sample was also 40l in volume and the deposit was a (10YR 5/3) brown sandy silt loam very similar to the natural.

C.1.4 The samples were processed by water flotation using a modified Siraf style flotation machine. The flots were collected on a 250µm mesh and the heavy residues sieved to 500µm and dried in a heated room, after which the residues were scanned for artefacts. The flots were scanned for plant remains using a binocular microscope at approximately x10 magnification. Nomenclature for the plant remains follows Stace (2010).

C.1.5 Sample <6> contained a quantity of charcoal and 15 items recovered from the heavy residue were selected for assessment (C.2). These were examined using a Brunel stereo microscope at x10-40 magnification and, where required, at up to x200 magnification using a Brunel Metallurgical SP-400BD microscope. Charcoal identifications were made using Schweingruber (1990).

**Residue:**

C.1.6 Sample <6> produced large quantities of fired clay, burnt flint and charcoal, with a small amount of pottery and slag. Occasional fragments of cremated bone were also retrieved which may relate to a nearby group of cremations which were preserved *in situ*.

C.1.7 Sample <7> also produced burnt flint with small quantities of pottery, fired clay and a single piece of possibly worked flint.

C.1.8 These finds will form a part of the finds reports.

**Flots:**

C.1.9 Sample <6> produced a flot of c. 1000ml of which 200ml was scanned for charred plant remains. While extremely rich in charcoal in good condition, some of which was suitable for species identification, there were very few other charred remains present. A single fragment could be identified as Barley (Hordeum vulgare L.) while five fragments in extremely poor condition could only be identified as cereal grains. In addition two Goosefoot (Chenopodium sp.) seeds were noted, also in poor condition.

C.1.10 Sample <7> produced a flot of c. 25ml of which 100% was scanned. The flot was almost entirely composed of fine roots with a very small amount of charcoal in poor condition. The charcoal was too small to be identified to species. Five badly preserved fragments of Goosefoot (Chenopodium sp.) were also observed.

C.1.11 The majority of charcoal fragments examined were identified as oak (Quercus sp.), with some of these being roundwood. The remaining items were provisionally identified as Pomoideae roundwood (hawthorn type) and one item of alder or hazel (Alnus/Corylus) roundwood.

### Discussion

C.1.12 Sample <6> produced a large flot rich in charcoal which would indicate an episode of burning in the vicinity, the remains of which were dumped in the pit/well (2640). The charred seeds, in contrast, appear to be residual or accidental inclusions within the deposit.

C.1.13 The seeds within sample <7> also appear to be the result of natural accumulation rather than deliberate deposition, while the charcoal appears to be the result of wind blown or washed in material rather than the result of a burning episode or deliberate deposition.

C.1.14 The charcoal from sample <6> was generally well preserved and appears from the initial examination of a small selection to be a mixture of roundwood and non-roundwood, including some probable heartwood amongst the oak. Further examination of this material may provide further information on whether smaller roundwood items were being deliberately selected, and whether the charcoal composition reflects the utilisation of an oak woodland with hawthorn/hazel understory.

## Appendix D. Bibliography and References

Barrett, J C and Bond, D, 1988 The pottery, in *Excavation at the north ring, Mucking, Essex* (D Bond), East Anglian Archaeology **43**, Chelmsford, 25–37

Biddulph, E and Stansbie, D, 2012 Pottery, in *London Gateway: Iron Age and Roman salt making in the Thames Estuary. Excavation at Stanford Wharf Nature Reserve, Essex* (E Biddulph, S Foreman, E Stafford, D Stansbie and R Nicholson), Oxford Archaeology Monograph **18**, Oxford, 74–6

Brickley, M, and McKinley, J I (eds), 2004 *Guidelines to the Standards for Recording Human Remains*, IFA Paper No. 7, British Association for Biological Anthropology and Osteoarchaeology (BABAO) and IFA

Clark A (1993) Excavations at Mucking. English Heritage. London

Drury, P J 1978 *Excavations at Little Waltham, 1970-71*, CBA Res. Rep. **26**, London

ECC, 2011, Aerial photographic assessment of the proposed Corringham gas pipeline corridor, Essex County Council Historic Environment Branch, for GEC

Edmonds, M, Evans, C, and Gibson, D 1999 Assembly and Collection _ Lithic Complexes in the cambridgeshire Fenlands. *Proc Prehis Soc* **65** (1999) 47-82

Garrow, D, Beadsmoore, E, and Knight, M, 2006 Pit clusters and the temporality of occupation: an earlier Neolithic site at Kilverstone, Thetford, Norfolk. *Proc Prehis Soc* **71** (2006) 139-57

Historic England, 2006 *Management of research projects in the historic environment: The MoRPHE project managers' guide*, English Heritage, Swindon

Fries-Knoblach, J, 2001 *Gerätschaften, Verfahren und Bedeutung der eisenzeitlichen Dalziederei* Mittel- und Nordwest-europa in Leipziger Forschungen zur Ur- und Frühgeschichtlichen Archäologie 2

Jones, M, 1977 Prehistoric salt equipment from a pit at Mucking, Essex Antiquaries Journal **57**, ii, 317-9 & Pl.LVI

McKinley, J I, 2000a Cremation burials, in The Eastern Cemetery of Roman London. Excavations 1983-1990 (B Barber and D Bowsher), 264-277, MoLAS Monograph **4.**

McKinley, J I, 2000b The analysis of cremated bone, in Cox, M and Mays, S (eds.) Human Osteology in Archaeology and Forensic Science, London: 403-21.

OA 2002, London Gateway Logistics and Commercial Centre Outline Planning Application.Archaeological surveys and up-date of assessment of impacts on cultural heritage in respect of the proposed development of London Gateway Logistics and Commercial Centre. Technical Report Volume 1. Prepared by Oxford Archaeology for P&O, July 2002 (includes Phase 1 Access Road corridor magnetometer survey report and fieldwalking report)

OA 2003a, The London Gateway Harbour Empowerment Order Archaeological Mitigation Framework (AMF), prepared by Andrews, G, Shepherd, N, Chandler, J, Firth, A, and Bates, M, on behalf of P&O. The AMF forms Appendix 2 of The London Gateway Logistics and Commercial Centre Harbour Empowerment Order, Statement of Common Ground on the Topic of Cultural Heritage for the HEO, agreed between the Peninsula and Oriental Steam Navigation Company (P&O) and Thurrock Council. Compiled by Macfarlanes and Faber Maunsell July 2003

OA 2003b, London Gateway Outline Planning Application: Archaeological Mitigation Framework.

OA 2005 *Sampling guidelines*. Unpublished document

OA 2010a, London Gateway Main Port and Park Access Road: Project Design for Archaeological Trenching, prepared by Oxford Archaeology for DP World

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

OA 2012b, London Gateway Archaeological Project Design Update Note, Archaeological Mitigation for the Access Road Phase 1 (Preliminary Ground Improvement) Works

OA 2012c, London Gateway Archaeological Project Design, Main Port and Park Access Road Mitigation: NW Section Soil Strip (Access Road Phase 3)

OA 2012d, A Multi-Disciplinary Investigation of the Sediments at the London Gateway Site, Essex: Geophysics, Palaeoenvironment and Dating, Final Deposit Model Update

OA 2014, London Gateway Access Road, Stanford-le-Hope, Essex: Archaeological Investigation Report

OA 2015, London Gateway CECL Pipeline Diversion: Project Design for an Archaeological Trench Investigation

OA 2016, London Gateway Logistics Park, Stanford le Hope, Essex, Proposed Great Garlands HGV Lorry Park. Archaeological Trench Investigation

Ortner, D J, 2003 Identification of pathological conditions in human skeletal remains. San Diego, Academic Press

Peachey, M, and Dale, R, 2005 'A late Medieval Site at Great Garlands Farm', *Essex Archaeology and History*, **36**

Philpott, R, 1991 *Burial Practices in Roman Britain. A Survey of Grave Treatment and Furnishing A.D. 43-410,* BAR British Series 219, Tempus Reparatum, Archaeological and Historical Associates

Resnick, D, and Niyawama, G, 1995 Enostosis, hyperostosis and periostitis. In D. Resnick (ed.), *Diagnosis of Bone and Joint Disorder*s. Philadelphia, Saunders: 4396-466

Rippon, S, 1991 Early Planned Landscapes in South-East Essex', Essex Archaeology and History **22**, 46-60

Roberts, C, and Manchester, K, 1995 *The Archaeology of Disease*. Ithaca, Cornell University Press

Roberts, C A, 2000 Infectious disease in biocultural perspective: past, present and future work in Britain. In M. Cox and S. Mays (eds.), *Human Osteology in Archaeology and Forensic Science*. London, Greenwich Medical Media: 145-62

Saunders, A, 1988 *A Short History of the Church and Village of Stanford-le-Hope*

Schweingruber, F. 1990. Microscopic Wood Anatomy (3rd edition). Birmensdorf: Swiss Federal Institute for Forest, Snow and Landscape Research

Stace, C, 2010 (third edition) *New Flora of the British Isles.* Cambridge: Cambridge University Press

Thompson, I, 1982 *Grog-tempered 'Belgic' pottery of south-eastern England*, BAR Brit. Ser. **108**, Oxford

Weston, D A, 2012 Non-specific infection in palaeopathology: Interpreting periosteal reactions. In A. L. Grauer (ed.), *A Companion to Palaeopathology*. Oxford, Wiley-Blackwell: 492-512

Wilkinson, 1988, *Archaeology and Environment in South Essex,* East Anglian Archaeology, Vol.**42**

English Heritage, 2011. Environmental Archaeology. A guide to the theory and practice of methods, from sampling and recovery to post-excavation (2nd edition). Centre for Archaeology guidelines

# Appendix E. Summary of Site Details

**Site name:** London Gateway CECL Pipeline Diversion

**Site code:** COLP15

**Grid reference:** NGR 570200, 182100

**Type:** Evaluation

**Date and duration:** 21/08/2015 to 18/09/2015

**Area of site:**

**Summary of results:**

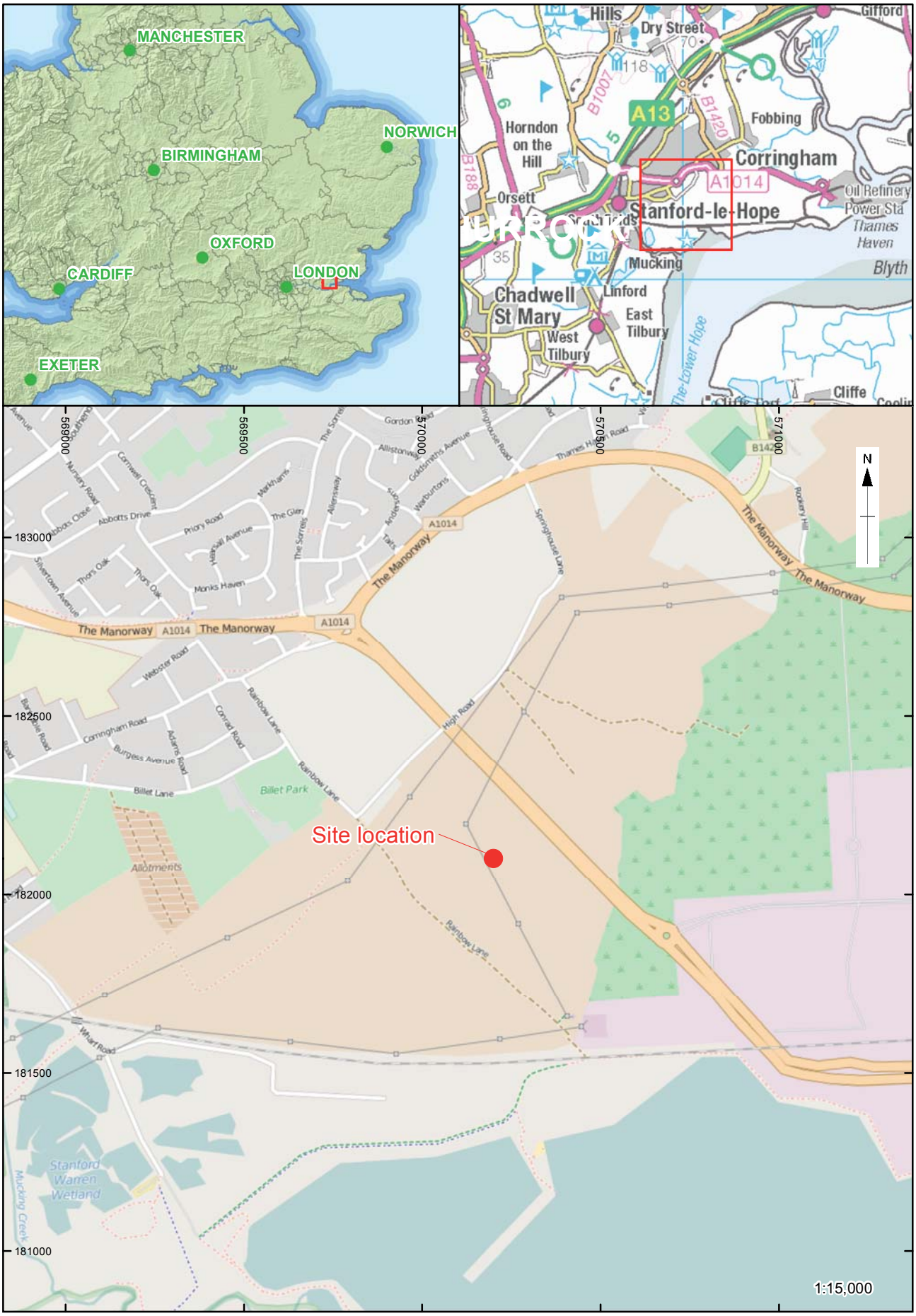
Oxford Archaeology South was commissioned by London Gateway Port Ltd to undertake an archaeological evaluation of the site of a proposed gas pipeline diversion crossing the main Port and Park Access Road leading to the London Gateway Port, alongside the River Thames near Stanford-le-Hope, Essex, centred on NGR 570200, 182100. The gas pipeline is owned by the Coryton Energy Company Ltd (CECL).The pipeline diversion works and associated working areas lie in an area of farmland at Great Garlands Farm, located outside the London Gateway Port to the west.

Eleven trenches were excavated and two significant concentrations of archaeology were identified. The relevant trenches were expanded to form small excavation areas, in order to clarify the extent of the remains. The excavation areas were designated Sites A and B:

**Site A** (NGR 570170/182400) was located on the north-east side of the LG Port and Park Access Road, 100m south-east from High Road. The earliest features in this area comprise a series of probable later prehistoric field boundary ditches, which appear to form a junction. Site A also contained a dense concentration of postholes and pits. Most of these are likely to be of early Romano-British date, although a later prehistoric date cannot be ruled out. Securely dated Romano-British features include a large pit, interpreted as a well and associated with a probable access path/ramp built from re-used Roman tile. This feature appears to have become the focus of a small cremation burial ground as four cremations were identified and others may be present beyond the limits of excavation. The extreme scarcity of Romano-British pottery from Site A, even though there were plentiful Roman finds of other types (eg. Roman roof tile, iron-smithing waste), suggests that this was not a focus of domestic settlement. Being in a coastal location the site could have have been connected with salt production.

**Site B** (NGR 570170/181970) was located on the south-west side of the LG Port and Park Access Road, 100m north-east from Rainbow Lane. This area contained later prehistoric and Roman enclosure ditches and a pond. The trenches in this area were placed to investigate a large rectilinear cropmark enclosure, which is at the south-eastern edge of a dense cropmark complex which extends on either side of Rainbow Lane. Most of the features appear to be of Late Bronze Age/Early Iron Age date but a single Roman boundary ditch was also identified.

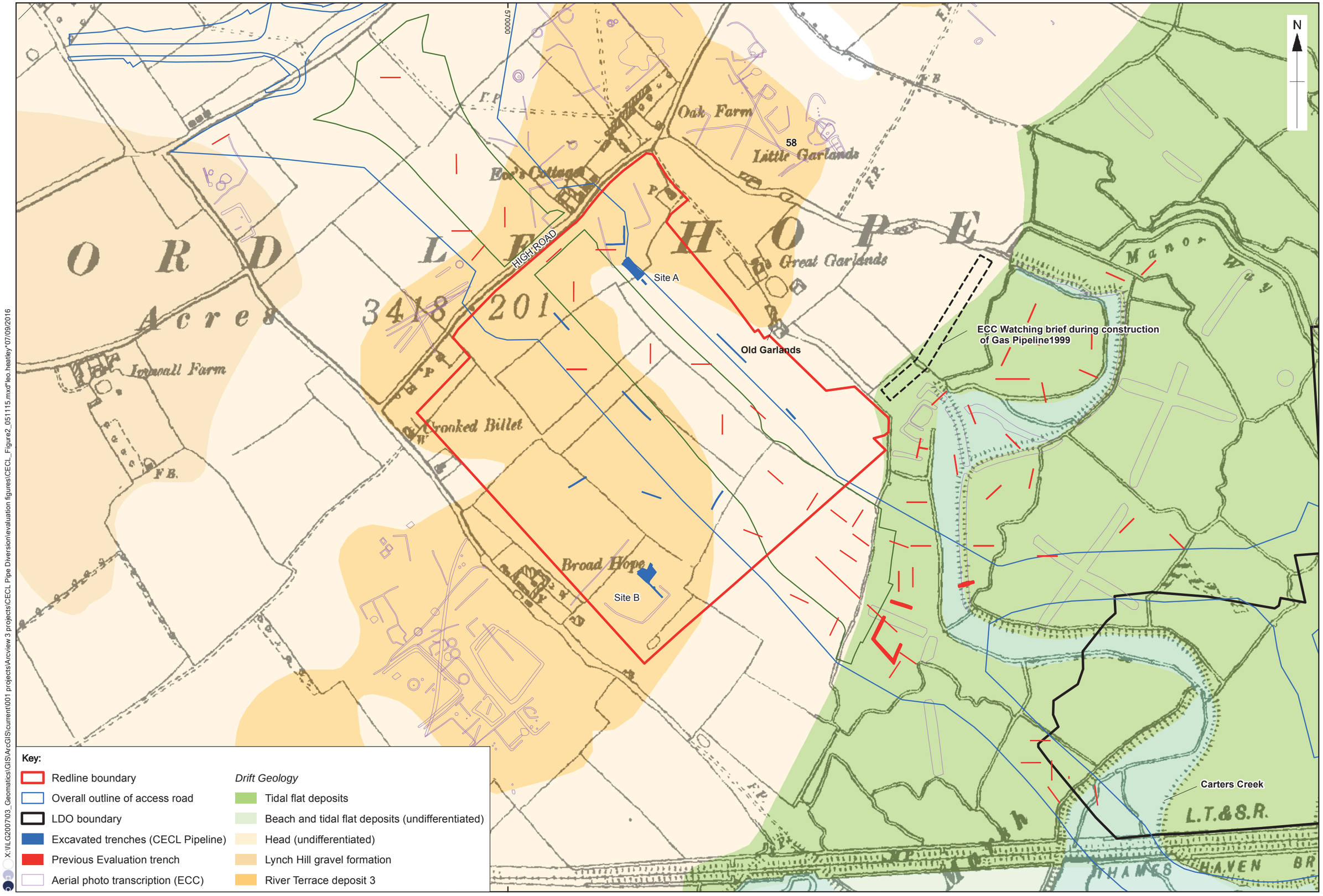
**Location of archive:** The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited with Thurrock Museum in due course.




\\Server8\invoice codes a thru h\C_invoice codes\COLPEV\CECL_PIPELINE_DIVERSION_TRENCHES_23-33\INTERIM_REPORT\COLPEV_Fig_01.mxd*markus.dylewski*05/11/2015



Figure 1: Site location




X:\ILG2007\03_Geomatics\GIS\ArcGIS\current\001 projects\Arcview 3 projects\CECL Pipe Diversion\evaluation figures\CECL_Figure2_051115.mxd*leo.heatley* 07/09/2016

Figure 2: CECL Pipeline Diversion application site and trench locations, overlaid on the 1898 OS Map and BGS geology, showing previous archaeological investigations in the vicinity

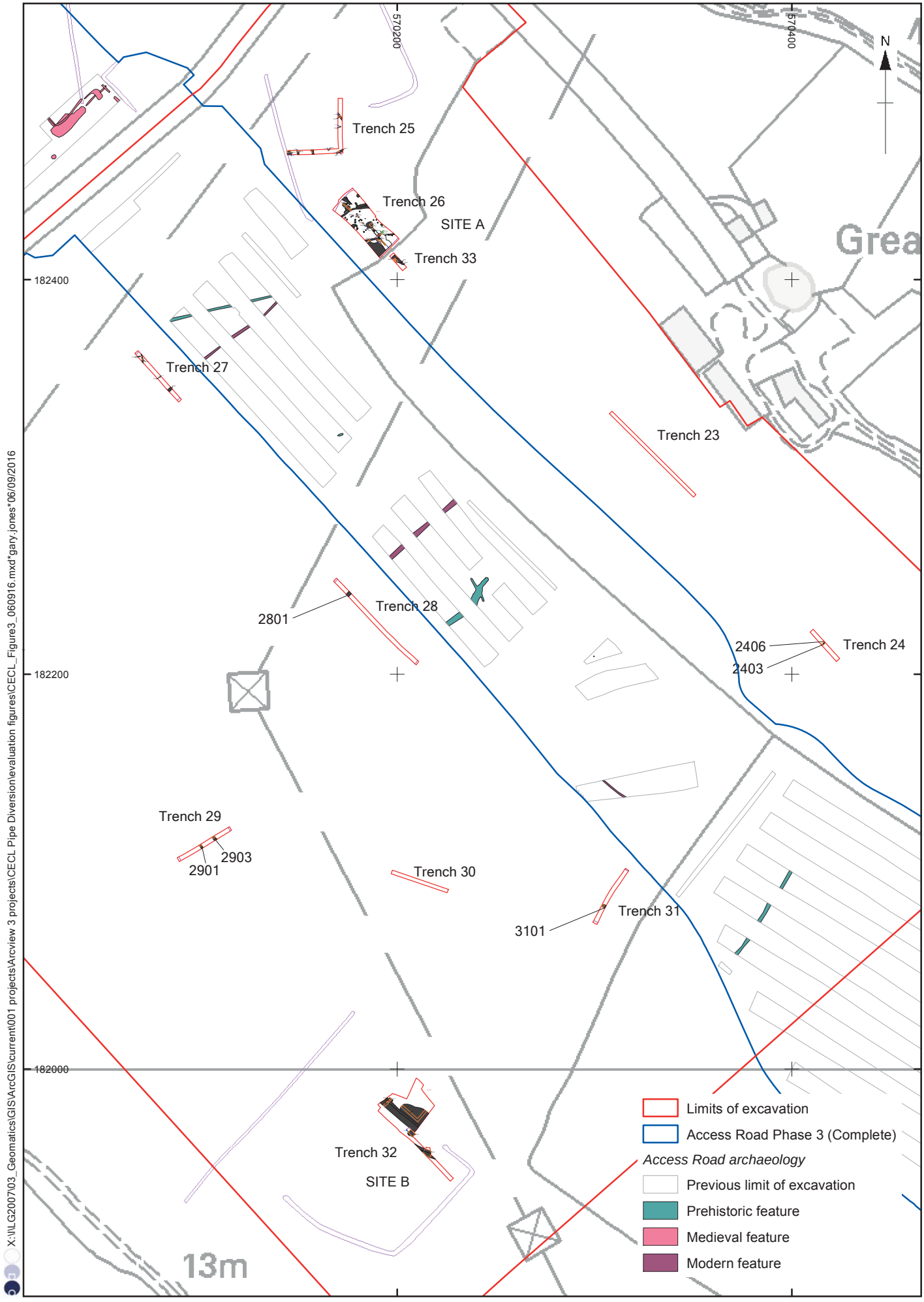
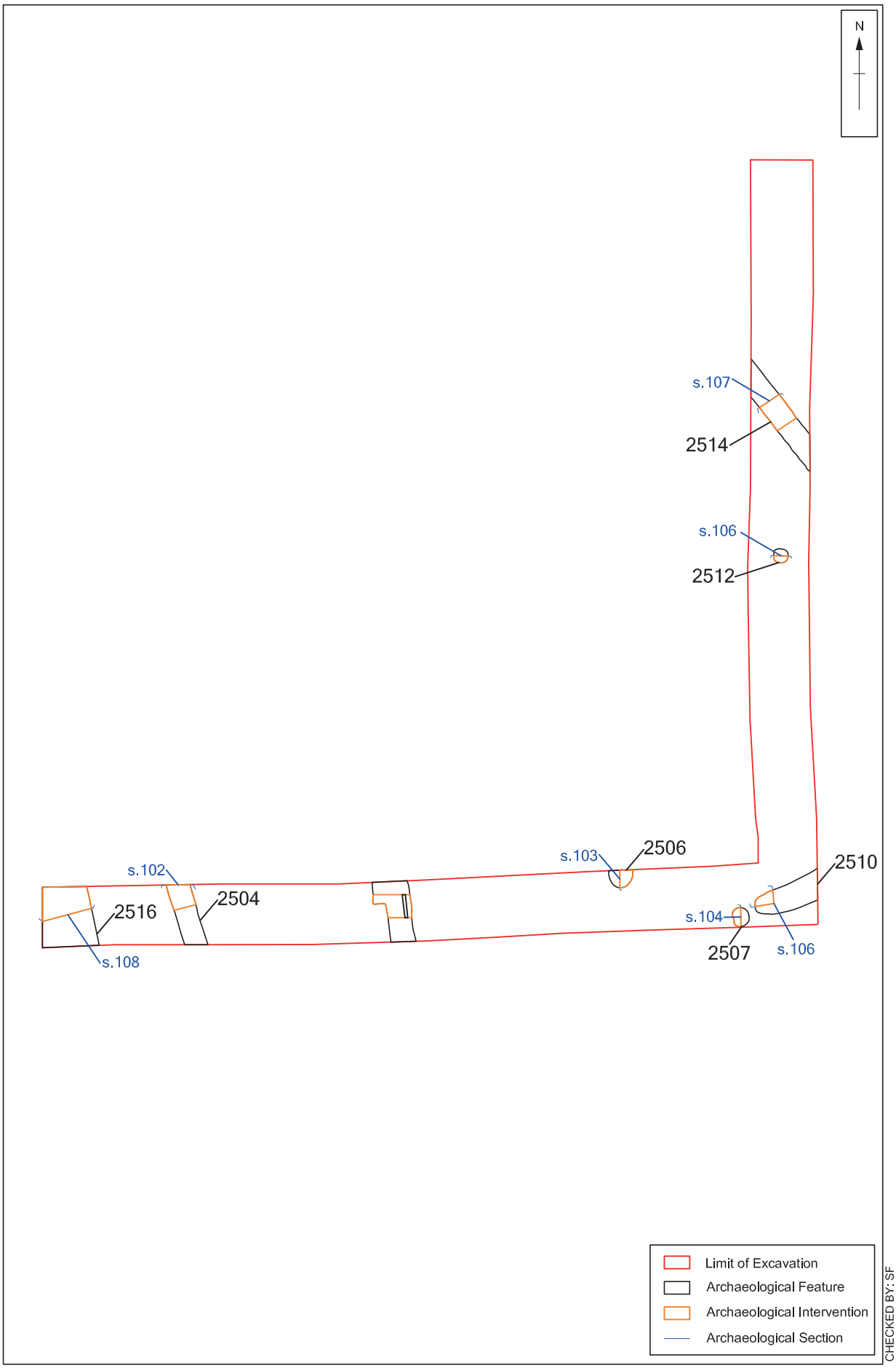



Figure 3: Summary overall trench plan




X:\ILG2007\03_Geomatics\CAD\001Current\COLPEV_CECL_PipelineDiversion\COLPEV_051115.dwg(A4 portrait figure 4)**COLPEV*CECL*matt.bradley* 07 Sep 2016

CHECKED BY: SF

Figure 4. Trench 25

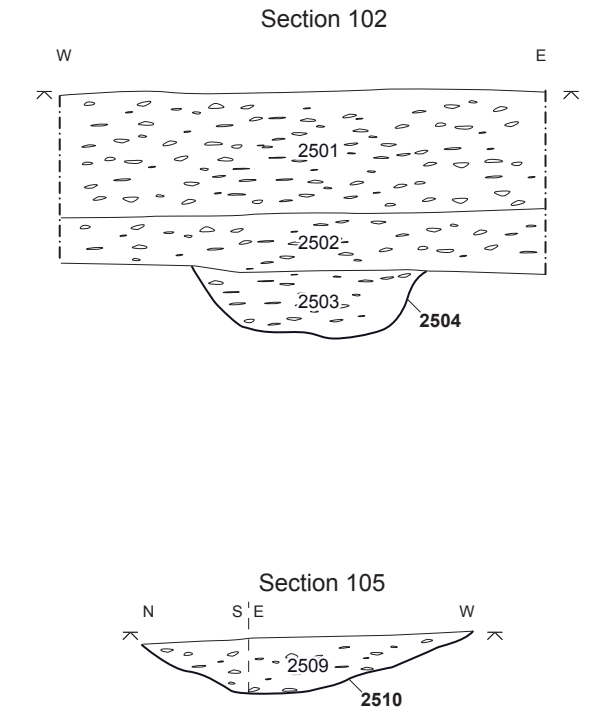



Figure 5: Trench 25 sections 102, 105, 108

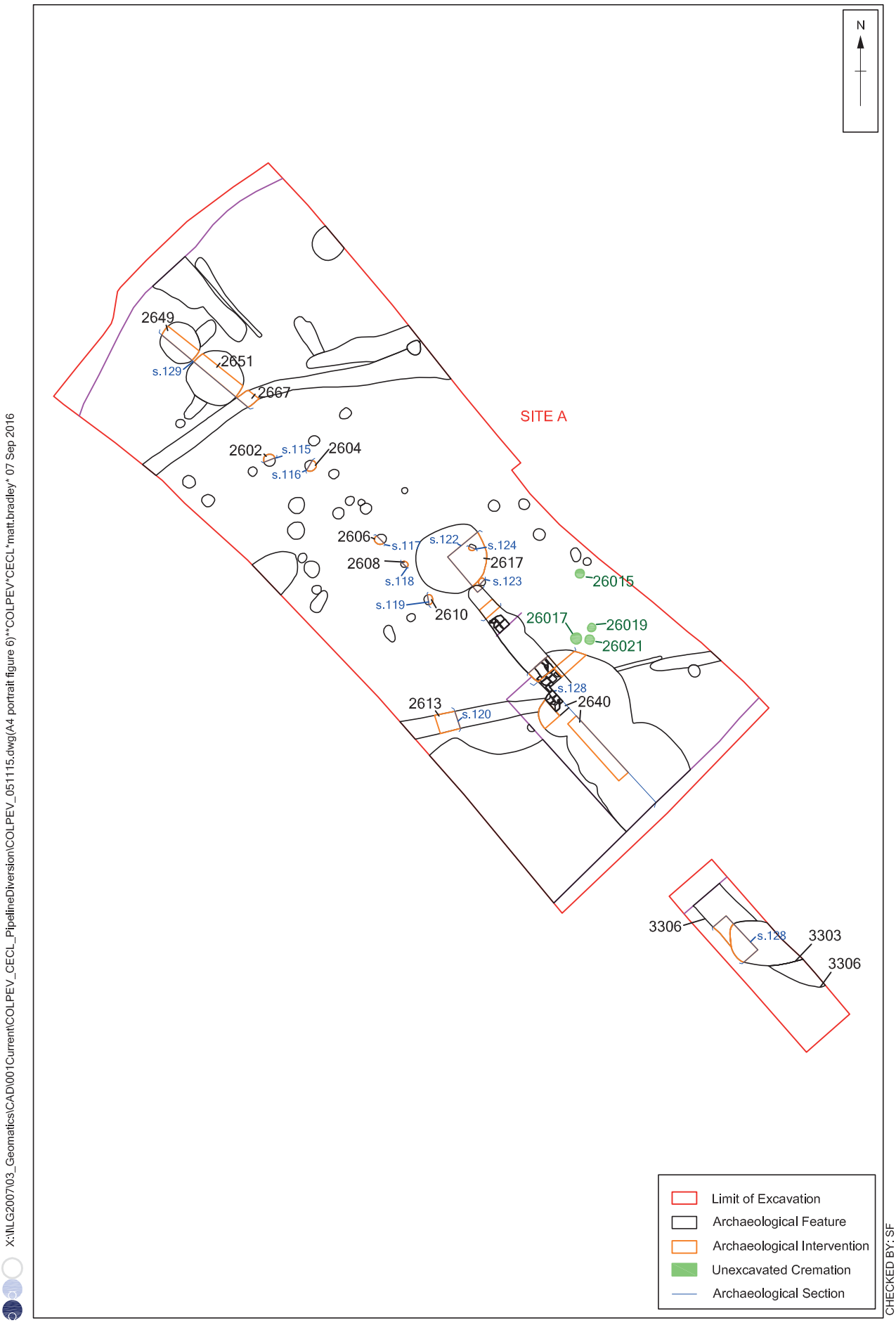



Figure 6. Area A, Trench 26

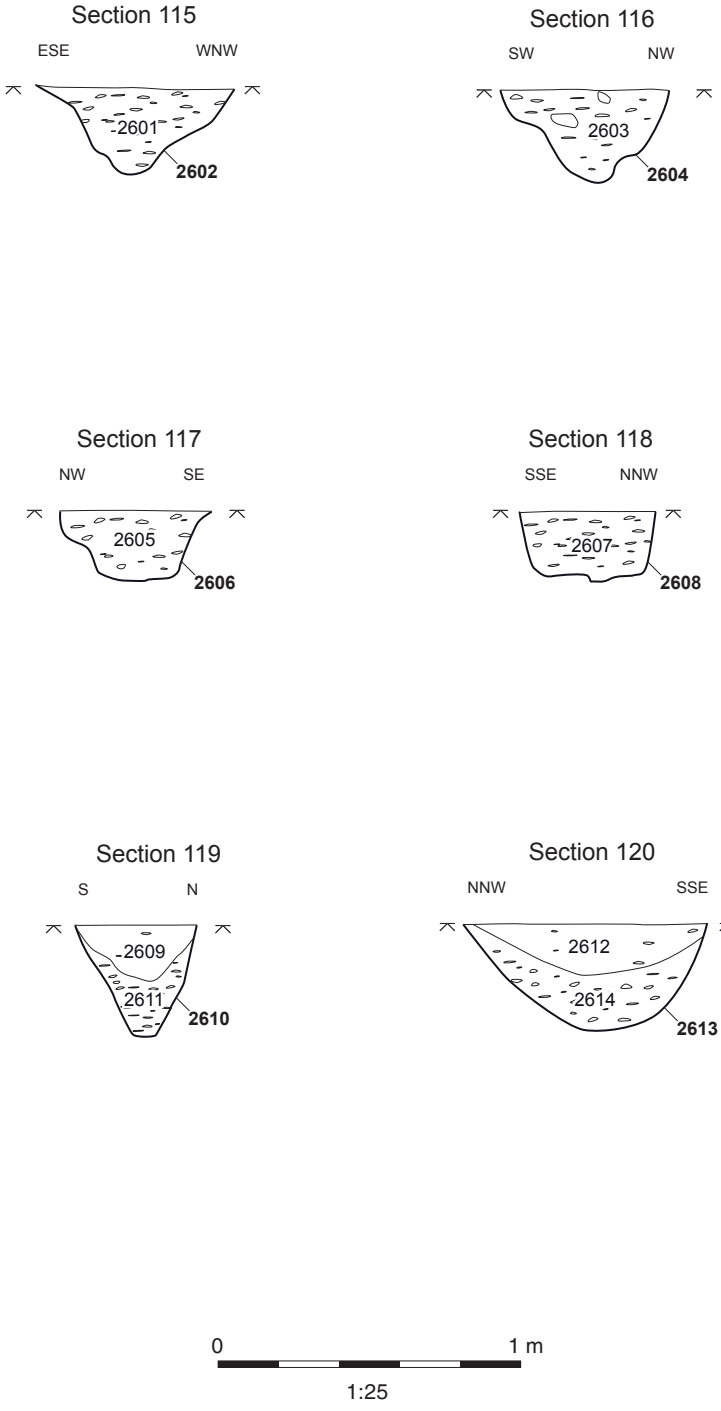



Figure 7: Trench 26 sections 115, 116, 117, 118, 119, 120

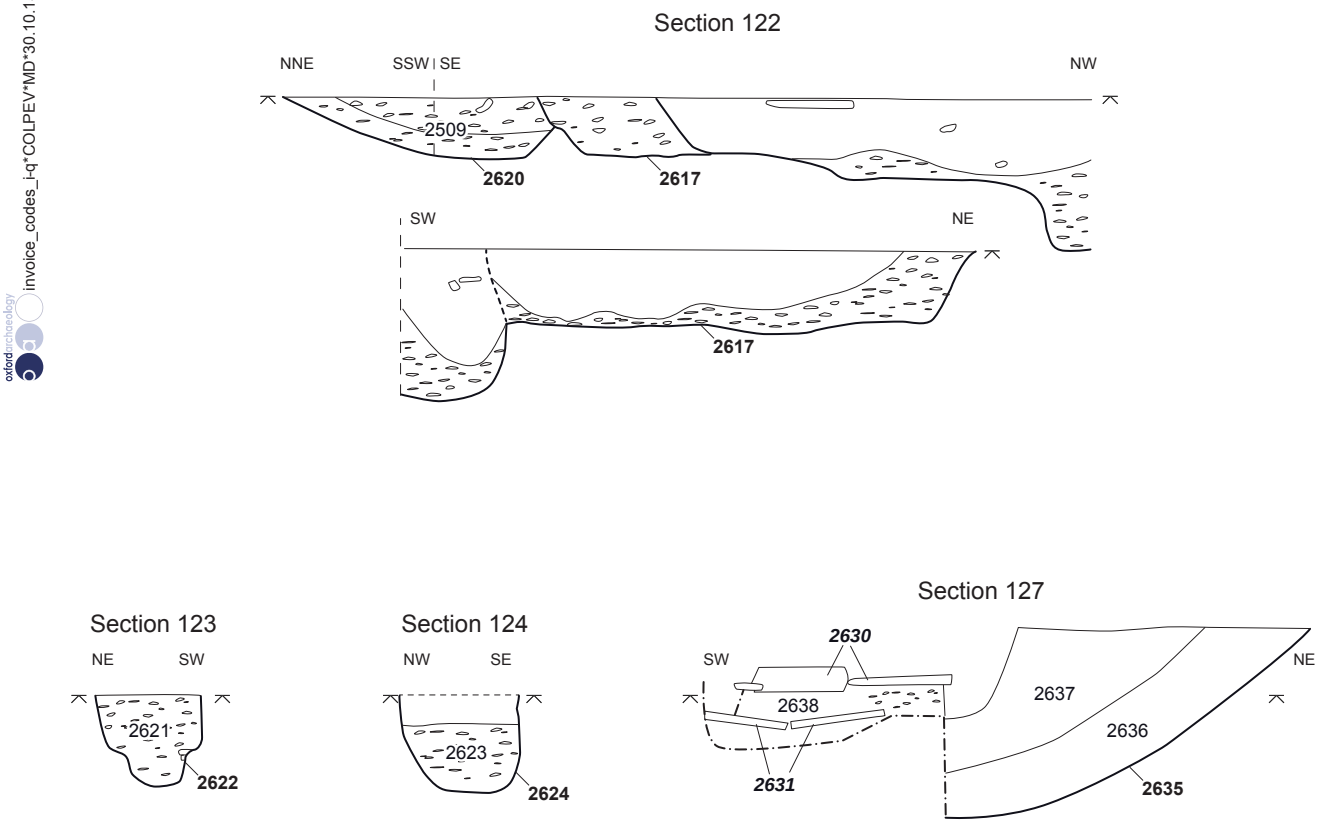
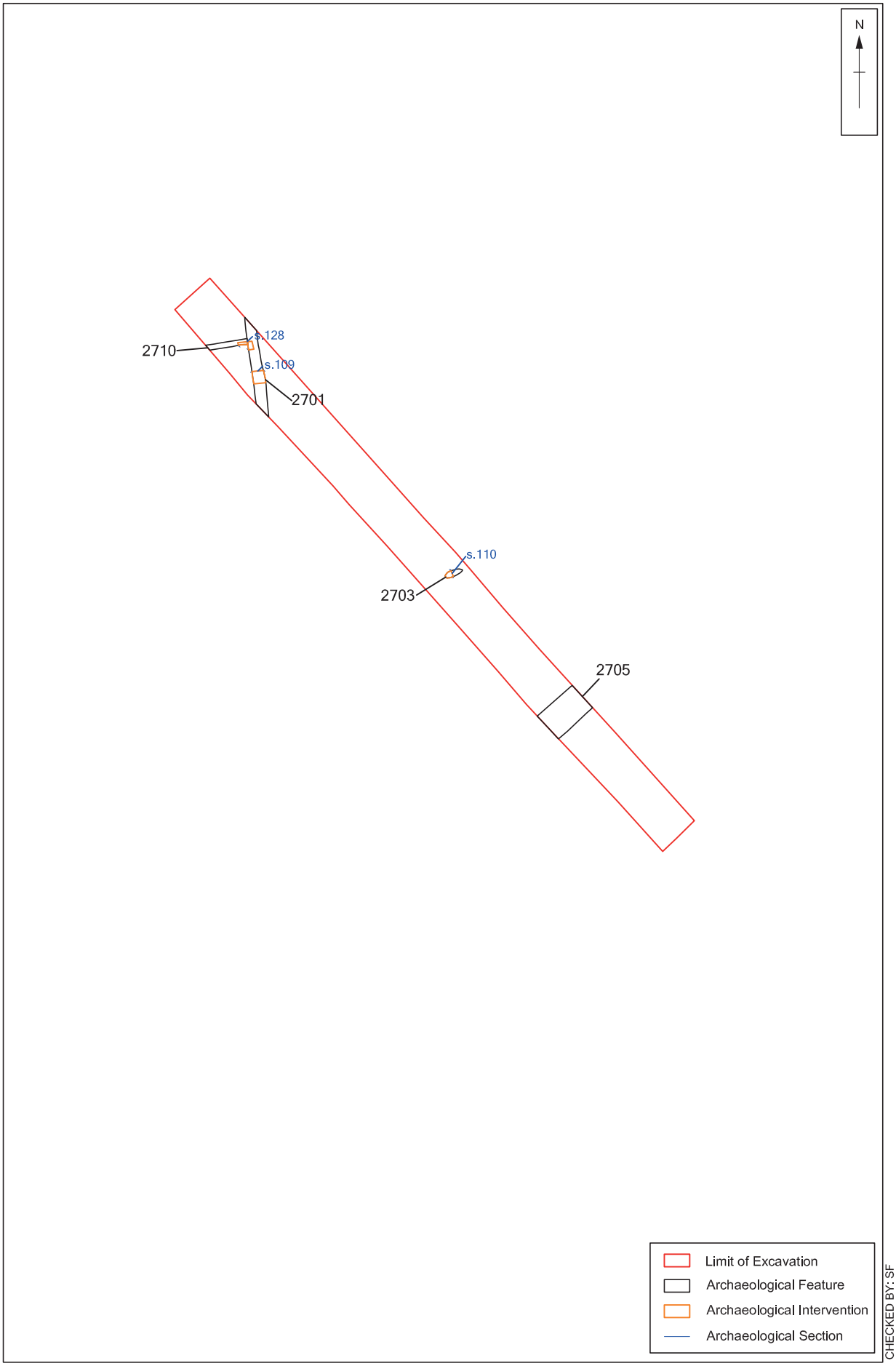


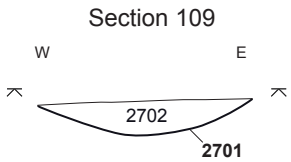

Figure 8: Trench 26 sections 122, 123, 124, 127, 128

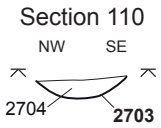



X:\ILG2007\03_Geomatics\CAD\001Current\COLPEV_CECL_PipelineDiversion\COLPEV_051115.dwg(A4 portrait figure 9)**COLPEV*CECL*matt.bradley* 07 Sep 2016

CHECKED BY: SF

Figure 9. Trench 27



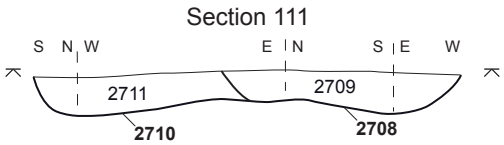





Figure 10: Trench 27 sections 109, 110, 111

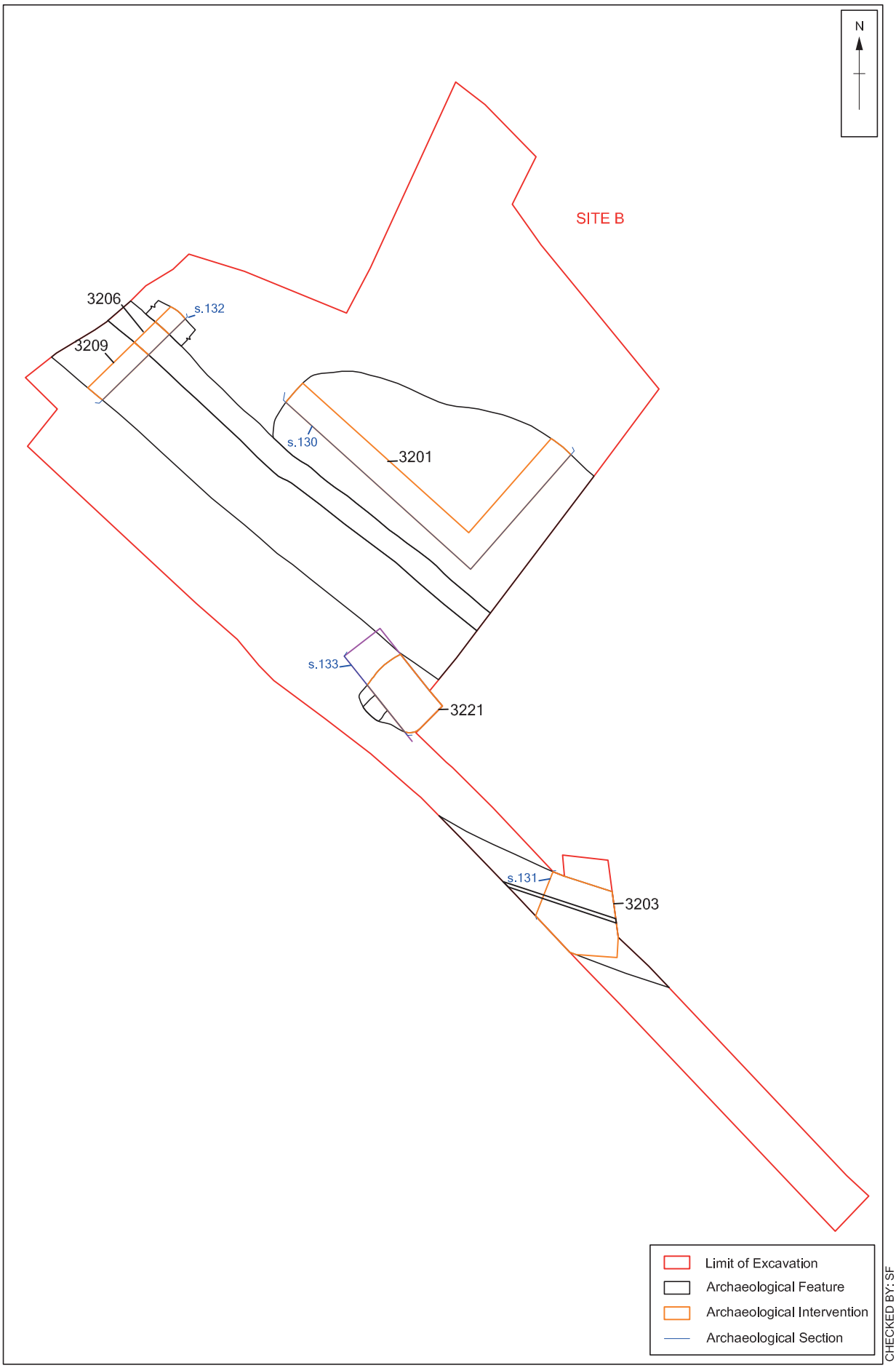



Figure 11. Site B, Trench 32

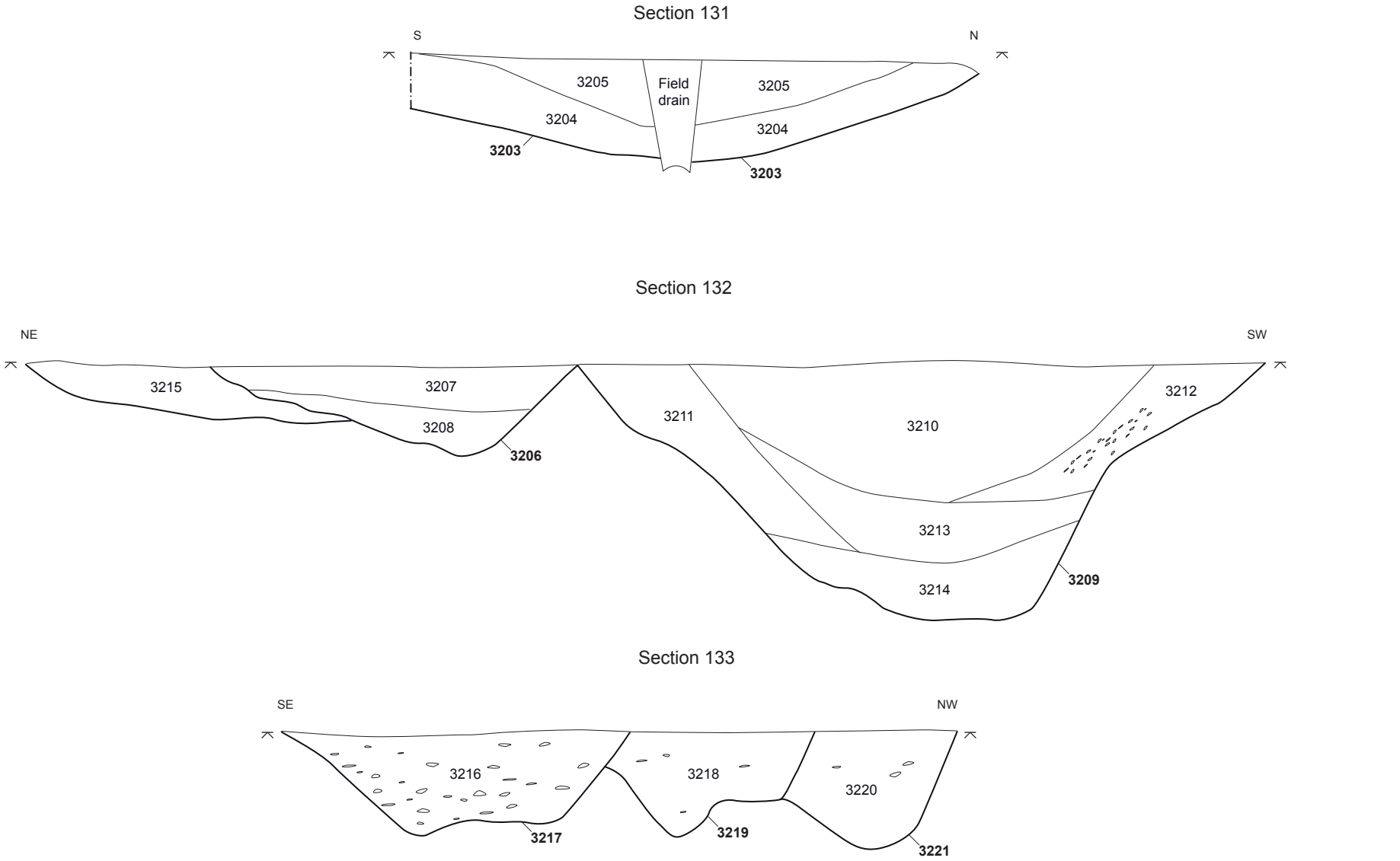



Figure 12: Trench 32 sections 131, 132, 133

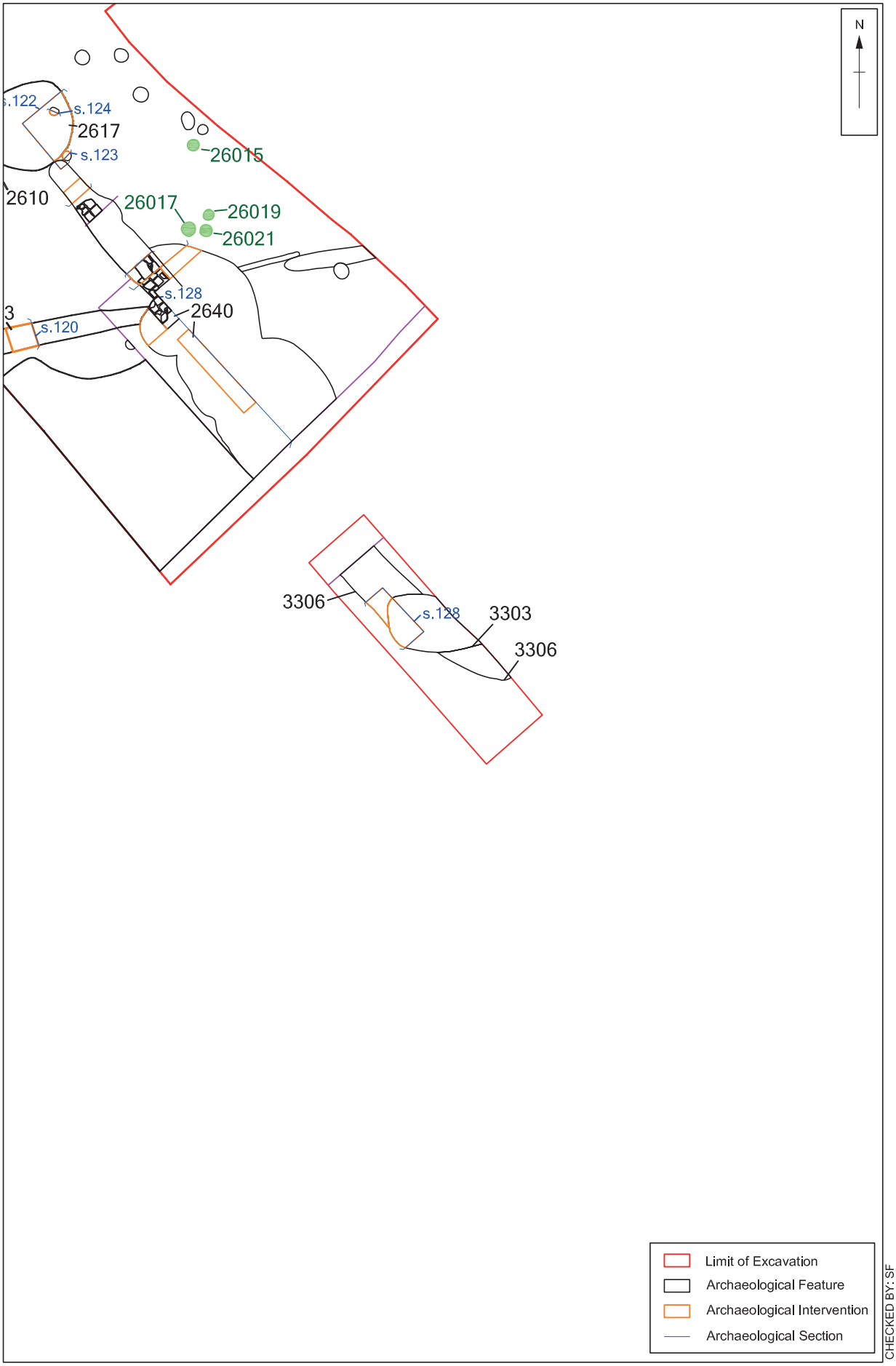



Figure 13. Trench 33

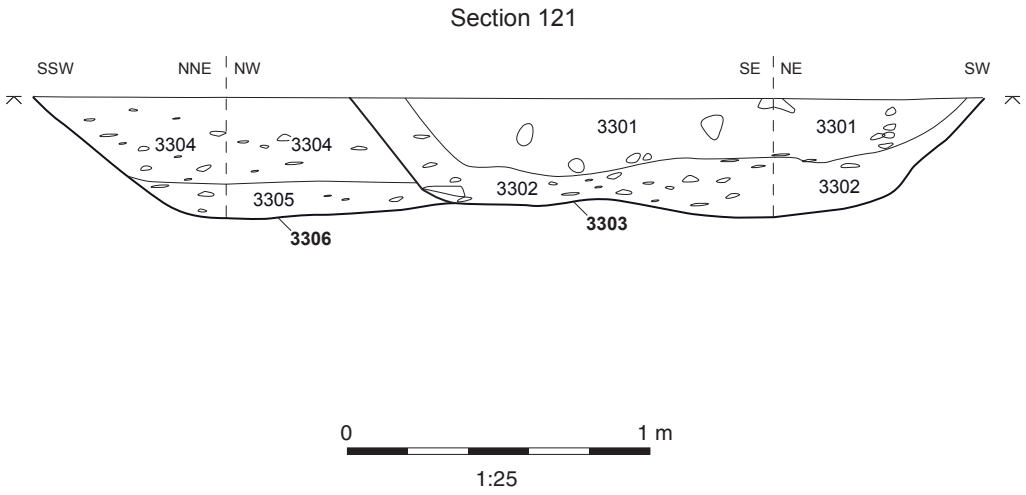



Figure 14: Trench 33 sections 121

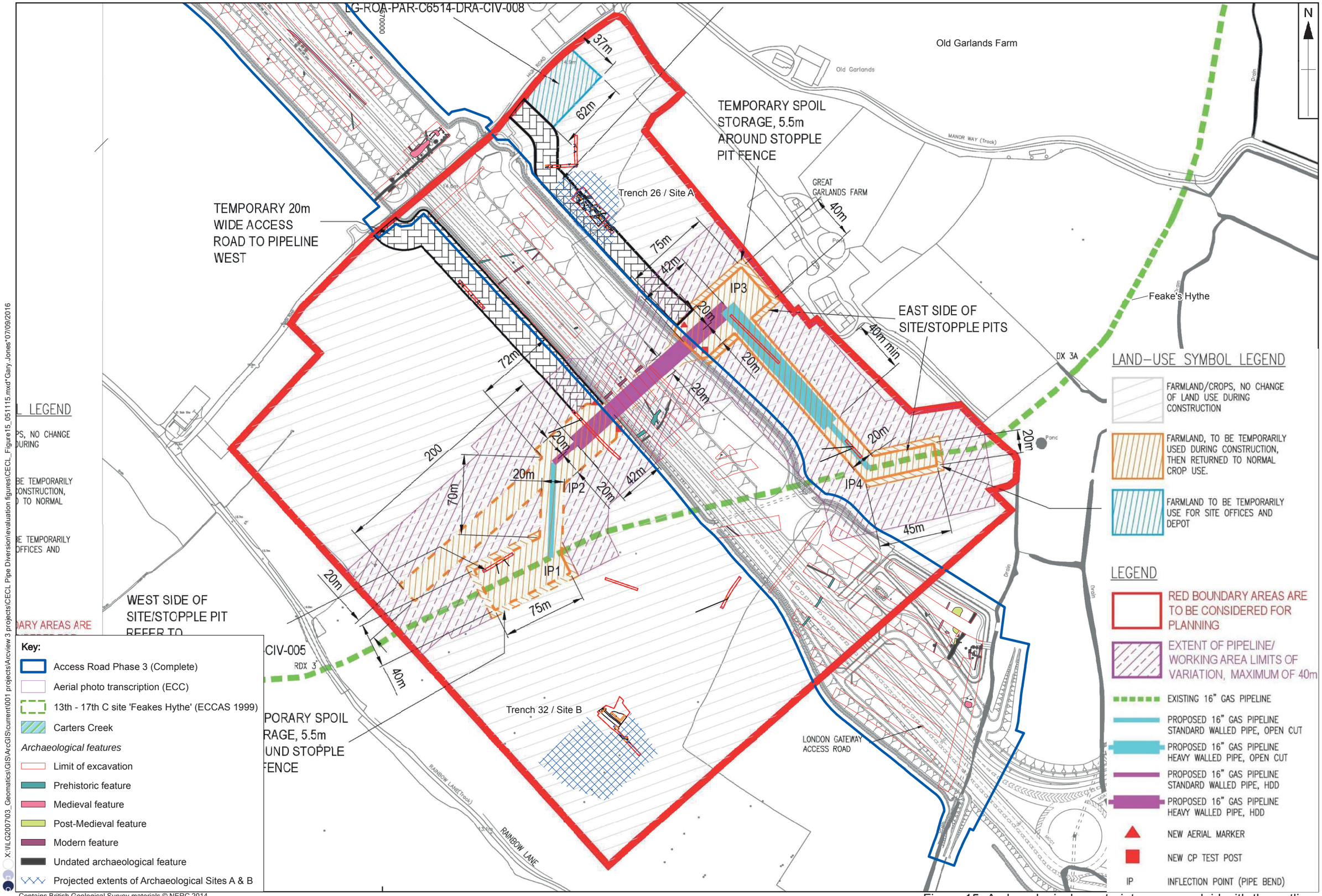







Figure 15: Archaeological constraints map overlaid with the outline design for the northern pipeline route option, showing the Horizontal Directional Drilling (HDD) method as the most extensive land-take

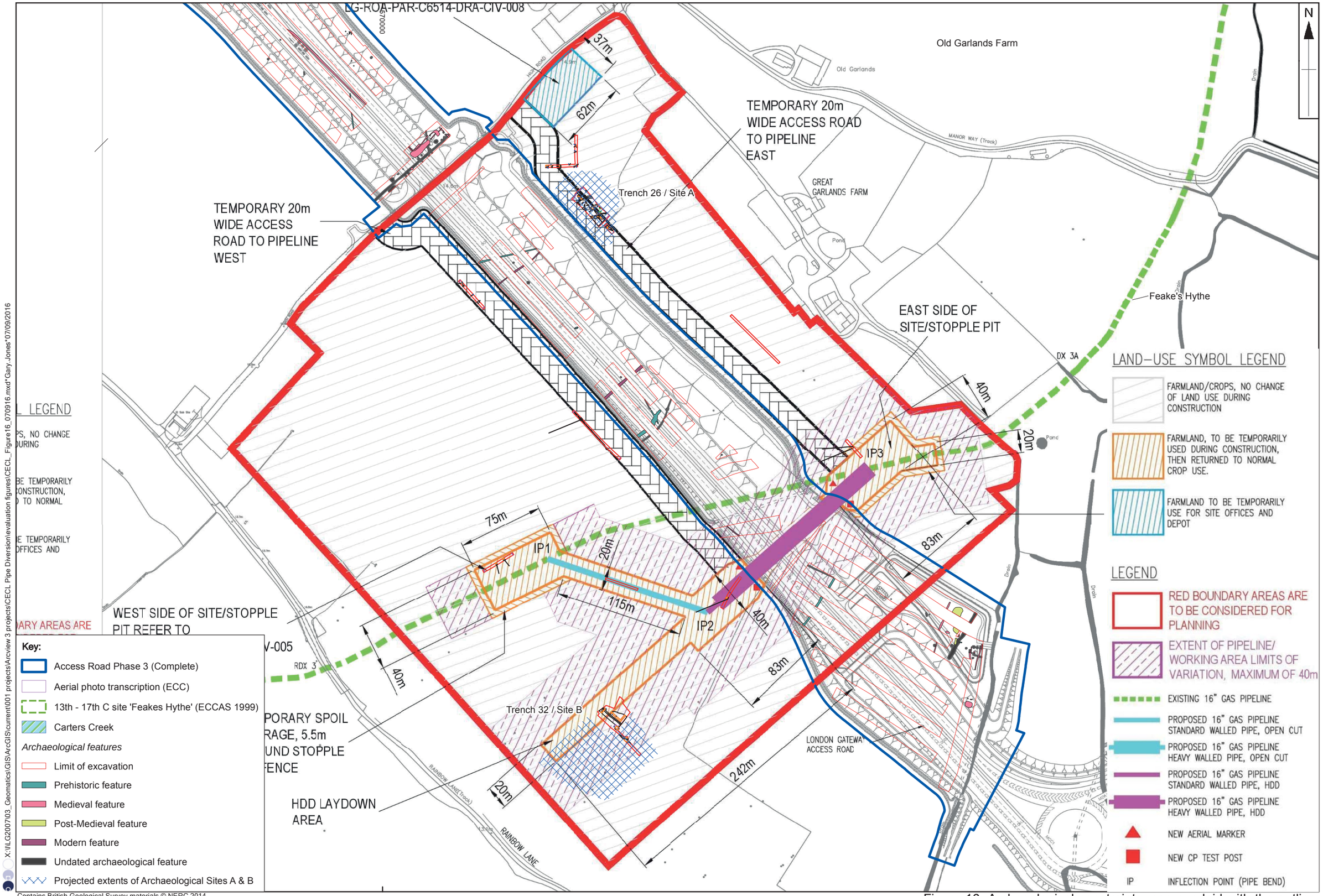







Figure 16: Archaeological constraints map overlaid with the outline design for the southern pipeline route option, showing the Horizontal Directional Drilling (HDD) method as the most extensive land-take

Plate 1: Area A, Roman tiled feature 2631, view NE

Plate 2: Area A, Roman tiled feature 2631, view N


Plate 3: Area A, Roman tiled feature 2631, view NW

Plate 4: Area A, Roman tiled feature 2631 and section 128, view NE

Plate 5: Area A, Cremation burial cluster (26015, 26019, 26021)

Plate 6: Area A, General view SE

Plate 7: Area B, Ditches 3217, 3219, 3221, Section 133, view NE


Plate 8: Area B, General view NW, Section 3201 in foreground

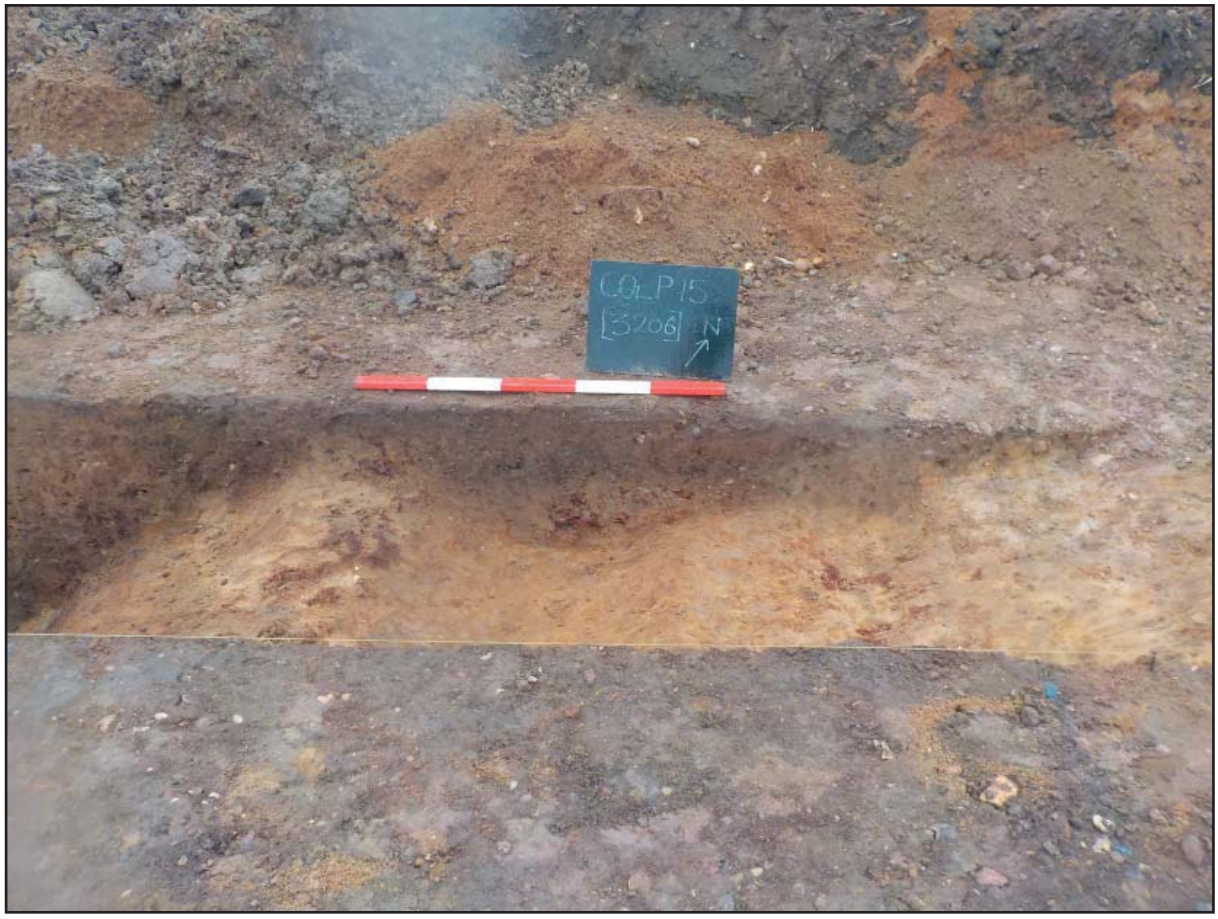



Plate 9: Area B, Ditch 3209


Plate 10: Area B, Ditch 3206

**Head Office/Registered Office/ OA South**

Janus House
Osney Mead
Oxford OX2 0ES

t: +44 (0) 1865 263 800
f: +44 (0) 1865 793 496
e: info@oxfordarchaeology.com
w: http://oxfordarchaeology.com

**OA North**

Mill 3
Moor Lane
Lancaster LA1 1QD

t: +44 (0) 1524 541 000
f: +44 (0) 1524 848 606
e: oanorth@oxfordarchaeology.com
w: http://oxfordarchaeology.com

**OA East**

15 Trafalgar Way
Bar Hill
Cambridgeshire
CB23 8SQ

t: +44 (0) 1223 850500
e: oaeast@oxfordarchaeology.com
w: http://oxfordarchaeology.com