M25 junction 28 improvement scheme

TR010029

9.45 Outline Archaeology Management Plan (AMP)

Rule 8(k)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

Volume 9

June 2021

Infrastructure Planning

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

M25 junction 28 scheme
Development Consent Order 202[x]

9.45 OUTLINE ARCHAEOLOGY MANAGEMENT PLAN (AMP)

Rule Number:	Rule 8(k)
Planning Inspectorate Scheme Reference:	TR010029
Application Document Reference:	TR010029/EXAM/9.45
Author:	M25 junction 28 scheme, Project Team, Highways England

Version	Date	Status of Version
2	June 2021	Deadline 9, final version
1	April 2021	Deadline 5
0	18 February 2021	Deadline 3a

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1 Introduction

1.1 Scheme background

1.1.1 This specification for archaeological excavation has been produced on behalf of Highways England by Atkins in relation to the M25 Junction 28 Interchange Scheme ("the Scheme").

1.1.2 The Scheme is an alteration of the existing junction 28 on the M25 which includes the provision of a dedicated loop road from the M25 northbound carriageway heading eastbound onto the A12, the demolition and reconstruction of the existing A12 eastbound off-slip and of the M25 northbound entry slip road, together with other improvements to the existing junction 28 roundabout, M25 and A12 carriageways.

1.2 Scope of brief

1.2.1 This brief sets out an outline programme of archaeological investigations to be implemented by Highways England during the detailed design and construction stages. These works will be delivered by the Principal Contractor who will appoint an archaeology contractor.

1.2.2 The purpose of this document is to provide sufficient information for archaeological contractors to tender for the design and implementation of the required archaeological investigations. The archaeological investigations undertaken to fulfil this specification will record and qualify the archaeological resource within the area of the Scheme ahead of and during construction through one or more of the following:

- Task-specific Written Schemes of Investigation (WSI) utilising this specification as its basis to include outline aims and research objectives of the project.
- Targeted archaeological evaluation trenching to determine the presence of nationally significant archaeological remains and inform design.
- Random archaeological evaluation trenching across the DCO boundary, at a percentage arrived at in consultation with GLAAS.
- Construction-integrated recording of archaeological remains through archaeologically controlled stripping, with subsequent sampling as identified in the WSI above, to preserve by record significant archaeological remains impacted by the Scheme.
- An archaeological watching brief for minor works associated within sensitive areas as identified through evaluation trenching.
- Interim reporting on programme and budget, with the goal of enabling construction to remain on programme.
- Reporting and analysis of the results of the investigations and creation of a stable archive to inform subsequent post excavation work.
- Post excavation assessment and analysis to inform the final assessment on the archaeological finds.

- Reporting and publication of assessments, analysis, and findings commensurate with the nature of the findings.
- Archiving of the digital and physical archives with the appropriate curator.

1.2.3 The details of this document to be followed for all pre-commencement archaeological work as well as those archaeological investigations undertaken during and following the commencement of the authorised works as outlined in the dDCO (TR010029/APP/3.1).

1.3 Roles and responsibilities

1.3.1 For the purposes of this scope of works, an Archaeological Contractor will be appointed to provide specialist consultancy expertise to deliver the archaeological excavation and subsequent post excavation works. Specific roles and responsibilities are outlined below:

- The Client – Highways England
- The Principal Contractor – The nominated contractor employed by the Client to prepare the final designs and construct the Scheme
- Archaeological Contractor – the nominated archaeological company employed by the Client or PC to carry out the archaeological works
- Archaeological Consultant – the nominated consultancy employed to oversee the implementation of the Archaeological Management Plan
- Consultee – Greater London Archaeological Advisory Service (GLAAS) acting for London Borough of Havering and Historic England where noted. Whilst part of the Scheme is located within Essex, consultations conducted for the environmental statement led to the decision for GLAAS to take the lead regarding archaeological impacts, as the majority of the ground-disturbing construction activities will take place within their jurisdiction.

2 Purpose and scope

2.1 Purpose

2.1.1 Chapter 11 (Cultural Heritage) of the Environmental Statement (ES)[1] (TR010029/APP/6.1) for the Scheme identified measures to be undertaken to evaluate, and/or mitigate potential impacts of the Scheme on the archaeological resource. The ES chapter also identified the requirement to preserve significant archaeological remains in situ through detailed design and construction stages.

2.1.2 This document acts as an overarching Written Scheme of Investigation (oWSI) designed to provide an outline within which task-specific WSIs can be developed for the individual evaluation and mitigation works. The WSIs will be forwarded to GLAAS for their information and comment.

2.1.3 The planning and delivery of a programme of archaeological management and mitigation required for the Scheme will be further developed by the Principal Contractor and Archaeological Contractor during the detailed design, pre-construction and construction stages of the Scheme.

2.1.4 The archaeological investigation work will fall into three broad categories:

- Identification of where the Scheme will and will not have the capacity to impact upon hitherto identified and recorded archaeological remains.
- further evaluation, if and where required, to identify, characterise and establish the significance of hitherto unidentified archaeology.
- mitigation through archaeological investigation, recording and publication of any archaeological remains that cannot be preserved in situ within the scheme footprint.

2.2 Compliance with technical standards

2.2.1 The Scheme will be constructed and operated under the authority of a development consent order (DCO made by the Secretary of State and follows the appropriate guidance pertaining to cultural heritage found within Volumes 10 and 11 of the Design Manual for Roads and Bridges (DMRB).

2.2.2 The approach to delivering archaeology for a road scheme of this type is outlined within LA106 of Volume 11, Section 2 of DMRB.

2.2.3 Whilst the DCO would authorise the construction and operation of the Scheme, the following industry legislation and guidelines are applicable to all sections of the Scheme. The legislation outlined below applies to works conducted in advance of a DCO being made, while the technical guidance is applicable to all archaeological works conducted under this AMP.

Legislation

- Highways Act 1980
- Ancient Monuments and Archaeological Areas Act 1979
- National Heritage Act 1983

[1] https://infrastructure.planninginspectorate.gov.uk/projects/south-east/m25-junction-28-improvements/?ipcsection=docs

- Treasure Act 1996
- Burial Act 1857.

Guidance

2.2.4 The following general guidance and standard documents will guide all work undertaken. Where relevant, other documents, are referred to directly in the appropriate Specific Methodologies as set out in Section 7 of this Strategy.

- Chartered Institute for Archaeologists (CIfA), 2019a. Code of Conduct
- Chartered Institute for Archaeologists, 2020a. Standard and guidance for archaeological field evaluation
- Chartered Institute for Archaeologists, 2020b. Standard and guidance for archaeological geophysical survey
- Chartered Institute for Archaeologists, 2020c, Standards and guidance for archaeological excavation
- Chartered Institute for Archaeologists, 2020d, Standards and guidance for and archaeological watching brief
- Chartered Institute for Archaeologists, 2019b, Standards and guidance for the archaeological investigation and recording of standing buildings or structures
- Chartered Institute for Archaeologists, 2020e, Standards and Guidance for the creation, compilation, transfer and deposition of archaeological archives
- Chartered Institute for Archaeologists, 2020f, Standard and guidance for the collection, documentation, conservation and research of archaeological materials
- DCLG, 2018. National Planning Policy Guidance
- Campbell, G, Moffett, L and Straker, V 2011 'Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition)'. Portsmouth: English Heritage
- Historic England, 2008, MoRPHE Project Planning Note 3: ‘Archaeological Excavation’
- Historic England, 2015a. Management of Research Projects in the Historic Environment: The MoRPHE Project Managers’ Guide
- Historic England, 2015b. Conservation Principles, Policies and Guidance: For the sustainable management of the historic environment
- Historic England, 2016. Preserving Archaeological Remains: Decisions-taking for Sites under Development
- Museum of London, 1994. Archaeological Site Manual (Third Edition)
- Watkinson, D and Neal, V., 2001. First Aid for Finds.

3 Baseline

[The Archaeology Contractor appointed by the Principal Contractor will be required to include a summary of known archaeological background, potential for as-yet unknown archaeology, and the research themes considered appropriate to guide archaeological investigations. This section will build on and collate information from the DBA, ES, and geophysical watching brief.]

3.1.1 The evidence baseline for the Scheme has been developed on the following assessments completed for the preparation of the DCO application:

- An Archaeological Desk-Based Assessment produced by AOC in 2017[2].
- Baseline assessments identified and outlined in the Environmental Statement (ES)[3].
- An archaeological Watching Brief conducted during geotechnical investigations (see Appendix A).

3.1.2 The information provided below presents a summary of the baseline as known to date. It includes information from both the Essex Historic Environment Record (EHER) and Greater London Historic Environment Record (GLHER), references to which are prefixed MEX and ELO, respectively.

1.1. Previous archaeological assessment

3.1.3 The EHER and GLHER record desk-based assessments for the widening of the M25 (MEX1035105); Thames Chase Community Forest (ELO11755) and Oak Farm Cemetery (ELO15641). The EHER does not give any information for the assessment undertaken in advance of the M25 widening. The assessment was located within the DCO boundary. Intrusive works undertaken following the assessment revealed post-medieval ditch boundary features. Additional archaeological investigation undertaken for the M25 – Tank 1706 and Strip Widening (MEX1049358) revealed two ditches which, upon excavation, were revealed to be back filled post-medieval field boundaries.

3.1.4 No archaeological deposits were encountered during investigations at M25 Tank 1727 (MEX1049360), M25 Tank 1740 and Strip Widening (MEX1049361) or M25 – Warley Road to Berden's Lane Strip Widening (MEX1403962) which are also located within the DCO boundary. Colluvium deposits were recorded as being preserved in situ between Warley Road and Berden's Lane.

3.1.5 The Thames Chase Community Forest desk-based assessment (ELO11755), undertaken in 1992, partially lies within the Site Boundary and within the Study Area, however it also extends over c. 4,398 ha to the south and west of the Site taking in the London Boroughs of Havering and Barking and Dagenham and the Essex districts of Brentwood and Thurrock.

3.1.6 The desk-based assessment undertaken at the Oak Farm Cemetery (ELO15641) in 2014, was located south of the A12 and west of the M25. The extreme eastern edge of the assessment area, along Ingrebourne River, is located within the Site Boundary. The assessment concluded that there was

[2] TR010029-000218-TR010029_M25_j28_6.3_Environmental_Statement_Appendix_11.2_Archaeological_DBA.pdf (planninginspectorate.gov.uk)
[3] https://infrastructure.planninginspectorate.gov.uk/projects/south-east/m25-junction-28-improvements/?ipcsection=docs

potential for ditches associated with the London to Colchester Roman road (DLO33238) and potential for paleoenvironmental remains given the APZ (DLO33196) along Ingrebourne River and Weald Brook. The assessment also noted the potential for post-medieval field boundaries.

3.1.7 In 2017, Independent Archaeology Consultants conducted evaluation trenching at the Oak Farm cemetery site south of the A12. The trenching resulted in the identification of what was thought to be Iron Age linear features within a single trench (Trench 34)[4]. Archaeological strip, map, and sample investigations were subsequently conducted by Development Archaeological Services, Ltd (DAS) in 2018[5]. Post-excavation analysis of the pottery recovered from excavations near Trench 34 (Area A in the DAS report) resulted in the identification of the pottery as Early Saxon in date (AD 450-650). The features were interpreted as drainage conduits and possible foundations for a light building structure.

3.1.8 The finds and analysis of the Early Saxon remains at Oak Farm suggest a possible presence of other Saxon remains nearby, including possible settlements.

3.2 Archaeological and historic background

Prehistoric (-AD 43)

3.2.1 There are no known prehistoric remains within the Site Boundary. However, GLHER designates part of the site an Archaeology Priority Zone (APZ), along the Ingrebourne River and Weald Brook (DLO33196) in the northwest area of the Site. This has been designated because the underlying geological alluvial deposits have the potential to overlie prehistoric deposits. Alluvial deposits can be particularly conducive to the preservation of paleoenvironmental features which can be useful for dating purposes. Further Archaeological Priority Zones of Gravel Head Deposits (DLO33197) and Gravel Sand Deposits (DLO33198) are similarly designated for the potential for prehistoric deposits to be buried beneath gravel deposits. [These areas are located c. 280m to the west of the southern extent of the Site Boundary and c. 150m north of the eastern extent of the Site Boundary respectively.]

3.2.2 A cropmark, recorded on aerial photographs, east of Little Tomkyns Farm (MLO100582) and at the southern extent of the study area, is undated; but on typological grounds the GLHER suggest that it may be indicative a Bronze Age barrow.

3.2.3 Current evidence indicates a lack of known heritage assets of prehistoric date within the study area, but the GLHER's designation of an APZ along Ingrebourne River and Weald Brook indicates geological conditions which may be conducive the survival of such remains. On this basis there is considered to be medium potential for prehistoric remains within the APZ (DLO33196) in the west of the Site but low potential for such remains throughout the rest of the Site. The archaeological Watching Brief (at Appendix A) conducted for ground investigations found levels of made ground across the site from between 0.5m bgl to 3.5m bgl, with alluvium up to 2.4m in an area west of Maylands Golf

[4] Carllson, C, nd. Land at Oak Farm Cemetery, Maylands Fields, Havering, London: Archaeological Trial Trench Evaluation. Independent Archaeological Consultants.
[5] Pine, C.A., 2019. Report on the Results of a Strip, Map, & Sample Investigation (Stage 2 Investigation), Land at Oak Farm, Cemetery, Maylands Fields, Havering, London. Development Archaeological Services, Ltd.

Course. Alluvial deposits were found across the site, including within the APZ. However, no archaeological features or finds were identified.

Romano-British (AD 43 – AD 410)

3.2.4 The Roman Road from London to Colchester (MLO106812; MEX2262) has been designated by GLHER as an Archaeological Priority Area (DLO33238). The road follows the course of the A12 to the west of J28 and then along Brook Street A1023 to the west of the junction. The GLHER notes the potential for roadside settlement and human burials associated with the road.

3.2.5 The only definitely Roman asset recorded in the Study Area is a findspot of a Roman finger ring (MEX2346) recovered Hillside Walk, Brentwood c. 254m southeast of the Site Boundary. Fieldwalking at Hole Farm (MLO76051; MLO76898) at the very southern extent of the study area recovered four sherds of Roman pottery.

3.2.6 Aside from the find of the ring, no Roman archaeology has been recorded within the study area. However, as the Roman road from London to Colchester (DLO33238; MLO106812; MEX2262) passes through the site the potential for Roman remains cannot be discounted. On this basis, there is considered to be medium potential for Roman remains within the Roman road APA (DLO33238) in the west of the site but low potential for Roman remains throughout the rest of the site.

Early Medieval (AD 410 – AD 1066)

3.2.7 The only evidence of early medieval activity in the study area is from the results of the 2019 strip, map, and sample investigations at the Oak Farm cemetery[6], where linear ditches were interpreted as drainage ditches, and the remains of a possible structure were dated between AD 450-650 based on analysis of pottery remains.

Medieval (AD 1066 – AD 1500)

3.2.8 The EHER records the settlement of South Weald (MEX1032780) as a number of parcels of land located between the modern settlement of South Weald, in the south, and Coxtie Green in the north. The medieval settlement of South Weald included a Manor House, Vicarage, Church House and Parish Church. It appears to have consisted of a small village focused on the church complex and surrounded by small farms, including the manorial holding at Calcott. In 1086 the manors of Calcott and South Weald covered an area of 2.5 hides and it is suggested that the rest of the parish was forested. In the early 1270s the assizes of bread and ale, the return of writs, free warren and right of gallows was held by Waltham Abbey, though Calcott had its own jurisdiction[7].

3.2.9 Weald Park (1000747), while primarily designated as a late 17th century / early 18th century park and woodland, has its origins as a deer park which was formed in the 12th century when South Weald was under the jurisdiction of Waltham Abbey. Following the Dissolution, the estate was sold to Sir Brian Tuke.

3.2.10 South of the Site Boundary along the current route of the M25, Beredens La Cranham (MLO9677; MLO23628; MLO37676; MLO53802; MLO54549) was

[6] Pine, C.A., 2019
[7] Medlycott, Maria. 2001. *South Weald: Historic Town Assessment Report*

subject to rescue excavation prior to the construction of the motorway. Beredens originated a free tenement of the Cranham Estate in the 14th century, having been purchased by John de Beredens in 1363[8]. The earliest house (MLO53802) recorded during the rescue excavation dated from the 14th century and consisted of the remains of a timber building on tile footings. An occupation site (MLO54549) was also recorded and comprised of post-holes, stake holes and pottery. According to the GLHER entries the house was modified in the post-medieval period. It was demolished in 1955 and had seeming been derelict for some time.

3.2.11 The very eastern extent of Dagnam Park (MLO104464) extends within the Study Area at a distance of c. 394m from the northern extent of the DCO boundary. Hatters Wood in the west of the park, and beyond the study area, has existed since at least 1293. At this time the manor of Dagenhams and Cockerels are recorded as being held by John of Weald.

3.2.12 The site of a medieval hospital, known from documentary records, at Near Shenfield Road (MEX2254) was located c. 250m south of the eastern extent of the DCO site, on the corner of Brook Street and Spital Lane. It was first recorded in 1201 and appears to have been a leper hospital and later a free chapel dedicated to St John the Baptist.

3.2.13 Medieval settlement is known within the study area to the east, northeast, northwest and southwest of the DCO site. As such there is considered to be medium potential for archaeological remains of medieval date to survive within the DCO boundary. However, it should be noted that the concentrations of settlement during this period as identified by the HERs lie beyond the DCO site boundary. As such it is likely that any medieval remains which do survive will be located beyond the major settlements and are thus most likely to be related to agricultural or woodland management of the area.

Post-Medieval (AD 1500 – AD 1900)

3.2.14 The only post-medieval assets recorded within the DCO site boundary on the HERs are ditches encountered during excavations undertaken for the M25-Tank 1741 and Strip Widening (MEX1049359). Five ditches were encountered and the largest was noted to correspond to a large curving north to south boundary shown on the first edition Ordnance Survey (OS) map.

3.2.15 Maps predating the Ordnance Survey show the place names of the sites described above, such as Weald or South Weald, Brook Street, Dagenham and Brentwood. However, the maps are at such a scale that they do not provide much detail in terms of land use for the site itself.

3.2.16 Post-medieval built heritage is common within the study area and can be sorted into two general categories: agricultural buildings and urban development, with the agricultural buildings being scattered throughout the study area and urban development primarily focused on settlements at Brentwood and Harold Wood.

Modern (post 1900)

3.2.17 One modern heritage asset is located within the DCO boundary: Maylands Aerodrome (MLO109189). Maylands Aerodrome was established in 1929 for

[8] Victoria County History, 1903. *Essex*, pp 105-106

display and leisure flights and offered early charter flights to destinations in southeast England, as well as from "London" to Paris. As the base for Hillman's Airways, also ran airmail services to Scotland and Northern Ireland. Following the destruction of all the aircraft by an incendiary bomb in 1940, the airfield ceased functioning. Hardstanding for hangars or other structures at the aerodrome may still survive within the DCO boundary.

3.2.18 Modern assets in the Study Area primarily relate to the sites of Second World War remains, including an Alan Williams Turret (destroyed) at Brook House (MEX1035529), a spigot mortar emplacement (destroyed) at Brook Street (MEX1035530) and a road barrier (destroyed) adjacent to the Golden Fleece Inn, Brook Street (MEX1035531).

3.2.19 A boundary post is recorded at Nags Head Lane (MEX105292) opposite the entrance to a sewage works.

3.3 Potential to contribute to local, regional, and national research objectives

3.3.1 Junction 28 of the M25 extends over multiple local jurisdictions. As the majority of the Scheme is located within the London Borough of Havering, the most appropriate research framework for the archaeological investigations is found with *A Research Framework for London Archaeology*[9]. Due to the proximity of the Scheme location to the border of the area covered by the London framework, along with the heavy focus of the London framework on areas around the central part of the region, the framework for the East of England[10] may be a more appropriate resource. This section outlines how the archaeological investigations are expected to fit into local, regional and national research objectives outlined by both frameworks.

Prehistoric

3.3.2 The principal research objective for the Palaeolithic across England relates to the identification of *in situ* remains from the period, along with developing a reliable chronology. In the absence of artefactual finds, the development of geoarchaeological deposit models and environmental sampling can add to the existing baseline for the period and be used to develop better predictive models for future work.

3.3.3 While the research objectives for other early prehistoric periods (Neolithic, Mesolithic, and Bronze Age) are more developed than the Palaeolithic, the scarcity of evidence for these periods within the study area limit the identification of further research at this stage. Within the DCO boundary, it may be expected to focus on research objectives relating to identifying materials and features dating to the period to establish a better understanding of land-use and settlement patterns.

3.3.4 The East of England framework identifies the need for a better understanding of the lithostratigraphic data to aid in the understanding of prehistoric environment and to support dating programmes for early prehistoric remains. Sampling of appropriate materials from the APZ geological deposits within the DCO boundary

[9]Museum of London and Historic England, 2002
[10] Medlycot, M, ed., 2011. *Research and Archaeology Revisited: A Revised Framework for the East of England*. East Anglian Archaeology Occasional Paper No 24. AGLAO East of England.

may aid in developing this research objective.

3.3.5 Research objectives relating to the later prehistoric periods and relevant to this Scheme include further understandings of landscape and settlement patterns. Investigations from the Oak Farm cemetery suggest that evidence from prehistoric field boundaries may be present and further study of these could advance the understanding of land use in later prehistoric periods.

Romano-British

3.3.6 With the presence of the DCO boundary including and adjacent to the route of a Roman road, archaeological remains dating to this period are expected to be encountered by the Scheme. Although there are no remains dating to the period recorded within the DCO boundary, roadside settlements, shrines, and other activities are common along Roman roads. In addition, the site includes the location where the Roman road would have crossed the Ingrebourne River. As such, there may be structures relating to the river crossing preserved. Archaeological investigations should look to answer questions regarding the presence of the road and any roadside activities.

Early Medieval

3.3.7 The identification of remains dating to the early Saxon period at the Oak Farm cemetery site south of the A12 hints at possible nearby settlements or other traces of occupation and land use. The location of the known early Saxon remains near the Roman road suggests the potential for information regarding the transition from Roman to Anglo-Saxon England. Should early medieval remains be identified, their position along the Ingrebourne River/ Weald Brook may provide data contributing to the objectives relating to the economic uses of rivers and waterways during the period.

Medieval

3.3.8 During the medieval period, the site was likely agricultural land supporting the nearby settlements at Brentwood and Romford. Investigations may be able to contribute to objectives relating to rural settlement, landscapes, and resource exploitation.

Post-Medieval and Modern

3.3.9 The site continued in agricultural use through most of the post-medieval period and the contributions to research objectives for the period are likely to be similar. Further information regarding the development and use of the Maylands Aerodrome as an early, non-military airfield may contribute to the research objectives relating to the development of industry and infrastructure specific to the modern period. Research objectives of the London framework for understanding post-medieval recreational and leisure activities may also benefit.

4 Potential archaeological impacts

[The Archaeological Contractor appointed by the Principal Contractor to the known and anticipated impacts to archaeological remains with specific reference to the types of impacts anticipated from the final design/construction activities.]

4.1 Overview

4.1.1 During construction, direct physical impacts could occur to archaeological assets from construction activities such as: site vegetation clearance, earthmoving operations, creation of site compounds, road and bridge construction, and excavations for provision of all associated infrastructures (gantries, signage, drainage, utilities etc.).

4.1.2 The only impact to known archaeological remains is to the Maylands Aerodrome (MLO109189). Studies of early OS maps and satellite imagery (Google Earth) suggest that part of the aerodrome facility may be preserved in the form of hardstanding for a building that once existed on the site. Artefactual remains associated with the aerodrome are thought to be limited, and additional documentary research may be required to identify and mitigate impacts to this asset.

4.1.3 The archaeological priority area (APA) associated with the London to Colchester Roman Road (DLO 33238) would be subject to earthmoving operations and road construction activities that would likely remove all archaeological remains within the footprint of the Scheme. Remains may include fabric from the original Roman road, as well as evidence of roadside activities and settlements. As this is the location where the road would have crossed the Ingrebourne River, remains may also include evidence of bridges, ferries, or other water-crossings.

4.1.4 Construction activities would result in the removal of deposits from the Archaeological Priority Zones (DLO 33916) connected to alluvial deposits. These deposits may contain prehistoric archaeological remains.

5 General methodology

5.1 Health and safety

5.1.1 Health and safety considerations will be of paramount importance in conducting all fieldwork. Much of the archaeological fieldwork is expected to be conducted immediately preceding construction activities through a strip, map, and sample approach. As such the Construction (Design and Management) regulations (CDM regulations will apply. Safe working practices will override archaeological considerations at all times.

5.1.2 All work will be carried out in accordance with the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety Regulations 1992 and all other relevant Health and Safety legislation, regulations and codes of practice in force at the time for the fieldwork.

5.1.3 A Risk Assessment and Method Statement (RAMS) for the work will be prepared prior to the commencement of fieldwork and submitted to the Archaeological Consultant for review and acceptance.

5.1.4 Appropriate Personal Protective Equipment (PPE) will be worn by all archaeologists and monitoring visitors while on site and in line with Health & Safety requirements. Any specific PPE will be confirmed following appointment.

5.1.5 The Principal Contractor will need to implement appropriate safe methods of work in the form of a method statement.

5.2 Consultation

5.2.1 WSIs should be developed in consultation with GLAAS archaeologist. Draft copies of the individual WSI should be submitted by the Archaeological Contractor to the Archaeological Consultant for review against this specification and for submission to GLAAS.

5.3 Written Schemes of Investigation

5.3.1 Following consultation with the relevant parties, task-specific WSIs will be prepared for specific phases of work identified in consultation with the LPA archaeological advisor (GLAAS). Such work may include, but is not limited to:

- Field walking
- Evaluation Trenching
- Strip, Map, and Sample
- Area Excavation
- Archaeological Watching Briefs.

6 Fieldwork

[Principal Contractor identify the types and locations of various fieldwork activities required for the Site, noting any specific requirements agreed with the consulting parties.]

6.1 Setting out and access

6.1.1 The Principal Contractor will provide digital copies (ESRI compatible shapefiles) of the excavation areas, areas for archaeological monitoring and borehole locations to be monitored and logs assessed and supply them to the Archaeological Contractor.

6.1.2 The Principal Contractor will be responsible for ensuring that areas of work are clear of all services, and individual work locations are scanned using appropriate cable avoidance equipment by an appropriately qualified member of the Archaeological Contractor's team.

6.1.3 Access will be arranged by Highways England in advance of all site works and confirmed by the Archaeological Consultant.

6.2 Geophysical survey

6.2.1 While geophysical survey is not anticipated to be suitable for most of the Scheme area, it may be conducted as part of advanced works at locations for the primary and secondary site compounds and for ecological compensation areas. Geophysical surveys may be initiated prior to the completion of this AMP, under separate specification and WSI in order to enable advanced works to proceed prior to the construction phase of the Scheme. The aims of any geophysical survey are to identify areas of archaeological potential for targeted evaluations.

6.3 Evaluation trenching

Overview

6.3.1 Trial trench evaluation provides a means of sampling a large area to record the density of archaeological features and finds and determine levels of recent disturbance. It is also employed to test the results of geophysical and topographic survey.

6.3.2 Trial trenching can help to identify the archaeological potential of a site and to locate specific zones of activity within the site.

6.3.3 Trial trenching will be used to inform the need for further archaeological works and/or mitigation; and to allow for an understanding of the risks posed by the archaeology on site and therefore, to effectively inform detailed design and construction activities.

6.3.4 A percentage of the specified works area will be excavated by machine by means of linear trenches. The number and layout of trenches will be agreed with the LPA's archaeological advisor (GLAAS) during the production of the WSI for the work and will be based on the findings of evaluation trenching conducted in advance of the DCO decision. The percentage is not expected to exceed 6% of the DCO boundary; any additional trenching will need to be agreed with the Client and Principal Contractor in advance of the work. All archaeological trial

trenching will be carried out by the archaeological contractor in accordance with national, regional and local policies and guidelines and in particular will be carried out in accordance with the CIfA Standard and guidance for archaeological field evaluation (2020a).

Aims and objectives

6.3.5 The purpose of archaeological trial trenching is to identify the presence or absence of archaeological remains and record any archaeological features and deposits within the sampled area. A report following this initial trenching work will be provided to GLAAS shortly after the archaeological trenching works have been done. The findings of the investigation will then inform the need for further archaeological works.

6.3.6 The aims of the archaeological trial trenching within the specified works area will be:

- To establish the presence/absence of archaeological remains within the Site.
- To determine the significance, extent, condition, nature, character, quality and date of any archaeological remains encountered.
- To record and sample excavate any significant archaeological remains encountered.
- To assess the eco-factual and environmental potential of any significant archaeological features and deposits.
- To assess and investigate the palaeoenvironmental potential of the Site.
- To determine the extent of previous truncations of the archaeological deposits.
- To inform the Client, Principal Contractor and Archaeological Consultant of the nature of archaeological remains within the specified area, thus allowing for a decision on the necessity for further works and/or mitigation.
- To make available to interested parties, including statutory consultees, the results of the investigation.

Methodology

6.3.7 A WSI detailing the methodology to be used for the excavation and recording of the trial trench evaluation will be prepared by the Archaeological Contractor appointed by the Principal Contractor.

6.3.8 The sample requirements will be agreed with the Archaeological Consultant on a site by site basis; contingencies may be required where archaeological remains are encountered.

6.3.9 Trench plans will be set out prior to the commencement of the investigations. The trenches will target features identified through previous field investigations where feasible. The remainder of the trenches will be located evenly across the Site with varying alignments to ensure for widespread coverage. The trench locations will be included within the WSI for the works which will be communicated to the statutory consultees for their review and comment.

6.3.10 Prior to the commencement of the archaeological works, the Archaeological Consultant will be notified so that monitoring visits can be arranged.

Fieldwork

6.3.11 The trial trench evaluation will adhere to WSI noted above, wherever reasonably practicable e.g. where site conditions and health & safety consideration allow. Any significant variations, such as movement of trenches or reduction of samples size due to site condition or live services etc. to the WSI must be agreed verbally with all relevant parties (i.e. the Client and Archaeological Consultant and the LPA archaeological advisor (GLAAS)) prior to the works, to allow for variations to be dealt with rapidly in the field. However, such agreements must be confirmed as soon as practicable in writing.

6.3.12 On-site conditions, as well as the results of the geophysical survey, may mean that the trenches have to be re-located at the beginning of the works. The archaeological site supervisor will take that decision on site upon consultation with the Archaeological Consultant and GLAAS. Welfare will be sited on Site to minimise impact on the Site and the environment.

6.3.13 Service plans must be provided for the Site by the Client. Buried services and overhead lines require appropriate buffers and this should be taken into consideration during the creation of the trenching plan. Trench locations will be CAT scanned by appropriately qualified staff before excavation and where overhead lines are present goal posts will be required to mark locations for plant crossings. Any plant crossing under an overhead line will be required to be supervised by a banksman with the hydraulic arm depressed to the maximum extent. Crossings of underground services, such as high pressure mains, will also be strictly monitored and the necessary permissions sought.

6.3.14 The trenches will be opened using a mechanical excavator equipped with a toothless bucket. Trenching will be carried out under constant archaeological direction under the control of an experienced archaeologist. Plant of an appropriate size will be used and will be equipped with a 1.4-1.8m wide bucket in most cases.

6.3.15 Undifferentiated topsoil or overburden of recent origin will be removed in successive level spits down to the first significant archaeological horizon, or the natural geology, whichever is encountered first. Topsoil and subsoil will be stored separately and will be visually scanned and where appropriate subject to metal detecting.

6.3.16 Trenches will be excavated only to a safe working depth, although can be stepped if appropriate. The trenches will be fenced from access with road pins and barrier mesh as appropriate.

6.3.17 Where structures, finds, soil features and layers of archaeological interest are exposed in the evaluation trenches, the Archaeological Contractor will observe, clean, assess, excavate by hand where appropriate, sample and record these features and finds. Archaeological features will be excavated sufficiently to identify and characterise, where possible, the nature, quantity and significance of the deposits as well as establishing date and depths.

6.3.18 The Principal Contractor and Client will be informed as soon as possible of the discovery of any significant archaeological remains, including human burials or hoards, or changes in the programme of ground works on Site. In the event of the discovery of human remains the Archaeological Contractor should also seek further consultation with GLAAS.

6.3.19 On completion of machine excavation, all faces of the trench that require examination or recording will be cleaned using appropriate hand tools e.g. trowels and brushes. All investigation of archaeological horizons will be by hand, with cleaning, inspection, and recording both in plan and section.

6.3.20 Where archaeological features are encountered the following samples will be excavated:

- Linear features: a minimum sample of 10% of their length, with a minimum individual slot length of 1m
- The termini of any linear features: 100% excavated
- Pits: a minimum of 50
- Complex features (such as hearths): 100% excavated

6.3.21 Significant solid or bonded structural remains, building slots or postholes will be preserved intact, even if fills are sampled.

6.3.22 A metal detector will be made available on Site to aid in the recovery of metal artefacts if required. The detector will not be set to discriminate against iron. Any metal detection will be undertaken by an experienced operator.

Finds

6.3.23 Full details of the specific methodology for archaeological finds is outlined in Section 7.

Human remains

6.3.24 Any human remains will be handled in line with the specific methodology for Human Burials in Section 8.

Environmental sampling

6.3.25 Where archaeological remains are uncovered, bulk samples will be taken from appropriate contexts for the recovery and assessment of both archaeological features and the natural deposit sequence in which archaeological remains are discovered. Sampling methods will follow the specific methodology in Section 9.

Recording

6.3.26 Archaeological recording will comply with the specific methodology set out in Section 10.

Backfilling and reinstatement

6.3.27 Where backfilling of archaeological trenches is required, the excavated areas will be backfilled with the excavated material and compacted with the machine bucket only. If significant archaeology is identified, this will be covered and protected by terram, a protective geotextile (or other suitable protective covering), prior to backfilling.

Reporting

6.3.28 Reporting of the archaeological works will comply with the specific methodology set out in Section 10.4.

Archiving

6.3.29 Archiving of the physical and digital record will comply with the specific methodology set out in Section 11.

6.4 Detailed (area) excavation

Overview

6.4.1 Where significant and complex archaeology is identified during the evaluation trenching, detailed (area) excavation will be conducted according to a task-specific WSI prepared for the work and based on of the findings of the evaluation trenching.

6.4.2 Where the need for detailed excavation is identified, the specified area will be machine stripped under archaeological control to the first archaeological horizon, or to the natural geology where no archaeological remains are encountered. All archaeological features are recorded in plan and a sample of features are excavated. The scaling of the sampling will be in line to meet the project objectives and research aims.

6.4.3 In some cases, where complex archaeological features/ relationships are identified, an initial small sample and analysis/ spot dating may need to be undertaken, before a strategy for the entire site is developed in consultation with the Lead Heritage Consultant and Consulting Parties.

6.4.4 As per section 14 all fieldwork will be subject to regular monitoring visits by the Lead Heritage Consultant and the Statutory Consultees in order ensure that it is being carried out to the required standards and that it will achieve the stated objectives in line with the approved WSI.

Aims and objectives

6.4.5 The aims of the detailed excavation within the specified works area will be:

- To meet the objectives of the mitigation strategy and research objectives posed in Section 3.4.
- To provide a comprehensive record of the archaeological features and analysis of the results.
- To determine the significance, extent, condition, nature, character, quality and date of any archaeological remains encountered.
- To record and fully excavate any significant archaeological remains encountered.
- To assess the eco-factual and environmental potential of any significant archaeological features and deposits.
- To assess and investigate the palaeoenvironmental potential of the site.
- To determine the extent of previous truncations of the archaeological deposits, if this has not already been determined through trial trenching.

- To inform the Lead Heritage Consultant and Consulting Parties of the nature of archaeological remains within the specified area, thus allowing for a decision on the necessity for further works, including the potential for preservation *in situ.*
- To make available to interested parties the results of the investigation.

6.5 Construction Integrated Recording (Archaeological strip, map, and sample

Overview

6.5.1 Construction Integrated Recording (CIR) is a programme of observation, investigation and recording of archaeological remains. It is used where the likely extent of the remains has been demonstrated, but it is not practical or appropriate to investigate in detail before the main construction programme (e.g. due to safety or logistical considerations or environmental or engineering constraints, as noted above).

6.5.2 The Principal Contractor's preferred method of working would be controlled as necessary to allow archaeological recording to take place to the required standard. The specified area will be machine stripped utilising appropriate plant fitted with toothless ditching blade under archaeological supervision to the first archaeological horizon, or to the natural geology where no archaeological remains are encountered. Plant will not be permitted to track across exposed subsoil. All archaeological features will be recorded in plan and a sample of features will be excavated. The archaeological works will be conducted simultaneously with construction works and will be directed by an archaeologist. All CIR will be carried out by the Archaeological Contractor in accordance with national, regional and local policy and guidelines.

Aims and objectives

6.5.3 The purpose of CIR is to identify and record any archaeological remains within the specified area during construction works or site investigations. The works will aim to avoid delays and substantial impacts on the construction programme, wherever possible.

6.5.4 The aims of CIR within the specified works area will be:

- To identify the presence and/or absence of archaeological remains.
- To provide a comprehensive record of identified archaeological features and analysis of the results.
- To determine the significance, extent, condition, nature, character, quality and date of any archaeological remains encountered.
- To record and sample or fully excavate any significant archaeological remains encountered.
- To assess the eco-factual and environmental potential of any significant archaeological features and deposits.
- To assess and investigate the palaeoenvironmental potential of the Site.
- To make available to interested parties the results of the investigation.

Methodology

6.5.5 A task specific WSI will be prepared in accordance with current policy and practice and investigations will adhere to the specific methodologies set out. However, the documents may be subject to change depending on the results of future works, such as geophysical survey, and developments in industry policies and standards. Any changes to the WSIs must be agreed in writing by the Archaeological Contractor with the Archaeological Consultant in consultation with the LPA archaeological advisor (GLAAS) prior to the commencement of the works.

6.5.6 Prior to the commencement of the archaeological works, the statutory consultees will be notified.

Fieldwork

6.5.7 CIR will adhere to the following methodology, wherever reasonably practicable e.g. where site conditions and health & safety consideration allow. Any significant variations, such as reduction of sample size due to site condition or live services etc. to the WSI must be agreed verbally with all relevant parties (i.e. the Employer, consultees) prior to the works, to allow for variations to be dealt with rapidly in the field. However, such agreements must be confirmed as soon as practicable by in writing.

6.5.8 In areas subject to CIR, the construction works and site investigations will be carried out under the direct supervision of an archaeologist working for the archaeological contractor. The archaeological contractor will be given prior notice of the nature of the construction work and site investigation works to be carried out.

6.5.9 All topsoil stripping will be monitored and directed by an experienced archaeologist. Archaeological supervision of topsoil stripping will be at a ratio of at least one archaeologist per mechanical excavator.

6.5.10 The removal of topsoil and overburden must be carried out using a mechanical excavator utilising a flat bladed bucket (toothless), and in horizontal spits. Plant will work away from, and not track across the, machined surface until the monitoring archaeologist has given permission to do so. Movement of plant over the remainder of the Site will be minimised to prevent rutting or damage to sub-surface archaeological features as far as is practicable.

6.5.11 A team of experienced archaeologists will carry out the archaeological works where archaeological remains are uncovered. The number of archaeologists should be proportional to the scale of the construction works and the number and scale of archaeological remains so as to ensure the requisite sample of features are adequately investigated and recorded within the necessary timeframe.

6.5.12 The Principal Contractor's preferred method of working would be controlled as necessary to allow archaeological recording to take place to the required standard. In general, topsoil and overburden will be removed in successive level spits down to the first archaeological horizon, or the natural sub-stratum, whichever is encountered first. At this point, ground works will cease while archaeological recording is carried out where necessary.

6.5.13 Where no archaeological remains are identified within the works area, this should be noted in the form of written records and photographs of the area to

demonstrate the lack of features and deposits. The construction programme may continue in areas where no archaeological remains have been identified, so long as the Archaeological Contractor and Consulting Parties (GLAAS) consent and the works do not preclude archaeological investigations on other parts of the Site from being carried out based on Health and Safety, access etc.

6.5.14 Investigation of archaeological horizons and features will be by hand. Minimum requirements for sample excavation will be limited to the works area and to the formation depth and follow national, regional and local guidelines. The minimum sample requirements are identified in Table 6-1 below.

Table 6-1 - Minimum sampling requirements by archaeological feature type

Feature type	Minimum sample requirements
Complex/ significant features/ deposits/ artefact assemblages/ artefacts	Sampling to be subject of further discussion with the statutory consultees.
Hearths, ovens, kilns	100% of domestic/industrial working features (hearths, ovens). These are also to be sampled for archaeomagnetism as standard if appropriate (this applies to any in-situ burnt features unless agreed otherwise on-site following discussion).
Possible prehistoric roundhouses or other post-built structures	Total excavation of all post-holes, spreads/ occupation layers and cut features (e.g. ring-gullies) directly associated with structures. Metal detector to be used at all stages of excavation/ removal, for better artefact recovery (e.g. for droplets of bronze).
Possible cremation burials	Total excavation; lifting of intact/ semi-intact pottery vessels with following micro-excavation in laboratory.
Linear features	Excavation by hand of sections across all termini, all junctions or intersections of cut features and, in the body of the features if datable, ancient and manifestly rich in ancient palaeoenvironmental remains, the following scope of works: linear features <10m long: at least one 1.0 metre-wide section. linear features >10m long: 1.0 metre-wide sections at maximum 10.0-metre intervals. Partial excavations within a linear at junctions of cut features will not be a substitute for sections across the body of the linear, away from such junctions, because of possible contamination between intercutting contexts. With prior agreement with the statutory consultees, the remainder of the fills of large linear features may be excavated mechanically under close archaeological

Feature type	Minimum sample requirements
	supervision and control and with thorough metal detecting.
Discrete cut features general	Total excavation by hand of all discrete, potentially datable and ancient cut features of less than 2 sq. metres plan area, and of such features manifestly rich in ancient palaeoenvironmental remains; except where deeper than 1 metre, when half-sections will be acceptable.
Post-holes	Post-holes probably associated with structures - complete excavation by hand.
Pits	Default - half-section. Further sampling to be decided on basis of Health & Safety considerations/ vulnerability of fill/ contents. In general, all pits would be subject to this sampling; however, if substantial numbers of pits are encountered then the local planning authority archaeologist will be consulted to establish percentage of pits requiring sampling to allow for characterisation.
Structural features	All structural features will be fully revealed in plan and recorded. All individual elements including walls, floors, doorways, and any negative features will have context boundaries distinguished facilitating a full written, drawn and photographic record.
Demonstrably 19th/20th century features	If not evidently part of a structure, e.g. a structure of industrial archaeological interest, or if without good artefact assemblage, record and sample only that sufficient to confirm late date. If artefact-rich/ part of a structure, treat as with pits and post-holes above.
Highly/nationally significant features (e.g. high-status burials)	The Client and statutory consultees, to be notified immediately on discovery/recognition. Strategy for excavation/scientific investigation/conservation etc to be agreed before work resumes.

6.5.15 Where significant remains are uncovered, further mitigation may be required. The Client and GLAAS should be consulted as soon as possible to identify the appropriate site investigations within the specified area prior to construction works.

Environmental sampling

6.5.16 Where archaeological remains are uncovered, bulk samples will be taken from appropriate contexts for the recovery and assessment of both archaeological features and the natural deposit sequence in which archaeological remains are discovered. Provision will be made for column and other appropriate samples to be taken. Sampling methods will follow the specific methodology in Section 9.

Human remains

6.5.17 Any human remains will be handled in line with the specific methodology for Human Burials in Section 8.

Recording

6.5.18 Archaeological recording will comply with the specific methodology set out in Section 10.

Reporting

6.5.19 Reporting of the archaeological works will comply with the specific methodology set out in Section 10.

Archiving

6.5.20 Archiving of the physical and digital record will comply with the specific methodology set out in Section 11.

6.6 Archaeological monitoring

Overview

6.6.1 A programme of observation, investigation and recording of archaeological remains will be undertaken during construction where appropriate. It is used where archaeological remains have not been identified by a detailed desk-based assessment or field evaluation, but where there is a realistic potential for archaeological discoveries. The Principal Contractor's method of working would not be directly controlled for archaeological purposes, unless important archaeological discoveries are found (in which case the site method may change to Construction Integrated Recording – see Section 9)

6.6.2 All work will be carried out by the Archaeological Contractor in accordance with national, regional and local policy and guidelines and in particular will be carried out in accordance with the CIfA Standard and guidance for archaeological field evaluation (2014b) and the CIfA Standard and guidance for an archaeological watching brief (2014c).

Aims and objectives

6.6.3 In line with CIfA standard and guidance (2014c), the purpose of archaeological monitoring is to:

> *to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works*
>
> *to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard (ibid, 4).*

Methodology

6.6.4 A WSI will be prepared in accordance with current policy and practice and all archaeological monitoring will adhere to the specific methodologies set out. However, the documents may be subject to change depending on future works and developments in industry policies and standards. Any changes to the WSIs must be agreed in writing with the Archaeological Consultant prior to the commencement of the works.

6.6.5 Prior to the commencement of archaeological monitoring the WSI will be communicated to the GLAAS and they will be informed of the timings of the work.

Fieldwork

6.6.6 The archaeological monitoring will adhere to the WSI wherever reasonably practicable e.g. where site conditions and health & safety consideration allow. Any significant variations, such as reduction of sample size due to site condition or live services etc. to the WSI must be agreed verbally with all relevant parties (i.e. the Client and Archaeological Consultant and the LPA archaeological advisor (GLAAS)) prior to the works, to allow for variations to be dealt with rapidly in the field. However, such agreements must be confirmed as soon as practicable by in writing.

6.6.7 An archaeologist will be present to monitor all intrusive ground-works involving the removal of modern material, made ground, topsoil and subsoils (including any temporary works and site set up and demolition works which may have an impact on archaeological deposits) within the specified works area. They will be positioned at a safe distance, beyond the limits of the working area of any mechanical excavator. Should access to the machined area be required, the machine will cease operations and if necessary, relocate to ensure safe access.

6.6.8 Any machining undertaken under archaeological monitoring will be done, where practicable, with a flat bladed bucket (toothless) and in horizontal spits. The machined area should be exposed to a ‘clean’ state which allows for the identification, definition and investigation of any archaeological remains.

6.6.9 Should there be unsupported sections deemed unsafe by the onsite staff, no member of staff will enter the excavated area. In this instance recording of the excavated areas will be conducted from ground level unless shoring has been installed by a competent person.

6.6.10 In the event that significant archaeological remains are revealed, additional excavation staff should be made available. The ground work in the location of the archaeology can be temporarily halted in order to determine the extent and character of any remains revealed. The degree of further work will be defined in discussions with the Archaeological Consultant, the Employer and GLAAS. Delays to development can be minimised by continuing to monitor areas of watching brief while the archaeological resource is recorded.

6.6.11 A full written and photographic record of the on-site works should be maintained at all times.

Finds

6.6.12 Full details of the specific methodology for finds is outlined in Section 7.

Human remains

6.6.13 Any human remains will be handled in line with the specific methodology for Human Burials in Section 8.

Environmental sampling

6.6.14 Where archaeological remains are uncovered, bulk samples will be taken from appropriate contexts for the recovery and assessment of both archaeological features and the natural deposit sequence in which archaeological remains are discovered. Provision will be made for column and other appropriate samples to be taken. Sampling methods will follow the specific methodology in Section 9.

Recording

6.6.15 Archaeological recording will comply with the specific methodology set out in Section 10.

Reporting

6.6.16 Reporting of the archaeological works will comply with the specific methodology set out in Section 10.

Archiving

6.6.17 Archiving of the physical and digital record will comply with the specific methodology set out in Section 11.

7 Finds

7.1 Overview

7.1.1 The following methodology will apply wherever finds are uncovered and collected. All finds will be treated in accordance with national, regional and local policies and guidance and in particular with CIfA's Standard and Guidance for the collection and documentation, conservation and research of archaeological materials (2014d), Historic England's Archaeological Conservation guidance documents (English Heritage, 2006; English Heritage 2008; Historic England 2018); ICON's professional standards and ethics (2014); and ICON Archaeology Group guidelines: A brief guide to the principles of archaeological conservation (2009).

7.1.2 In order to inform evaluation strategies on-site and streamline the post-excavation processes, field-based finds identification and spot dating should be incorporated into the field methodologies outlined in the WSIs for evaluation and mitigation.

7.2 Methodology

7.2.1 All finds shall be recorded by context; individually significant finds ("special finds" or "small finds") shall also be recorded three-dimensionally using a sequence of unique numbers. To inform the investigation strategy finds processing shall be carried out during the course of the investigations and provisional spot dates and information provided to the Archaeological Consultant who will provide the information to GLAAS as appropriate.

7.2.2 All identified finds and artefacts will be collected and retained. Certain classes of material, i.e. post-medieval pottery and building material, may on occasion be discarded after recording if a representative sample is kept. No finds will be discarded without the prior approval of the archaeological representative of the local authority and the receiving museum.

7.2.3 Any finds covered by the provisions of the Treasure Act (1996, amended 2003) and Treasure (Designation) Order 2002, including gold and silver, will be moved to a safe place and reported to the coroner's office according to the procedures determined by the Act. They will also be reported to the local finds liaison officer from the Portable Antiquities Scheme.

7.2.4 Exposed finds will be lifted at the end of each working day. Where removal cannot be undertaken on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage.

7.2.5 On site a representative sample of finds will be examined to establish the date range of the assemblage, with particular reference to pottery. In addition, the artefacts will be used to characterise the site, and to establish the potential for all categories of finds should further archaeological work be necessary.

7.2.6 All finds of gold and silver will be moved to a safe place. Where removal cannot be undertaken on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage.

7.2.7 Provision for onsite conservation and finds treatment, in addition to any scientific dating of materials uncovered, will be undertaken where appropriate.

7.2.8 All finds will be treated in a proper manner and to standards agreed in advance with the recipient museum. Finds will be retrieved and cared for in accordance with Historic England Archaeological Conservation guidance documents (English Heritage, 2006; English Heritage 2008; Historic England 2018); ICON's professional standards and ethics (2014); and ICON Archaeology Group guidelines: A brief guide to the principles of archaeological conservation (2009).

7.2.9 The protection of all finds on site and during transportation to the post-excavation facility will be the responsibility of the Archaeological Contractor

7.2.10 Upon completion of the project, the landowner will be contacted regarding the preparation, ownership and deposition of the archive and finds. The local museum will also be contacted to ascertain whether deposition can be attained.

7.3 Post-excavation

7.3.1 Where artefacts are encountered and collected, a post-excavation research strategy should be prepared by the Archaeological Contractor. Where possible, this should be developed along with field methodologies to allow for streamlined processing and identification of finds in the field and to address common post-excavation analyses that are expected from the investigations.

7.3.2 Artefacts will be cleaned and conserved, where necessary, to allow for identification and to accommodate further investigation.

7.3.3 Post-excavation storage will be secure and appropriate to the material and significance of the object. Analysis will be in line with national best practice guidelines for artefact conservation and may include x-radiography and consolidation as part of the process.

7.3.4 All post-excavation work will be undertaken in accordance with Historic England Archaeological Conservation guidance documents (English Heritage, 2006; English Heritage 2008; Historic England 2018); ICON's professional standards and ethics (2014); and ICON Archaeology Group guidelines: A brief guide to the principles of archaeological conservation (2009).

8 Human remains

8.1 Overview

8.1.1 No known burial sites will be impacted during the works however ground works may result in unexpected human remains being exposed.

8.1.2 The following methodology will apply where human remains are encountered. All human remains will be treated in accordance with national, regional and local policies and guidance. In addition, all works will comply with the following relevant best practice guidelines:

- Brickley and McKinley, 2004. Guidelines to the Standards for Recording Human Remains.
- APABE, 2017. Guidance for Best Practice for the Treatment of Human Remains Excavated from Christian Burial Grounds in England.
- Historic England, 2018b. The Role of the Human Osteologist in an Archaeological Fieldwork Project.
- McKinley and Roberts, 1993. Excavation and post excavation treatment of cremated and inhumed human remains.
- Mitchell and Brickley, 2017. Updated Guidelines to the Standards for Recording Human Remains – December 2017.

8.2 Methodology

8.2.1 Any finds of human remains will be left in situ, covered and protected. An initial in situ visual observation and assessment of the remains will be carried out in order to inform the Archaeological Consultant, the Client, the Consulting Parties and notifiable parties. All works will cease within the area until consultation has been undertaken and provision made for an Osteoarchaeologist to attend the site in order to oversee recovery and recoding of the remains.

8.2.2 Where human remains are encountered the Archaeological Contractor will inform the Archaeological Consultant and the Ministry of Justice and the local constabulary immediately.

8.2.3 If removal of human remains is deemed necessary following consultation with the client, a coroner's licence from the Ministry of Justice will be required prior to the excavation and removal of the remains.

8.2.4 Human remains will be treated with dignity and respect at all times. It may be necessary to screen off the human remains from public view and other construction works and this will be arranged as soon as possible where required.

8.2.5 All articulated and disarticulated human remains, including structured burials and charnel, will be excavated and lifted in a logical and appropriate manner with the suitable tools. There should be an awareness that further human remains may be present within the surrounding area.

8.2.6 All articulated human remains will be lifted by hand by archaeologists or, if required, an exhumation contractor. Each excavated individual will be bagged separately and permanently labelled as to content and cross referenced with the archaeological records of the excavation (APABE 2017). Different skeletal areas

and bones from the left and right sides will be bagged separately (APABE 2017, Annex S3, 38) and all bags labelled.

8.2.7 Unstratified disarticulated human bone is of limited scientific value (APABE 2017, 41) as there is often little opportunity to relate types of data together (e.g. number of individuals, bone size and age). Disarticulated bone will be rapidly screened when discovered and any anomalies, such as anatomically dissected disarticulated remains or remains thought to have been deposited within a deliberate deposit that may have cultural significance (APABE 2017, 44) will be brought to the attention of the Osteoarchaeologist who will determine the appropriate course of further investigation, in consultation with the Archaeological Consultant and the Client. Any disarticulated remains will be carefully cleared from the spoil. Care will be taken to clearly differentiate disturbed but originally articulated human burials.

8.2.8 All grave goods and associated exposed artefacts will be recorded and removed at the end of the working day to limit the risk of theft and disruption to the area. If this is not possible, security will be required and should be coordinated in conjunction with the Client.

8.2.9 Samples may be taken from the fill around the head and around the torso and feet for the recovery of small bones/teeth and for the possibility of further scientific investigation (e.g. investigation of parasite flora) (APABE 2017, Annex S3, 38).

8.3 Recording

8.3.1 All human remains should be bagged and boxed with an assigned identification number or code.

8.3.2 All applicable pro forma record forms, including context sheets and skeleton recording sheets, should be completed. Written descriptions should include details about the human remains and their surrounding context as well as the degree of truncation and disruption. The location of all skeletons should be accurately located on plans and mapped using measured photogrammetry and tied in to the OS NGR, with levels given to AOD.

8.3.3 Photography is generally recognised as the best way to record in situ human remains. Only authorised photographs should be taken, and these should be carried out in a sensitive manner. A suitable scale should be visible in photographs. The photographic record would be provided jpeg and RAW formats and all photographs would be taken at a minimum of 16 megapixels.

8.4 Reporting

8.4.1 Reporting of the excavation and/or removal of human remains will be incorporated into the relevant archaeological investigation report, or independent report if the investigations have been carried out separately.

8.4.2 All reporting will comply with the specific methodology set out in Section 10.

8.5 Archiving

8.5.1 Archiving of the physical and digital record will comply with the specific methodology set out in Section 11.

8.5.2 Generally, human remains should be reinterred at an appropriate location within two years. However, this time limit may be altered after consultation with the Ministry of Justice.

9 Environmental sampling

9.1 Overview

9.1.1 Archaeological science refers to the science-based research methods used in archaeology in the post-excavation phase. Provision must be made during the intrusive on-site works, including trial trenching, CIR and archaeological monitoring, to ensure that archaeological science can be comprehensive and accurate as the post-excavation analysis can greatly contribute to knowledge creation and can improve the understanding of a Site. The following methodology will be of relevance to environmental samples. Historic England's Science Advisor for the region may be consulted to identify best practices in methodology.

9.2 Methodology

9.2.1 All environmental sampling will be conducted in accordance with national, regional and local policies and guidance. All aspects of the collection, selection, processing, assessment and reporting on the environmental sampling shall be undertaken in accordance with the principles set out in Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation (English Heritage 2011) and with reference to the Association for Environmental Archaeology's Working Paper No. 2, Environmental Archaeology and Archaeological Evaluation. A palaeoenvironmental specialist should be available on-site to oversee and develop the strategy as appropriate.

9.2.2 Provision shall be made for the removal of samples from all securely stratified deposits which shall be scatter sampled for retrieval and assessment of biological remains. A targeted sampling strategy appropriate to the archaeological features and deposits will be adopted in consultation with the local planning authority. As a minimum this will include bulk samples for most archaeological contexts as well as provision for column and/or other necessary sampling as set out in the paragraphs below. There may be a potential requirement for other types of sampling, for example using a grid to sample an occupation layer. The processing and assessment of samples shall be undertaken in parallel with the trial trenching so that preliminary results are available to inform the development of the sampling programme. If these preliminary results indicate the need for a sampling strategy which deviates from the requirements set out here, this will require to be agreed with the Archaeological Consultant.

9.2.3 Bulk samples will be taken using 10L plastic, lidded tubs (with handles) or securely fastened strong polythene bags (double bagged). All sample tubs/bags will be appropriately and clearly labelled with site codes, context details and sample information using permanent ink.

9.2.4 Bulk samples of dry context will be taken in the range of 40L-60L as appropriate. Samples of wet (i.e. waterlogged) deposits should total 20L. Where the context is of a lower volume, 100% of the context will be sampled.

9.2.5 Monolith and Kubiena box samples should be taken where necessary to allow for specialist analysis of deposits. The location and depth should be accurately

recorded, and all samples should be taken with a 50mm overlap where more than one monolith is required. Column samples should also be taken down the length of a section where appropriate. These samples should be neatly packed and secured with plastic and rubber bands. All samples will be appropriately and clearly labelled with site codes, context details and sample information using permanent ink.

9.2.6 In waterlogged conditions, it is possible that timbers will survive below ground. Where there is potential for timbers to be dated, they should be sampled following guidelines in Waterlogged Wood: Guidelines to the Recording, Sampling, Conservation and Curation of Waterlogged Wood (Brunning and Watson 2010). Should such remains be encountered, a specialist conservationist should be deployed to site to oversee the recovery, recording, and conservation of the remains.

9.2.7 All samples will be recorded in a sample register forming part of the site record.

9.2.8 The Archaeological Contractor will be responsible for the safekeeping of all samples on-site and during transportation to the processing facility.

9.3 Post-excavation

9.3.1 Where archaeological remains are encountered, a post-excavation research strategy should be prepared by the Archaeological Contractor following the completion of the on-site archaeological investigations.

9.3.2 Processing and assessment of samples shall be undertaken in line with the agreed strategy for the recovery and sampling of environmental remains and Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation (English Heritage 2011). Subject to variations agreed in writing based on this, samples shall be processed and assessed under the supervision of the Archaeological Contractor's palaeoenvironmental specialist(s).

9.3.3 Suitable samples for scientific dating shall also be recovered. Dating techniques shall only be applied where required to meet the aims and objectives of the investigations and on written instruction from the Archaeological Consultant. These may include, but not be limited to:

- Radiocarbon dating
- Radiocarbon dating (Accelerator Mass Spectrometry)
- Optically Stimulated Luminescence (OSL)
- Archaeomagnetic dating
- Dendrochronological dating.

9.3.4 The following post-excavation analysis techniques may also be adopted where appropriate:

- Sample Flotation
- Sample Wet Sieving
- Sample Dry Sieving
- Residue Sorting

- Flot Sorting
- Routine Soil Analysis
- Soil Micromorphological Analysis (Thin Section Analysis)
- Charcoal Identification
- Wood Identification
- Non-charcoal charred plant macrofossil analysis
- Faunal remains analysis
- Waterlogged plant analysis
- Dendrochronological analysis.

9.3.5 All processing, recording, cleaning, storage and conservation of samples shall be in accordance with the Chartered Institute for Archaeologist's Standard and guidance for the collection, documentation, conservation and research of archaeological materials (2014d).

10 Recording and reporting

10.1 Recording

10.1.1 All excavated contexts shall be fully recorded by detailed written context records giving details of location, composition, shape, dimensions, relationships, finds, samples, cross-references to other elements of the record and other relevant contexts.

10.1.2 Written and photographic records will be maintained at all sites, even where archaeological features have not been encountered, in order to document the scope of the works, their location and the presence/absence of archaeological remains.

10.1.3 A born-digital approach should be adopted in the first instance. As far as practical, records should be created and maintained in a digital environment suitably backed up.

10.1.4 The record of archaeological investigations will include, at minimum:

- the site/trench codes as defined by the Archaeological Contractor;
- the location of the works area
- the date(s) of the works
- personnel involved in the works
- a description of the archaeological and/or construction works
- scope of excavation works and depths, if applicable
- a degree of visibility and capacity to observe archaeological features, noting any areas where obstructions occurred and reasons for this
- location and description of any archaeological remains
- location and description of any modern remains
- areas and depths where archaeological remains were left in situ.

10.1.5 In order to achieve this, on-site recording of archaeological features, where not precluded by Health & Safety considerations, will consist of:

- hand cleaning of archaeological features, sections and surfaces sufficient to establish the stratigraphic sequence exposed.
- examination of excavated material in order to retrieve artefacts to assist in the analysis of their spatial distribution.
- sample excavation of exposed features (see relevant methodology sections for minimum sample requirements.
- completion of pro-forma record sheets.
- plans and sections of all exposed archaeological features and horizons (including boundaries of natural) at an appropriate scale. A scale of 1:100 and/or 1:200 will be utilised to initially map the entire exposure and will be linked to detail plans at 1:20 of excavated features and sections at 1:10, if necessary. All features will be accurately tied into the Ordnance Survey National Grid and Ordnance Datum.

- a scaled photographic record of representative exposed sections and surfaces, along with sufficient photographs to establish the setting and scale of the groundworks.
- a record of the datum levels of archaeological deposits.

10.1.6 Records will be produced using either pro-forma context or trench record sheets.

10.1.7 Digital recording is preferred, but recognised as not always practical. All non-digital written records should be completed with black or permanent ink and all drawings will be completed using a 'hard' pencil (recommended 2H or 4H). All documents will include the unique site code.

10.1.8 A record of the full sequence of all archaeological deposits as revealed in the investigation works will be made. Plans and sections of features will be drawn at an appropriate scale of 1:10 or 1:20, with sections drawn at 1:10.

10.1.9 A full photographic record will be maintained inclusive of working shots to represent the general context of the archaeological investigations. The principal features and finds will both be recorded in detail and in a general context. This will consist of SLR digital photography (using a minimum of a 16-megapixel camera) capturing RAW and JPEG data. An appropriate scale should be included in detailed images wherever possible.

10.1.10 Registers of all contexts, drawings, photographs, finds, and samples will be maintained in a standardised format.

10.1.11 Where archaeological features are encountered, linear features and occasional discreet features will be located using a GNSS GPS and tied into the National Grid. Where complex features or groups of features are encountered, these will be recorded at a scale of 1:20 on planning sheets, based on a 5m grid system. The grid will be used for planning features and all other horizontal control on site. Unless otherwise appropriate, all planning should be undertaken utilising GNSS GPS to provide ESRI compatible shapefiles.

10.1.12 For trial trenching, trench locations and the extent of the excavated area will be surveyed using a differential GPS. The actual areas of ground disturbance and any features of archaeological interest will be accurately located on a site plan and to a known, permanent location. This will also be required in cases where significant remains are uncovered during a watching brief. A site grid will be accurately tied into the National OS Grid and located on a map of the area.

10.2 Human remains

10.2.1 Any human remains will be recorded as per this methodology and in accordance with the Specific Methodology for Human Burials in Section 8.

10.3 Finds

10.3.1 Specific methodologies for dealing with finds is set out in Section 7. All finds recording on Site will include, as a minimum:

- The site/trench codes as defined by the Archaeological Contractor
- The location of the works area
- Context number in which the artefact was found

- Designated find number
- Material type
- Brief description of the artefact

10.3.2 All finds will be labelled and bagged or boxed, where possible, with attached identification tags in plastic bags and entered into an on-site finds register and numbered accordingly. Any finds that are too large to be bagged will be labelled in an appropriate and visible manner with a finds tag.

10.4 Report preparation

10.4.1 Upon completion of the fieldwork, the Archaeological Contractor will prepare a fieldwork report within four to twelve weeks. This will be dependent upon the scope and nature of the fieldwork and upon the results of the fieldwork and external specialist reports. This timetable may be extended on those sites with extensive and significant archaeological remains; this will be agreed in advance with the Archaeological Consultant.

10.4.2 The contractor and the Archaeological Consultant should agree the reporting timescales in writing once work in the field is complete. Where appropriate an interim report will be provided. The timeframe for providing the interim report should be specified and agreed with Consulting Parties during the development of the task-specific WSI for the work.

10.4.3 The report will adhere to national standards and will include the following, as a minimum:

- Non-technical summary
- Contents list
- List of Tables, Figures etc.
- Introduction
- Summary of project background
- Description and illustration of the Site location
- Geology and topography of the Site
- Archaeological and historical background details for the Site including relevant previous archaeological interventions
- Statement of objectives and aims
- Statement of methodology
- Results and observations based on the quantitative and stratigraphic record with reference to any specific project constraints
- Discussion of the results in terms of the location, extent, date, nature, condition, quality and significance of any archaeological remains identified during the works
- Statement of archaeological significance and potential of the Site
- Assessment of results in terms of the Site-specific aims and wider context

- Conclusions and recommendations for appropriate further archaeological investigation and mitigation with reference to the specific aims and research agenda as set out in Section 4 of this Strategy
- Bibliography
- Acknowledgements
- Site matrix, if applicable
- Trench, context, find, drawing and photographic etc. registers, as applicable
- A copy of the OASIS form.

10.4.4 Copies of the draft report will be sent to the Archaeological Consultant for onward transmission to the Client and statutory consultees for comment; final copies of the report (paper & electronic) will also be submitted to be deposited in the GLAAS Historic Environment Record (HER) and/or the EHER, as applicable.

10.4.5 Any significant variation in the project design, including timetables, proposed after the agreement of the proposals will be communicated by the Archaeological Consultant to the statutory consultees.

10.4.6 An OASIS form will be completed, and a paper copy will be appended to the report. An electronic copy of the post-excavation assessment report will be deposited with the Archaeological Data Service (ADS).

10.5 Post investigation assessment and updated project design

10.5.1 On completion of the fieldwork a methodology for processing, sampling and the analysis of all artefacts and ecofacts recovered during the evaluation will be determined, commensurate to the complexity and character of the data recorded. This will enable an informed decision to be made on the need for any further archaeological mitigation. The evaluation report will be prepared in accordance with the guidance given in the CIfA's *Standard and guidance for archaeological field evaluation* (CIfA 2020a). Emphasis will be given to placing the results of the evaluation into the context of the archaeology of the area and include a statement on the archaeological significance of the results.

10.5.2 Within four weeks of completion of fieldwork a draft interim report will be prepared and submitted for review by the Archaeological Consultant. Following any necessary revisions, the Archaeological Contractor will submit a final version of the report within a further week of receipt of comment to the Archaeological Consultant for approval and issue to statutory consultees.

10.5.3 The reporting will include as a minimum:

- A non-technical summary
- Introductory statements
- The aims and methods used in the investigations
- Methodology(s
- Results and conclusions
- A table summarising the deposits, features, classes and numbers of artefacts encountered and spot dates of significant finds

- A synthesis of the findings and research aims achieved to date
- Proposed further stages of archaeological analysis and reporting through an updated project design
- A synthesis of the specific research aims that could be answered through implementation of the updated project design (UPD)
- Recommendations for any appropriate and proportionate further fieldwork to achieve the identified objectives within the UPD
- Proposals for deposition of the complete archive, including artefacts and physical and digital archive material.

10.5.4 Immediately upon completion of the finalised assessment report, the report and any data or other documentation produced during the post-excavation process shall be integrated into the site archive. The archaeological contractor shall store the archive in suitable conditions in a secure location until instructions are received from the Archaeological Consultant for its deposition.

11 Archive preparation and deposition

11.1 Overview

11.1.1 Archaeological material recovered from fieldwork is irreplaceable and data recorded during the course of fieldwork should be copied and held securely in a separate location in line with current good practice, until it can be deposited in a recipient repository. The recipient repository should be identified by the Archaeological Consultant in consultation with GLAAS. Details of the archival repository will be agreed before the commencement of any fieldwork.

11.2 Methodology

11.2.1 The methodology for archiving the physical and digital record is included in this section:

- Physical archive: All written records, drawings, and photographs as well as artefacts, eco-facts and environmental samples.
- Digital archive: All 'born digital' material such as GIS files, survey data, digital images, databases, spreadsheets, LiDAR data, etc.

11.2.2 The paper and digital archive will be security copied via the Archaeology Data Service (ADS), the only accredited digital archive in the United Kingdom for heritage data. The digital archive copy will be prepared and deposited through ADS-easy 2.0.

11.2.3 All archiving will comply with national, regional and local standards and guidance. In addition, archiving will comply with the following guidelines:

- ADS, 2011. Guides to Good Practice.
- Brown, D.H., 2011. Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation (Second Edition).
- Brown, D.H., 2011b. Safeguarding Archaeological Information. Procedures for minimising risk to undeposited archaeological archives.
- Chartered Institute for Archaeologists, 2014. Standards and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials.
- Society of Museum Archaeologists, 1993. Selection, Retention and Dispersal of Archaeological Collections: Guidelines for use in England, Wales and Northern Ireland.

11.3 Physical archive

11.3.1 The physical archive for all archaeological investigations at every specified Site will comprise all artefacts, environmental samples and written and drawn records. It is to be consolidated after completion of each phase of archaeological works with records and finds collated and ordered as a permanent record which is accessible and secure.

11.3.2 The documentary archive includes written and drawn records and photography generated during Site fieldwork as well as associated site matrix, summary of

key findings, photography, specialist reporting, specialist data and finds and environmental inventories generated during post-excavation.

11.3.3 Deterioration and damage of all documents is to be avoided by ensuring that the site records, drawings and post-excavation records are stored in a secure and stable environment.

11.3.4 All documents will be appropriately labelled and include the site code and be consistent within the confines of the project. A contents list will be included within the archive.

11.3.5 Printed copies of any reports and publications, if applicable, of the archaeological investigations at each Site will be included along with all maps and figures associated with the reports.

11.3.6 In addition to deposition with the receiving museum, the documentary archive will be security copied as PDF/A files and deposited digitally, alongside “born digital” material, with the Archaeological Data Service (ADS).

11.3.7 The material archive refers to finds and environmental samples. This includes:

- Small finds
- Bulk finds of material grouped by type i.e. ceramic fragments, animal bone, etc.
- Environmental samples, including thin-sections, and other environmental remains.

11.3.8 Prior to fieldwork, the Archaeological Contractor will have storage facilities in place to temporarily house the Site archive for a period of one year from completion of fieldwork; this should be an appropriate period of time for archive preparation and deposition.

11.3.9 Archaeological finds rarely have any monetary value, but they are an important source of information for future research, included in museum exhibits and teaching collections. The Chartered Institute of Archaeologists (CIfA 2014) recommend that finds are publicly accessible and that landowners donate archaeological finds to a local museum.

11.3.10 All receiving museums require notification before fieldwork begins. The receiving museum must be identified in advance of fieldwork and archival agreements in place with the task-specific WSI. The appropriate notification forms should be completed and discussions should be had with the museum to discuss arrangements as early as possible. On completion of the project, the archaeological contractor will discuss arrangements for the archive to be deposited with the corresponding local museum and with the client. This will be prepared in the format agreed with local museum services and following national guidance (ADS 2011 and Brown 2011).

11.3.11 Prior to the deposition of the material archive, all finds will be kept secure and clean, wherever possible. They will be recorded and catalogued and stored in suitable archive boxes or in conditions suitable to their material composition and size as per national guidelines.

11.3.12 All finds will be labelled, with reference to the accession number, and accompanied with catalogues and copies of specialist reports.

11.3.13 The retention, selection and dispersal of finds will be carried out after discussion

with the receiving museum and relevant specialists prior to museum deposition.

11.3.14 In the case where finds are retained, landowner consent will be required to allow transfer of the finds. A Deed of Transfer will be drawn up by the relevant museum for signing by the landowner. The complete finds inventory and further finds information can be provided to the landowner, on request.

11.3.15 The Site archive will be deposited with the relevant museum within one year of the completion of all fieldwork (if no further work is required). It will then become publicly accessible.

11.4 Human remains

11.4.1 The specific methodology for human remains should be followed during the post-excavation stage. Human remains should be reburied unless exceptional circumstance call for their retainment for future study and this is agreed with all relevant parties. All ethical and conservation considerations must be carefully deliberated.

11.5 Digital archive

11.5.1 The Principal Contractor will complete OASIS records for each individual phase of archaeological works resulting in a report as soon as possible after the completion of the works. All applicable sections of the record should be completed.

11.5.2 An electronic copy of the final report will be deposited with the ADS.

11.5.3 The digital archive shall include all relevant files.

12 Post-excavation requirements

12.1 Interim reporting

[Principal Contractor to describe the frequency and content of required interim reporting as required by the Archaeological Consultant from the Archaeological Contractor.]

12.2 Post-excavation analysis

[Principal Contractor to describe any specific post-excavation analysis agreed by the Archaeological Contractor and the Client outside of those outlined in Sections 7-10.]

12.3 Reporting

12.4 Archiving

13 Public engagement and outreach

[Principal Contractor/Archaeological Contractor to describe the communications, public involvement, and monitoring conditions agreed between the Client and the Archaeological Contractor, with input from the Consulting Parties.]

13.1.1 The archaeological programme for M25 J28 may result in the excavation of nationally significant archaeological remains relating to prehistoric, Romano-British and/or early medieval periods. These works offer potential for an outreach and interpretational programmes across a number of settings. These range from on-site events during the course of the archaeological excavations, that will allow the public to learn more about archaeology and the remains uncovered, through to permanent interpretation materials incorporated into public realm amenities.

13.1.2 It is expected that archaeological contractors responding to the tender for the archaeological works will demonstrate a commitment to outreach. They will be expected to provide detailed information concerning how they will meet the requirements for this programme of works but that they will also demonstrate innovation in the implementation of these elements.

13.1.3 The detailed design of the associated outreach strategy for the archaeological programme will require further input from the Client, the lead archaeological consultant, principal engineering/construction contractor, archaeological contractor, GLAAS and the receiving museum.

13.1.4 The archaeological contractor must:

- appoint a community archaeologist/public engagement officer (either drawing upon their existing staffing pool or through recruitment) who will lead on the development and implementation of the public outreach strategy for the lifetime of the project. Costs associated with this role must be included in tender responses and budgets.
- present the work to the public i.e. via open days that focus on the results of fieldwork; lecture series; exhibition material in public places etc.
- produce a suite of materials and activities with which to engage the pubic, which should include interactive, hands on events; this could include such activities as pop up museums and artefact handling opportunities.
- produce synthetic, themed post-excavation outputs, suitable for and appropriate to those targeted audiences, in the form of slim volumes or digital outputs such as websites, which should include an assimilation of the results of the programme into the existing understanding of the wider archaeological landscape.
- work closely with the Client to identify opportunities for interpretation and enhancement through design activities, such as incorporation into public realm amenities such as footpaths, cycle-ways, and wayfinding.

14 Communications and monitoring

14.1.1 The Archaeological Contractor shall liaise directly with the Archaeological Consultant in all instances concerning fieldwork and post-excavation phases, unless specifically requested otherwise. All consultation and site liaison with the Client and the local planning authority through their archaeological advisors (GLAAS) will be the responsibility of the Archaeological Consultant unless otherwise stated. Any enquiries on the archaeological works from interested parties (including the media) should be referred to the Archaeological Consultant who will inform the relevant parties.

14.1.2 All work will be undertaken in accordance with this specification and the WSI prepared by the Archaeological Contractor in advance of the works and approved by the Archaeological Consultant, the Client and the LPA's archaeological advisors (GLAAS). Any departures from this brief or working to the agreed WSI will made explicit and agreed with all parties first.

14.1.3 The archaeological investigations will be monitored at regular intervals by the Archaeological Consultant, the Client and the LPA's archaeological advisor (GLAAS). The Archaeological Consultant will agree suitable monitoring dates with the Archaeological Contractor and notify the LPA's archaeological advisor (GLAAS) in advance of the start of work on the site. Monitoring frequency will be agreed with the LPA's archaeological advisor (GLAAS).

15 Programme

[Principal Contractor to include the programme of all archaeological investigations.]

15.1.1 The Archaeological Contractor shall provide an indicative programme for the archaeological excavation. The start date for the archaeological fieldwork will be confirmed by Graham following the appointment.

16 Bill of quantities (if required)

16.1.1 The deliverables the Archaeological Contractor will need to allow for the following:

- Production of task-specific WSIs outlining the overall objectives and appropriate research aims for the archaeological investigations.
- Fixed price cost for archaeological evaluation trenching and recording of revealed archaeological features sufficient to quantify, characterise and date the archaeological resource sufficient to meet the requirements of the LPA's archaeological advisor (GLAAS).
- Hourly, daily and weekly costs for providing archaeologists to undertake watching briefs where appropriate.
- Reports on the findings of the archaeological investigations.
- Production of a Post Investigation Assessment and updated Project Design for any appropriate future works that are identified.
- Deposition of the archive with the receiving museum.

16.1.2 In addition, the following information is required:

- Company Health and Safety Policy.
- Risk assessments and method statements for work being undertaken for the project.
- A named individual responsible for the overall project design and delivery to include CV with qualifications, experience on similar schemes and contact details.
- CVs of key personnel with qualifications and experience.
- Details and CVs of any external specialists and other third parties anticipated to be used or with the potential to be used in the commission.
- An estimate of the staffing levels and timescales required to achieve the archaeological fieldwork and subsequent post excavation assessment.

16.1.3 For Pricing the following should be included:

- A fixed cost for delivery of all evaluation trenching.
- A fixed individual cost for each investigative element of the work as detailed in this scope of works, based on staff resourcing alone including a table of staff time and daily rates.
- Hourly rates for key staff to attend client and/or stakeholder meetings if required including travel costs.
- Day and hourly rates for staff required for delivery of each element of the work that may be required, including archaeological monitoring.
- Contingency costs for the appropriate treatment of individual palaeoenvironmental samples including implementation of appropriate dating techniques.

- Contingency daily and hourly rates for use of additional named specialists (i.e. specialist conservators etc).
- Costs for travel, staff accommodation, subsistence and other reasonable disbursements if required to undertake the work.

Appendices

Appendix A. Archaeological watching brief and test pitting

Cotswold Archaeology

M25 Junction 28 Improvement
London Borough of Havering

Archaeological Watching Brief and Test Pitting

for
Atkins

on behalf of
Highways England

CA Project: SU0020
LAARC Site Code: MJU19
CA Report: SU0020_1

December 2019

Andover Cirencester Exeter Milton Keynes Suffolk

M25 Junction 28 Improvement

London Borough of Havering

Archaeological Watching Brief and Test Pitting

CA Project: SU0020
CA Report: SU0020_1

Document Control Grid						
Revision	Date	Author	Checked by	Status	Reasons for revision	Approved by
1	06/12/19	BHH	APS	Internal review	-	APS

CONTENTS

LIST OF ILLUSTRATIONS

SUMMARY

Project Name:	M25 Junction 28 Improvement
Location:	M25 Junction 28, London Borough of Havering
NGR:	556814 192447
Type:	Watching Brief and Test Pitting
Date:	October and November 2019
Location of Archive:	Museum of London
Site Code:	MJU19

In October and November 2019 Cotswold Archaeology (CA) carried out an archaeological watching brief with supplementary test pitting exercise in connection with proposed improvements at Junction 28 of the M25 motorway, London Borough of Havering, and Essex, at the request of Atkins, acting on behalf of Highways England. All of the monitoring and test-pitting works were located within the London Borough of Havering.

Overall, the monitoring and test-pitting works produced largely negative results, with no activity pre-dating the modern period being observed. Sterile alluvial deposits were recorded in the area of the Weald Brook. These deposits were not seen to overlie any archaeological remains. Modern made-ground was recorded across large parts of the scheme area suggesting a significant level of modern truncation and disturbance most likely associated with the construction of the M25 motorway, the A12 trunk road, a skip-yard and recycling facility, and various major underground services that run through the site. With the exception of land on the west side of the Weald Brook and to the south of the A12, where modern disturbance and made ground deposits were less frequently encountered and shallower in depth, then the extensive levels of modern disturbance are considered to make the likelihood of archaeological features and deposits surviving very low across the much of the scheme area.

1. INTRODUCTION

1.1 In October and November 2019 Cotswold Archaeology (CA) carried out an archaeological watching brief with supplementary test pitting exercise in connection with proposed improvements at Junction 28 of the M25 motorway, London Borough of Havering, and Essex, at the request of Atkins, acting on behalf of Highways England. All of the monitoring and test-pitting works were located within the London Borough of Havering.

1.2 In December 2014, the Department for Transport (DfT) published its Road Investment Strategy (RIS) for 2015-2020, announcing £15 billion to invest in England's strategic road network between 2015 and 2020. A number of schemes have been identified to be constructed within the plan period, including the improvement to M25 Junction 28 (hereafter, the Scheme - centred at NGR: 556814 192447; see Figure 1). The Scheme was announced by Highways England in July 2017 and comprises upgrading Junction 28 located at the junction between the M25 anti-clockwise and the A12 in Essex, and includes the provision of a dedicated link for this right-turn movement and minor improvements of the existing roundabout.

1.3 The archaeological works were originally intended to comprise monitoring of geotechnical test-pits and windowless samples, to be undertaken in accordance with the *M25 Junction 28 Improvement. London Borough of Havering: Written Scheme of Investigation for an Archaeological Watching Brief* (CA 2019a), approved by the Greater London Archaeological Advisory Service (GLAAS), in their capacity archaeological advisors to the London Borough of Havering. However, following the excavation of a number of test-pits without archaeological supervision a supplementary programme of test-pitting was agreed with GLASS and implemented under the *M25 Junction 28 Improvement, London Borough of Havering Supplementary Written Scheme of Investigation for a Programme of Archaeological Test Pitting* (CA 2019b). The fieldwork also followed the S*tandard and guidance for an archaeological watching brief* (CIfA 2014) and *Guidelines for Archaeological Projects in Greater London* (GLAAS 2015).

The site

1.4 The Scheme is located between Brentwood and Romford and comprises upgrading Junction 28, located at the junction between the M25 anti-clockwise and the A12 in

Essex, including the provision of a dedicated link for this right-turn movement and minor improvements of the existing roundabout. The Scheme converts the use of the existing hard shoulder over the M25 viaduct to the proposed deceleration lane and associated diverge configuration. The diverge commences to the north of the existing structure. Following the diverge nose it begins to turn into the adjacent land, north-east of the existing junction. The existing circulatory/M25 northbound merge will be realigned to pass under the proposed link. The horizontal alignment continues in a loop while the vertical profile starts to decline from the proposed structure on an embankment following the existing topography downhill towards the A12.

1.5 The off-line parts of Scheme area currently comprise rough pasture partially surrounded by blocks of woodland and small scale arable and pasture fields. The fields are bound by hedgerows with intermittent trees and linear woodland belts. Semi-mature woodland belts are present along the on and off slip roads of the M25 as well as along the A12 toward the urban fringe of Romford to the west. The monitored ground works and archaeological test pits were located in a variety of settings, some within the woodlands to the side of the M25 motorway, the rough pasture mentioned above, pasture located towards the A12 and rough pasture located to the south of the A12; therefore stratigraphy varies across the scheme with alluvium and made ground seen in some parts but not in others.

1.6 The Scheme area is located within the geological area known as the London Basin; bedrock geology is anticipated to comprise London Clay Formation of the Thames Group overlain by localised superficial deposits of Alluvium and Head throughout the Scheme area. Modern made ground is present within the Scheme area, associated with the Brook Street Landfill to the north-west of the Junction 28 roundabout, infilled ponds and alterations to the alignment of Weald Brook and Ingrebourne River. It is also likely to be associated with the construction of the A12, M25, utilities infrastructure, London and North Eastern railway line, and buildings located within the Scheme area (Highways England 2017).

1.7 Stratigraphy varied greatly across the area subjected to archaeological monitoring and test pitting (Fig 2). Pits such as ATK041, located in a field to the north of the R.J Skip Hire & Recycling facility (the skip-yard) in the central part of the Scheme area (Fig 3) and the rough pasture to the side of the M25 motorway had significant deposits of made ground, often exceeding 1.2m thick. Monitored pits (e.g. ATK037

and ATK040) located within the woodland (Fig 3) in the north part of the Scheme area contained a layer of subsoil, approximately 0.3m thick, overlying the natural clay geology, which interventions located slightly to the west of the woodland (ATK046 and ATK049) did not contain. Possible alluvial deposits were identified in pits ATK009, 011, 035, 054, 090, TP2, TP3, TP4 and TP5, located to the west of the Weald Brook, and to the north of a straightened section of brook running broadly east to west along the south side of the A12 and linking into the Weald Brook. Seven geotechnical (GI) test pits were monitored to the south of the A12. although dug to a maximum depth of 3m, natural geology was encountered between 0.3m and 1m below present ground level (bpgl) in these pits. The deposit sequence encountered across the Scheme area is discussed in further detail in section 5 below.

2. ARCHAEOLOGICAL BACKGROUND

2.1 The following section has been informed by the Option Selection stage Road Investment Strategy M25 Junction 28 Improvements Scoping Report (Atkins 2017), and the Road Investment Strategy M25 Junction 28 Improvements Environmental Assessment Report (Highway England 2017). These assessments were informed by searches of the Essex Historic Environment Record (EHER) and Greater London Historic Environment Record (GLHER) as the Scheme area falls within both administrative areas (Highways England 2017).

2.2 There are four Archaeological Priority Areas (APAs) within the Site itself and the study areas utilised for the above reports. To the west of the M25, APA DLO33196 reflects the potential for important prehistoric deposits to be present, which may survive beneath alluvial deposits associated with Weald Brook. A further two areas with the potential for the survival of prehistoric deposits lie east of Nag's Head Lane [DLO33197] and south of Dagnam Park [DLO33198]. The remaining APA is associated with a Roman Road [MLO106812/MEX2262] underlying the current Colchester Road/A12 [DLO33238].

Prehistoric and Roman

2.3 A desk-based assessment carried out by Cotswold Archaeology in 2014 on Maylands Golf Course, to the west of and partially including the Scheme area with the study area used for the assessment, again identified the potential for prehistoric and palaeoenvironmental remains to survive within alluvial deposits along the

eastern boundary of the golf course associated with the Weald Brook (Cotswold Archaeology 2014, Highways England 2017). The evidence for prehistoric activity in general is limited within the area.

2.4 Palaeolithic handaxes have been retrieved as findspots within the Havering Borough, however, none have been identified within the study area. The closest find spot to the site itself records the recovery of a Palaeolithic handaxe found in South Weald, c. 1.5km to the north-east of the site (AMIE ref. 1142676).

2.5 It is generally considered that South Weald Camp, a later prehistoric hillfort located within Weald Park approximately 2km to the north-east of the site, must have been the focus of activity during the Iron Age (Essex County Council 2006).

2.6 The Roman Road [MEX2262/MLO106812] from London to Colchester, the course of which survives as the modern A12 Colchester Road. Romford, located c. 5.8km to the south-west of the site, has been identified as Durolitum, a stopping place and crossing point over the River Ram, described in the 3rd century AD document, the Antonine Itinerary (Cotswold Archaeology 2014). The site of a Roman building [MLO23390] has been recorded east of Nag's Head Lane at Tyler Hill Farm.

Saxon

2.7 Recent investigations at Oak Farm Cemetery to the south of the site have recorded Early and Middle Saxon activity, with occupation seemingly centred on area of hilltop Head deposits (A. Single, pers. comm.). It is possible that associated activity extends further north, across the A12 towards the Scheme area itself.

Medieval & Post-medieval

2.8 During the early medieval period, large parts of Essex fell within an area known as the Forest of Essex, a royal forest used for hunting by the king, with a royal hunting lodge established in the Forest at Havering-atte-Bower. The royal manor status of Havering was confirmed by William the Conqueror after the Conquest (Lingham 1969). The royal manor of Havering, listed in the Domesday Survey of 1086 within Beacontree hundred, comprised in the late 11th century a large landholding with an important king's residence.

2.9 In c.1200, the manor of Havering, still heavily wooded, extended from the River Thames to the south and Havering-atte-Bower to the north and encompassed the

present area of Romford, Hornchurch, Harold Wood and Harold Hill, with the site situated at its north-eastern limit (McIntosh 1986 and Lingham 1969). As a consequence of the growth of the population and the royal need for additional revenue, large areas of the royal manor were cleared of forest in the 13th century, and the manor was split into twenty subordinate manors (Lingham 1969, McIntosh 1986 and Powell 1978).

2.10 The manor of Havering became a Liberty in 1465 and the charter confirmed exceptional privileges which had been granted previously. The Liberty survived until the end of the 19th century (McIntosh 1986 and 1991, Powell 1978).

2.11 Early medieval settlement [MLO12476] has been recorded east of Nag's Head Lane, north of Tylers Common. Other recorded heritage assets primarily consist of features such as those associated with South Weald historic settlement [MEX1032780], located within the historic core of South Weald Conservation Area, a medieval hospital [MEX2254] and a moat [MEX2256], both located off Brook Street, and other buildings of medieval origin [MLO15564], either sited west of Nag's Head Sewage Works or within Maylands Golf Course, including The Golden Fleece [MEX40795] on Brook Street.

2.12 The earliest cartographic depiction of the western part of the Scheme area and its surroundings is the c. 1618 map of the Liberty of Havering (Cotswold Archaeology 2014). The map shows that part of the Scheme area situated to the west of the Weald Brook/Ingrebourne River, which formed the eastern boundary of the Liberty. Numerous enclosed fields, created because of the woodland clearance, are depicted within the Scheme area, probably resulting from clearance of the ancient Forest of Essex (Cotswold Archaeology 2014).

Modern

2.13 The 1881 Ordnance Survey map shows changes in the general area of the site. The map shows that the majority of woodland copses and belts depicted within the site in the 17th century had been removed, with Cock Wood to the north representing the sole surviving remnants of the medieval forest. Although some of the field boundaries had also been removed, the majority of the boundaries shown on the map, demarcated by trees, correspond with the enclosures shown on the post-medieval mapping.

2.14 A civil aerodrome was constructed immediately to the west of the site during the 1930s (Cotswold Archaeology 2014), and continued to operate despite the land surrounding it being sold for a golf course until it burnt down in 1940, during a World War II bombing raid (Maylands Golf Course, which still operates).

2.15 The M25 motorway was officially opened in 1986; junction 28 forms the focus of the site and improvement works scheme.

3. AIMS AND OBJECTIVES

3.1 The objectives of the archaeological works were:

- to monitor the ground investigation (GI) works, and to identify, investigate and record any significant buried archaeological deposits revealed on the site during the course of the ground investigation and supplementary test-pitting;
- to model, as far as possible, the extents and depths of any underlying archaeologically/geoarchaeologically-sensitive deposits, including those associated with the Weald Brook APA DLO33196 and any evidence for a continuation of the Head deposits mapped to the south of the A12;
- to identify any affected earthworks and structures connected with the 1930s aerodrome, in order to avoid damage to surviving remains from geotechnical works;
- at the conclusion of the project, to produce an integrated archive for all of the project work and a report setting out the results of the project and the archaeological conclusions that can be drawn from the recorded data, including an assessment of geoarchaeological potential informed by the results of the monitoring works and an inspection of borehole logs.

4. METHODOLOGY

4.1 The fieldwork followed the methodology set out in the *M25 Junction 28 Improvement. London Borough of Havering: Written Scheme of Investigation for an*

Archaeological Watching Brief (CA 2019a) and *M25 Junction 28 Improvement, London Borough of Havering Supplementary Written Scheme of Investigation for a Programme of Archaeological Test Pitting* (CA 2019b) which was written as an amendment following the completion of some elements of the geotechnical trial pitting without archaeological attendance during the works. An archaeologist was present during intrusive groundworks associated with hand-dug inspection pits prior to window/windowless and borehole sampling, the remaining GI trial pits, and supplementary test-pits (Fig 2 - TP 1 to 7). A further seven trial pits, TP ATK210 – TP ATK207, were subsequently monitored on the south side of the A12, to the west of Putwell Bridge Caravan Park (Fig 2). The geotechnical trial pits and archaeological test pits measured 3m by 0.7m (Fig 4); the hand-dug inspection pits measured approximately 0.3m in diameter and were hand dug to 1.2m before being drilled (Fig 5). The supplementary archaeological test pits also measured 3m long by 0.7m wide (Fig 6).

4.2 Where archaeological deposits were encountered written, graphic and photographic records were compiled in accordance with CA Technical Manual 1: *Fieldwork Recording Manual*.

4.3 The archive and artefacts from the evaluation are currently held by CA at their office in Milton Keynes. The archive will be deposited with the LAARC. A summary of information from this project, set out within Appendix B will be entered onto the OASIS online database of archaeological projects in Britain.

5. RESULTS (FIG 2)

Overall Stratigraphy

5.1 The results below are principally drawn from observations made during the excavation of GI trial pits, windowless samples, hand-dug test-pits prior to drilling/ boring, and the supplementary archaeological test-pits. The recorded observations were supplemented by discussions with the attending geotechnical engineer in order to ensure consistency in the identification of the exposed deposit sequence. As the GI works and archaeological test pits were spread across a large area of land used for differing functions the sequence exposed in the pits varied significantly.

5.2 The natural geology across the scheme comprised a silt clay, varying between mid-orange brown, mid-grey brown and mid-yellow brown in colour. In the central part of the site, in the vicinity of the skip-yard modern made-ground deposits in excess of 3.5m deep were encountered and the natural substrate was not reached. In the woodland and surrounding area to the north of the skip-yard and west of the M25 motorway, natural geology was exposed at approximately 0.5m bpgl; however, thick made-ground deposits were also noted in this area; in excess of 4.0m in pit ATK-036 (Fig 2). To the west of the woodland area, natural clay geology was exposed at c.1.2m covered by alluvium. To the east of the Maryland's Golf Course, the stratigraphy of the pits varied considerably; for example, in pit ATK-100 natural clay was exposed at 0.25m bpgl, whereas in pit ATK-055 it was not exposed until c.2.4m bpgl, overlain by alluvial deposits. To the south-east of skip-yard the natural clay was exposed at between 0.3m and 1.5m bpgl in the archaeologically monitored pits, largely sealed by made-ground with the exception of pit ATK-014 which contained a thin layer of alluvium overlying the natural substrate. Lastly, in the area to the south of the A12, natural geology was encountered at between 0.3m and 1.05m, covered by either modern made-ground or subsoil and topsoil.

Alluvium

5.3 Alluvial deposits associated with the Weald Brook were noted in eleven pits: ATK-014, 052, 053, 055, 056, 057, 059, TP 2, 3, 4.and 5. The minimum thickness being c.0.3m in ATK-014 located to the south-east of the skip-yard and the maximum encountered in ATK-055 measuring c.2.1m, located to the west of the Maryland's Golf Course. All of the pits containing alluvial deposits, with the exception of TP 4 and 5 and ATK-014, were located east of Maryland's Golf Course and west of the Weald Brook. Test Pits 4 and 5 and trial pit ATK-014 were located north of the Weald Brook, where a straightened section runs parallel to the A12, and the alluvium was noted as measuring between 0.6m and 1.0m thick. Alluvial deposits consisted of mid-orange gravel silt clay, significantly softer than the natural clay geology.

Made-Ground

5.4 Significant deposits of made-ground were encountered in seventeen of the archeologically monitored GI pits: ATK-024, 026, 027, 031, 032, 035, 036, 079, 082, 083, 084, 093, 094, 098, 100, 205 and 206, as well as in archaeological pit TP6. The majority of these pits were located in the areas north and south-east of the skip-yard, with a few in the area west of the Weald Brook, east of Maryland's Golf

Course. The minimum thickness of made-ground was encountered in pits ATK-100 and ATK-094, both situated toward the western edge of the site, measuring c.0.25m thick. This material is likely to represent infilling/ raising of ground levels along the western edge of the Weald Brook, probably in an attempt to increase the area of productive land available for arable cultivation. At its maximum, modern made-ground reached depths in excess of 3.5m thick in the area north of the skip-yard and c.4.0m in ATK-036 located near to the woodland area. This indicates that substantial "fill" operations have been undertaken in this area.

Archaeological Test Pit 1

5.5 Due to the location of the test pit in close proximity to a previously unidentified underground service then with agreement of GLAAS the pit was not excavated.

Archaeological Test Pits 2 and 3

5.6 Archaeological test pit 2 was located to the west of the Weald Brook, to the east of the Maryland's Golf Course, and measured 3.0m in length by 0.7m wide. Natural clay geology was encountered at 0.85m bpgl, covered by 0.6m of alluvium, sealed by 0.25m of mid-grey brown clay silt topsoil. No archaeological features, deposits or artefacts were identified in this pit.

5.7 Archaeological test pit 3 was located to the south of TP2 and was of the same dimensions. As with TP2, the natural clay geology was covered by an alluvial deposit measuring 0.6m thick, sealed by a 0.3m layer of topsoil. No archaeological features, deposits or artefacts were noted within this pit.

Archaeological Test Pits 4 and 5

5.8 Archaeological test pits 4 and 5, both measuring 3m long by 0.7m wide, were located to the west of the Weald Brook and south-east of the skip-yard. In TP4 the natural clay geology was encountered at 1.2m bpgl, covered by a deposit of alluvium 1.0m thick, sealed by 0.2m of mid-grey brown clay silt topsoil.

5.9 TP5 was located slightly to the north-east of TP4. The natural clay geology was encountered at 0.8m bpgl, covered by 0.6m of alluvium in turn sealed by a 0.2m thick topsoil.

5.10 No archaeological features, deposits or artefacts were recorded within either pit.

Archaeological Test Pits 6 and 7

5.11 Archaeological test pits 6 and 7, also measuring 3m long by 0.7m wide, were located slightly north of the skip-yard. Natural geology was encountered in TP6 at 0.6m, covered by 0.2m of modern made-ground consisting of mid-orange brown clay silt with modern brick and debris inclusions. This was overlain by 0.4m of clay silt topsoil.

5.12 TP7 was located slightly south-west of TP6. The natural geology was encountered at 0.2m bpgl, sealed by the same topsoil encountered in TP6. TPs 6 and 7 did not contain any archaeological features, deposits or artefacts.

Geotechnical pits in Archaeological Priority Areas

5.13 There are four APAs across the M25 Jct 28 Improvement Scheme in which 27 geotechnical trial and inspection pits were subject to archaeological monitoring, these were ATK-056, 077, 089, 90, 024, 026, 027, 030, 031, 032, 036, 082, 083, 084, 054, 035, 093, 094, 098, 100 and 201 – 207.

5.14 Only a single pit located with an APA contained alluvium. ATK-056 was located close to the eastern bank of the Weald Brook. The natural clay geology was encountered at 2.35m bpgl, covered by 2.1m of soft silt clay alluvial deposit, and then sealed by a clay silt topsoil 0.3m thick. No archaeological deposits, features or artefacts were noted within this pit.

5.15 A significant number of the geotechnical pits subject to archaeological monitoring contained layers of made-ground, especially those located within close proximity to the skip-yard. Pits ATK-024, 026, 027, 031 and 032 all contained substantial deposits of made ground covering the natural clay geology, the most significant being ATK-031 and ATK-032, in which the depth of made-ground exceeded 3.5m. In this area the made-ground comprised of dark yellow brown silt clay, gradually becoming darker in colour as it increased in depth.

5.16 Three of the geotechnical pits monitored in the area south-east of the skip-yard and east of the Weald Brook also contained deposits of made-ground. ATK-084 contained the shallowest deposit, at 0.3m thick, whereas ATK-082 and 083 contained 0.7m and 1.4m respectively. In this area made-ground consisted of a light grey brown sandy silt, with clay towards the bottom of the deposit.

5.17 Four of the geotechnical pits in the area west of the Weald Brook contained deposits of made-ground, although generally not as substantial as in other areas monitored. Pits ATK-035, 094, 098 and 100 contained made-ground, ATK-035, 094 and 098 contained only 0.25m of the deposit; whereas, ATK-098 identified a 2.0m thick deposit. In this area made-ground comprised of dark yellow brown silt clay with gravel inclusions, increasing in compaction as the depth increased.

5.18 A single geotechnical pit was subject to archaeological monitoring near to the woodland located to the north of the skip yard and west of the M25 motorway. ATK-036 contained in excess of 4.0m of made-ground. Nearby Windowless sample ATK-003, which was not subject to archaeological monitoring, also logged a significant depth of made-ground, comprising dark grey brown gravel clay with some silt inclusion towards the base of the deposit.

6. DISCUSSION

6.1 In total, 31 pits were archaeologically monitored, comprising six archaeological test pits and 25 geotechnical trial or inspection pits. The pits were excavated in a number of differing locations across the Scheme, as a result of which the stratigraphy across the site differed notably.

6.2 Six bespoke archaeological test pits were also excavated in three locations across the Scheme. Test pits 2 and 3, located on land east of Maryland's Golf Course and west of the Weald Brook, all contained alluvial deposits associated with the Brook. However, this was observed to be a sterile deposit and was not seen to cover any archaeological features.

6.3 Test pits 4 and 5 were located south-east of the skip-yard and to the north of a straightened section of stream running broadly east to west along the south side of the A12 and linking into the Weald Brook. They also contained deposits of alluvium associated with the watercourse that again did not appear to cover archaeological features or contain any artefacts.

6.4 Archaeological test pits 6 and 7 were located slightly north of the skip-yard. TP6 contained made-ground, probably associated with various landfilling operations and the development of the skip-yard. Unexpectedly TP7 did not contain made-ground;

however, neither pit contained any evidence of archaeological features or deposits, though it should be noted that the made-ground deposit in TP6 suggests that if there had been archaeological features in the area they would potentially have been heavily truncated by whatever operations preceded the infilling of the area and likely not survived.

6.5 The majority of the geotechnical pits monitored in the area of the Weald Brook contained alluvial deposits, varying from 0.7m to 2.1m thick. While there is the potential for these deposits to mask earlier archaeological remains no such features, or any artefactual material, were observed in any of the pits, all being devoid of archaeological remains and cultural material. However, it should be noted that this may simply be reflection of the relatively small area investigated, rather due to any genuine absence of past activity in the Scheme area. Trial pits ATK-035, 094, 098 and 100 did not contain alluvial deposits but did contain shallow deposits of made-ground, 025m thick, reflecting either a localised episode of dumping/ ground raising. It should be noted that no evidence for a buried turf or topsoil horizon was seen in these pits, suggesting that the area had been stripped of any such deposits prior to the importation of the modern dumped material. It is possible given the presence of alluvial deposits in some of the adjacent pits (e.g. ATK053 & ATK055) that any alluvial deposits that were originally present in these areas had also been removed along with any turf/ topsoil.

6.6 A small number of geotechnical pits were monitored to the east of the Weald Brook, south-east of the skip-yard. ATK-082, 083 and 084 all contained made-ground between 0.3m and 1.4m thick likely associated with the construction of the A12 trunk road, located to the south. While some trial and test-pits to the north of the A12 were noted to contain alluvial deposits (e.g. ATK014 and TP4 & TP5), the survival of these deposits appears to be variable. In pits ATK-082 and 083, also located to the north of the watercourse, the depth of made-ground coupled with the absence of any buried topsoil would suggest that were any archaeological remains previously present they are likely to have been significantly disturbed by the modern development of the A12 road.

6.7 Seven geotechnical pits required archaeological monitoring north of the skip-yard; the majority of those recorded contained significant made-ground deposits, exceeding 3.5 in ATK-027, 031 and 032. In ATK-027, 031 and 032 the natural geology was not exposed as the required base depth of excavation was reached

before the natural substrate was exposed. Given the significant depth of modern made-ground it seems unlikely that any archaeological deposits survive in this area. An examination of modern and historic maps of the Scheme area does not show any large features, such a quarry pits that would account for such a large and deep area of made ground. While a small pond is depicted on historic Ordnance Survey maps from the 1881 1st Edition, the pond is not of sufficient size to account for the area of made ground encountered. It is therefore conjectured that these extensive deposits were placed on the site in connection with the construction of the M25, possibly infilling an unrecorded borrow pit.

6.8 Six geotechnical trial pits were excavated at the land south of the A12. These pits are located within or in close proximity to the London to Colchester Roman road Archaeological Priority Area (DLO33238). Two of the six pits, ATK-205 and ATK-206 contained made-ground associated with the development of a modern trackway through the area; however, natural clay geology was exposed within the pits and the made-ground was not seen to be covering any archaeological features. The remaining four pits were located on land that did not appear to have been significantly disturbed; however, archaeological features/deposits were not revealed in any of the pits. Given the presence of Roman and Saxon activity in the near vicinity, including Saxon remains recently investigated to the immediate west in connection with the Oak Farm Cemetery development, then the absence of any archaeological remains in these pits may well again be a reflection of the relatively small area subject to investigation rather than a genuine absence of any remains within this part of the Scheme area.

6.9 No earthworks or structures associated with the aerodrome that previously existed to the west of the Scheme, in the area now largely occupied by the Mayland's Golf Course, were identified during the works.

6.10 Overall, the monitoring and test-pitting works produced largely negative results, with no activity pre-dating the modern period being observed. Sterile alluvial deposits were recorded in the area of the Weald Brook. These deposits were not demonstrated to overlie any archaeological remains. Modern made-ground was recorded across large parts of the scheme area suggesting a significant level of modern truncation and disturbance through-out the site associated with the construction of the M25 motorway, the A12, a skip-yard and recycling facility and various services that run through the site. With the exception of the land on the west

side of the Weald Brook and to the south of the A12, where modern disturbance and made ground deposits were less frequently encountered and shallower in depth, then the extensive levels of modern disturbance are considered to make the likelihood of archaeological features and deposits surviving very low across the Scheme.

7. CA PROJECT TEAM

Fieldwork was undertaken by Bethany Hardcastle and Jonathan Orellana. The report was written by Bethany Hardcastle. The illustrations were prepared by Ryan Wilson and Rosanna Price. The archive has been compiled and prepared for deposition by Hazel O'Neil. The project was managed for CA by Adrian Scruby.

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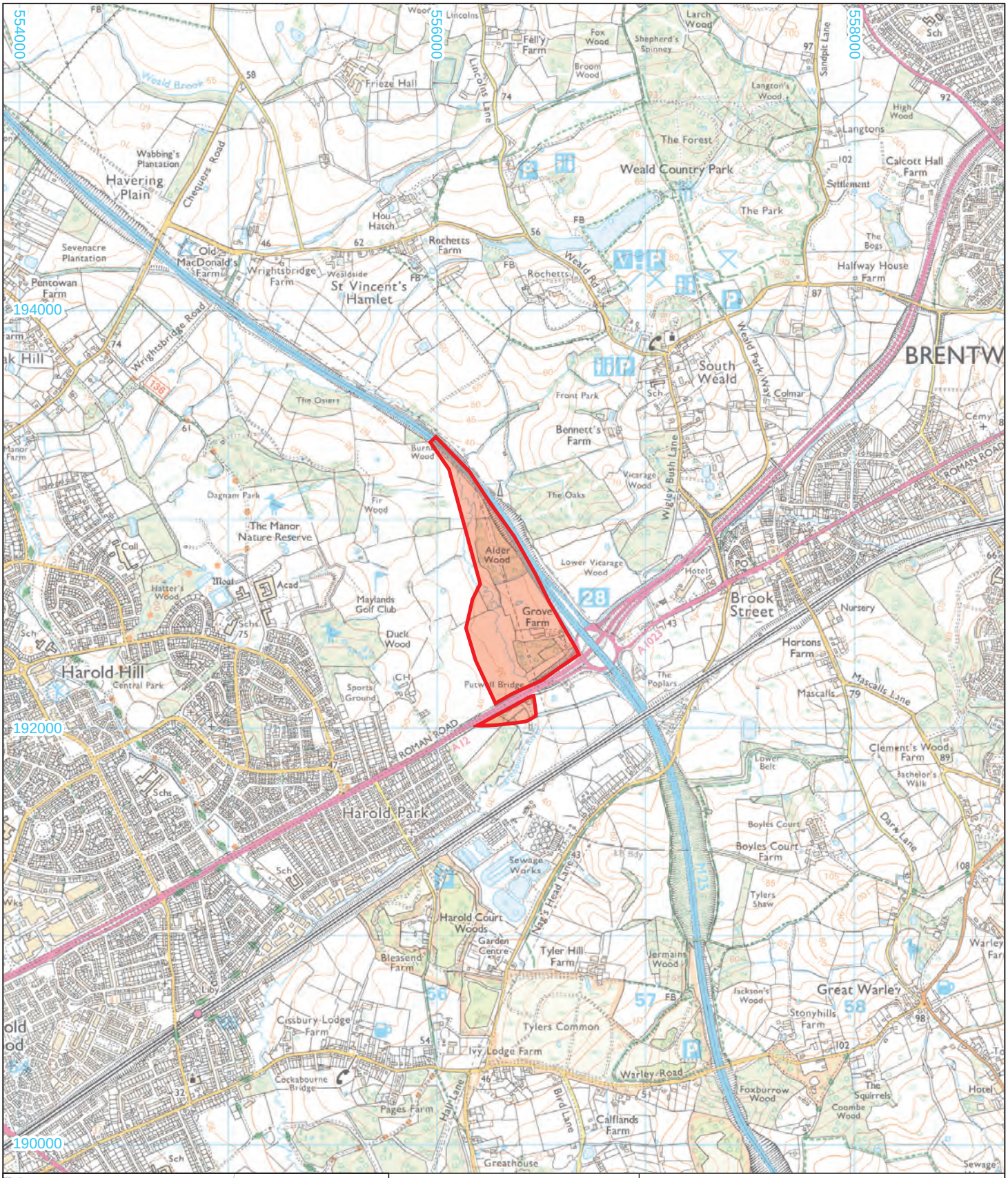
APPENDIX A: CONTEXT DESCRIPTIONS

Pit No.	Context No.	Type	Fill of	Context interpretation	Description	L (m)	W (m)	Depth /thickness (m)
TP2	200	Layer		Topsoil	Mid-grey brown clay silt	3.0	0.7	0.25
TP2	201	Layer		Alluvium	Mid-orange brown silt clay	3.0	0.7	0.6
TP2	202	Layer		Natural	Mid-orange brown compact clay	3.0	0.7	
TP3	300	Layer		Topsoil	Mid-grey brown clay silt	3.0	0.7	0.3
TP3	301	Layer		Alluvium	Mid-brown orange clay silt	3.0	0.7	0.6
TP3	302	Layer		Natural	Mid-red brown gravel clay	3.0	0.7	
TP4	400	Layer		Topsoil	Mid-grey brown clay silt	3.0	0.7	0.2
TP4	401	Layer		Alluvium	Mid-orange brown clay silt	3.0	0.7	1.0
TP4	402	Layer		Natural	Mid-orange brown silt clay with gravel inclusions	3.0	0.7	
TP5	500	Layer		Topsoil	Mid-grey brown clay silt	3.0	0.7	0.2
TP5	501	Layer		Alluvium	Mid-orange brown clay silt	3.0	0.7	0.6
TP5	502	Layer		Natural	Mid-blue orange mottled clay with occasional silt patches	3.0	0.7	
TP6	600	Layer		Topsoil	Mid-grey brown clay silt	3.0	0.7	0.4
TP6	601	Layer		Made ground	Mid-orange brown clay silt	3.0	0.7	0.2
TP6	602	Layer		Natural	Mid-orange brown compact clay with occasional chalk inclusions	3.0	0.7	
TP7	700	Layer		Topsoil	Mid-yellow brown silt clay	3.0	0.7	0.2
TP7	701	Layer		Natural	Mid-yellow brown clay with occasional gravel inclusions	3.0	0.7	
ATK-009	900	Layer		Topsoil	Mid-grey brown clay silt			0.3
ATK-009	901	Layer		Natural	Mid-yellow brown clay silt			0.5
ATK-009	902	Layer		Natural	Mid-yellow brown compact clay			
ATK-011	1100	Layer		Topsoil	Dark grey brown clay silt			0.2
ATK-011	1101	Layer		Natural	Mid-yellow brown silt clay			0.5
ATK-011	1102	Layer		Natural	Mid-yellow brown compact silt clay			
ATK-013	1300	Layer		Topsoil	Dark grey brown clay silt with high organic content			0.6
ATK-013	1301	Layer		Natural	Mid-yellow brown clay with occasional gravel and flint inclusions			
ATK-033	3300	Layer		Topsoil	Mid-grey brown silt clay			0.1
ATK-033	3301	Layer		Natural	Mid-yellow brown clay with occasional gravel inclusions			
ATK-035	3500	Layer		Topsoil	Mid-grey brown clay silt	3.0	0.7	0.25
ATK-035	3501	Layer		Natural	Mid-orange brown gravel clay	3.0	0.7	0.45
ATK-035	3502	Layer		Natural	Mid-grey brown compact clay	3.0	0.7	
ATK-037	3700	Layer		Topsoil	Dark grey brown clay silt with high organic content			0.2
ATK-037	3701	Layer		Subsoil	Mid-grey brown clay silt, frequent rooting			0.3
ATK-037	3702	Layer		Natural	Mid-brown grey compact clay			
ATK-040	4000	Layer		Topsoil	Dark grey brown clay silt with high organic content			0.1
ATK-040	4001	Layer		Subsoil	Mid-brown grey sandy silt with occasional rooting			0.4
ATK-040	4002	Layer		Natural	Mid-orange brown compact clay			
ATK-041	4100	Layer		Made ground	Mid-grey brown clay silt with frequent modern debris inclusions			1.2+
ATK-046	4600	Layer		Topsoil	Dark grey brown clay silt with high organic content			0.2

ATK-046	4601	Layer		Natural	Mid-brown grey silt clay			
ATK-048	4800	Layer		Topsoil	Dark brown grey clay silt with high organic content			0.3
ATK-048	4801	Layer		Natural	Mid-brown yellow compact clay			
ATK-049	4900	Layer		Topsoil	Mid-brown grey silt clay			0.3
ATK-049	4901	Layer		Natural	Mid-yellow brown compact clay			
ATK-054	5400	Layer		Topsoil	Mid-brown grey clay silt with high organic content			0.25
ATK-054	5401	Layer		Natural	Mid-yellow brown clay silt			0.7
ATK-054	5402	Layer		Natural	Mid-brown grey compact clay			
ATK-069	6900	Layer		Topsoil	Dark grey brown clay silt with high organic content			0.2
ATK-069	6901	Layer		Subsoil	Mid-yellow brown clay sand with frequent gravel inclusions			0.4
ATK-069	6902	Layer		Natural	Mid-yellow brown gravel clay			
ATK-077	7700	Layer		Topsoil	Mid-brown grey clay silt			1.2
ATK-077	7701	Layer		Natural	Mid-yellow brown compact clay			
ATK-079	7900	Layer		Made ground	Mid-grey brown clay silt with modern debris inclusions, including plastic			1.2
ATK-089	8900	Layer		Topsoil	Dark grey brown silt clay with high organic content			0.2
ATK-089	8901	Layer		Natural	Mid-brown grey compact clay			
ATK-090	9000	Layer		Topsoil	Mid-brown grey clay silt with high organic content			0.9
ATK-090	9001	Layer		Natural	Light yellow brown compact clay			
ATK-201	20100	Layer		Topsoil	Dark grey brown silt clay	3.0	0.7	0.5
ATK-201	20101	Layer		Subsoil	Light brown grey silt clay	3.0	0.7	0.3
ATK-201	20102	Layer		Natural	Light grey yellow gravel clay	3.0	0.7	
ATK-202	20200	Layer		Topsoil	Light grey brown silt clay	3.0	0.7	0.4
ATK-202	20201	Layer		Subsoil	Light grey brown silt clay	3.0	0.7	0.4
ATK-202	20202	Layer		Natural	Light yellow brown compact clay	3.0	0.7	
ATK-203	20300	Layer		Topsoil	Dark grey brown silt clay	3.0	0.7	0.3
ATK-203	20301	Layer		Subsoil	Light yellow brown silt clay	3.0	0.7	1.2
ATK-203	20302	Layer		Natural	Mid-grey yellow compact gravel clay	3.0	0.7	
ATK-204	20400	Layer		Topsoil	Mid-grey brown silt clay	3.0	0.7	0.2
ATK-204	20401	Layer		Subsoil	Light grey brown silt clay	3.0	0.7	0.5
ATK-204	20402	Layer		Natural	Mid-yellow brown compact clay	3.0	0.7	
ATK-205	20500	Layer		Made Ground	Mid-grey brown sandy silt with frequent modern debris and silt inclusions	3.0	0.7	0.6
ATK-205	20501	Layer		Natural	Mid-brown orange silt clay with a natural gravel band at 2.8bgl	3.0	0.7	
ATK-206	20600	Layer		Made Ground	Mid-grey brown sandy silt with frequent brick and modern debris	3.0	0.7	0.5
ATK-206	20601	Layer		Natural	Mid-brown orange silt clay	3.0	0.7	
ATK-207	20700	Layer		Topsoil	Mid-grey brown sandy silt with occasional modern brock and debris inclusions	3.0	0.7	5
ATK-207	20701	Layer		Subsoil	Mid-yellow brown clay silt with occasional gravel inclusions	3.0	0.7	0.8
ATK-207	20702	Layer		Natural	Mid-yellow brown sandy gravel	3.0	0.7	0.5
ATK-207	20703	Layer		Natural	Mid-orange brown compact clay	3.0	0.7	

APPENDIX B: OASIS REPORT FORM

PROJECT DETAILS		
Project Name	M25 Junction 28 Improvement, London Borough of Havering: Archaeological Watching Brief and Test Pitting	
Short description	In October and November 2019 Cotswold Archaeology (CA) carried out an archaeological watching brief with supplementary test pitting exercise in connection with proposed improvements at Junction 28 of the M25 motorway, London Borough of Havering, and Essex, at the request of Atkins, acting on behalf of Highways England. All of the monitoring and test-pitting works were located within the London Borough of Havering. Overall, the monitoring and test-pitting works produced largely negative results, with no activity pre-dating the modern period being observed. Sterile alluvial deposits were recorded in the area of the Weald Brook. These deposits were not demonstrated to overlie any archaeological remains. Modern made-ground was recorded across large parts of the scheme area suggesting a significant level of modern truncation and disturbance through-out the site associated with the construction of the M25 motorway, the A12, a skip-yard and recycling facility and various services that run through the site. With the exception of the land on the west side of the Weald Brook and to the south of the A12, where modern disturbance and made ground deposits were less frequently encountered and shallower in depth, then the extensive levels of modern disturbance are considered to make the likelihood of archaeological features and deposits surviving very low across the Scheme.	
Project dates	October and November 2019	
Project type	Watching brief and archaeological test pitting	
Previous work		
Future work	Unknown	
PROJECT LOCATION		
Site Location	M25, Junction 28, London Borough of Havering	
Study area (M^2/ha)		
Site co-ordinates	NGR: 556814 192447	
PROJECT CREATORS		
Name of organisation	Cotswold Archaeology	
Project Design (WSI) originator	Cotswold Archaeology	
Project Manager	Adrian Scruby	
Project Supervisor	Bethany Hardcastle and Jonathan Orellana	
MONUMENT TYPE	none	
SIGNIFICANT FINDS	none	
PROJECT ARCHIVES	Intended final location of archive (museum/Accession no.)	Content (e.g. pottery, animal bone etc)
Physical	Museum of London	none
Paper	Museum of London	Pit recording sheets, photo record sheets, day sheets, sketches
Digital	Museum of London	Context database, digital photographs, survey data
BIBLIOGRAPHY		
CA (Cotswold Archaeology) 2019 *M25 Junction 28 Improvement, London Borough of Havering: Archaeological Watching Brief and test Pitting.* CA typescript report **SU0020_1**		



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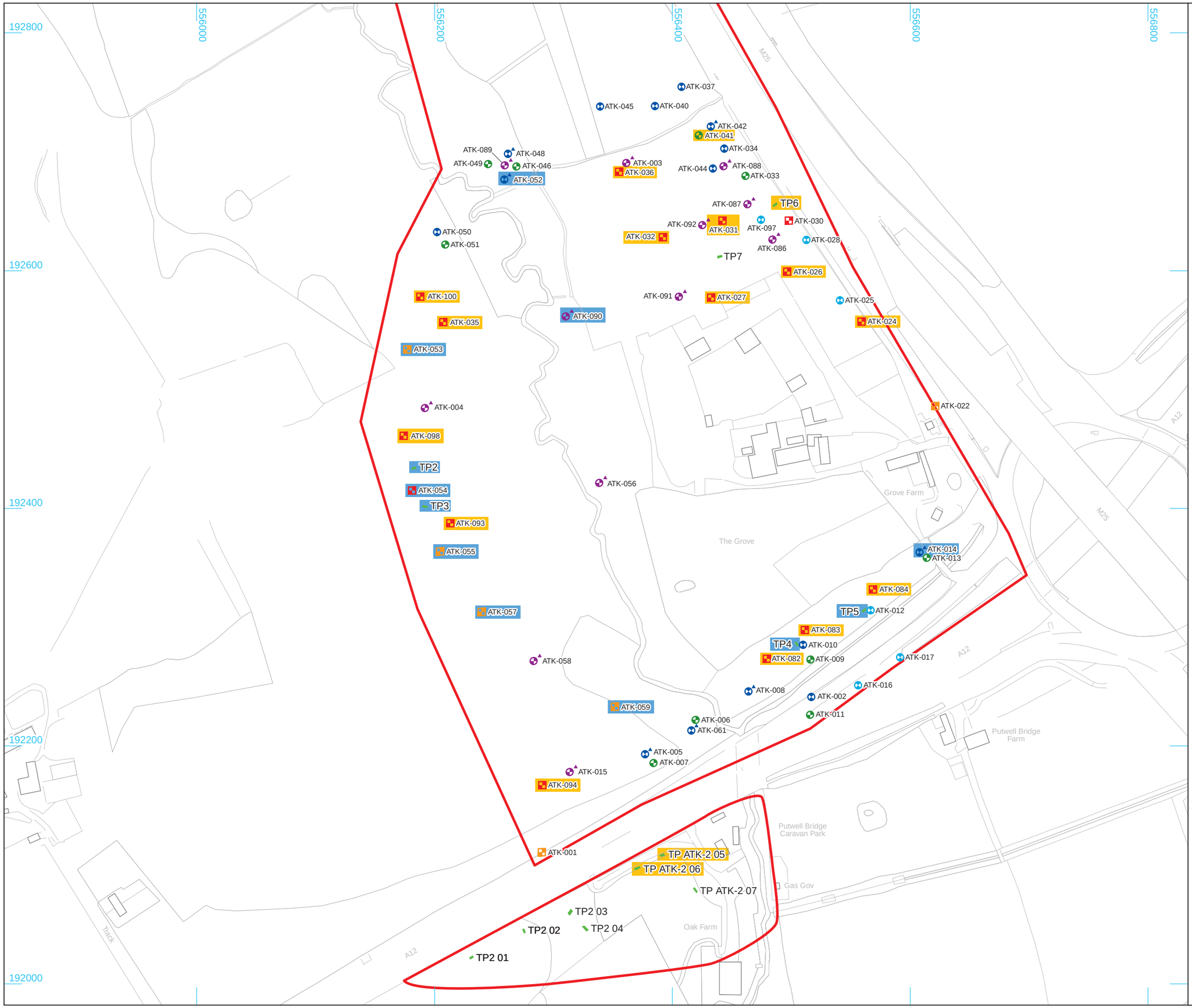
PROJECT TITLE

M25 Junction 28 Improvements, London Borough of Havering

FIGURE TITLE

Site location plan

DRAWN BY	**RW**	*PROJECT NO.*	**SU0020**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**18/12/2019**	**1**
APPROVED BY	**AS**	*SCALE@A4*	**1:25,000**	



N

- Site boundary
- Archaeological test pit
- Alluvium
- Made ground
- Dynamic sampling and rotary core
- Dynamic sampling and rotary core with install
- Cable percussion borehole
- Windowless sample with install
- Static cone penetration test
- Trial pit
- Hand-held windowless sample

0 1:3000 150m

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PROJECT TITLE

M25 Junction 28 Improvements, London Borough of Havering

FIGURE TITLE

Plan showing the locations of archaeological test pits and GI investigation / trial pits

DRAWN BY	**RW**	*PROJECT NO.*	**SU0020**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**18/12/2019**	**2**
APPROVED BY	**AS**	*SCALE@A3*	**1:3000**	

Site, looking south towards skip yard

Site, looking north into woodland

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PROJECT TITLE

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FIGURE TITLE

Overall site photographs

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CHECKED BY	**DJB**	*DATE*	**18/12/2019**	**3**
APPROVED BY	**AS**	*SCALE@A4*	**NA**	

Pit ATK035, looking south-west

Pit ATK205, looking west (1m scale)

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PROJECT TITLE

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FIGURE TITLE

Geotechnical trial pits: photographs

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CHECKED BY	**DJB**	*DATE*	**18/12/2019**	**4**
APPROVED BY	**AS**	*SCALE@A3*	**NA**	

Pit ATK009

Pit ATK069 (0.15m scale)

Pit ATK086 (0.15m scale)

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PROJECT TITLE

M25 Junction 28 Improvements, London Borough of Havering

FIGURE TITLE

Geotechnical inspection pits: photographs

DRAWN BY	**RW**	*PROJECT NO.*	**SU0020**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**18/12/2019**	**5**
APPROVED BY	**AS**	*SCALE@A3*	**NA**	

Test Pit 4, looking south-west (1m scale)

Test Pit 6, looking north-east (1m scale)

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PROJECT TITLE

M25 Junction 28 Improvements, London Borough of Havering

FIGURE TITLE

Archaeological test pits: photographs

DRAWN BY	RW	PROJECT NO.	SU0020	FIGURE NO.
CHECKED BY	DJB	DATE	18/12/2019	6
APPROVED BY	AS	SCALE@A3	NA	

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Printed on paper from well-managed forests and other controlled sources.

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Highways England Company Limited registered in England and Wales number 09346363