1EW03 - Enabling Works Central

AWHi – Fieldwork Report for Archaeological Monitoring at C25145 Twyford Padbury Brook. Site Code: 1C21TPBAM

Document no.: 1EW03-FUS_CNA-EV-REP-CS06_CL09-000002

Revision	Author	Checked by	Approved by	Date approved	Reason for revision
C01	Nuala C. Marshall	Virgil Yendell	Iain Williamson	08/07/2022	First Issue
C02	Nuala C. Marshall	Virgil Yendell	Iain Williamson	26/09/2022	Second Issue

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Executive Summary

This report details the findings of the Archaeological Monitoring at Twyford Padbury Brook ('the Site'). The fieldwork was issued with the unique site code, 1C21TPBAM, for recording, sampling, and archiving purposes. The results of previous palaeoenvironmental investigations at the Site identified gravel terraces which had potential to contain Pleistocene faunal remains. The result of this investigation will inform the archaeological resource assessment for the Site and identify whether any geoarchaeological remains present have the potential to contribute to the aims, objectives and knowledge gain defined in the GWSI: HERDS.

The Site is located immediately north of the village of Twyford, Buckinghamshire (NGR SP 66610 26800), situated at around 84m OD and covers arable fields encompassing c.209.61ha in total. The investigation comprised Archaeological Monitoring during the excavation of drainage pond WMZ03A. Work was carried out between the 3rd and 10th August 2021.

The aims of the investigation were to determine the presence or absence of Pleistocene faunal remains within the gravel terraces at the Site.

Deposits were recorded by a geoarchaeologist from the edge of the excavations without entering them. The deposit sequence included approximately 2m of terrace gravel; very ephemeral organic deposits were noted in the bottom c. 0.1m of the gravel. Possible periglacial features or Pleistocene palaeochannel features were also recorded in the gravel. The gravel was overlain by c. 0.25m of thin weathered silt alluvium and sealed by subsoil (c. 0.1m) and topsoil (c. 0.3m). No faunal or lithic remains were recorded.

A previous phase of geoarchaeological work in the vicinity recorded a comparable sequence and the gravel unit was OSL dated to MIS 3. Although no Palaeolithic cultural materials or Pleistocene faunal remains were identified during the previous works, temperate organic remains have previously been found at lower elevations along the Great Ouse at Radwell (c.38 and 37.5m OD and radiocarbon dated to the Early-Middle Devensian) and large mammalian remains have previously been recovered from Twyford and Steeple Claydon at c. 85 m OD, which is comparable but slightly higher than the recorded surface of c. 82m OD for the gravel within the area of pond WMZ03A.

Even so, with no Pleistocene faunal remains present within the footprint of the pond, there is no direct potential for further archaeological work at this location.

The Pleistocene palaeochannel features and the thin organic deposit, which recorded poorly preserved wood, grass, plant stems and roots but its significance in contributing to a greater understanding of the development of the landscape during this early period is limited. Evidence of land surface stabilisation and vegetation growth (trees and grass) in the vicinity prior to being overlain by further gravel terrace deposits, are nominally of interest and do suggest watercourses and bodies of water with associated vegetation extant during the temperate periods characterised by MIS 3. Such ecotonal edges, from dryland to wetland, would have provided sources of water and vegetation attractive to the large mammals such as those remains found at Twyford and Steeple Claydon. This suggests that the MIS3 gravel deposits continue to have a potential for recovery of Palaeolithic faunal remains and the organic horizon indicates the possibility of very

localised palaeoenvironmental potential not uncovered by the previous palaeoenvironmental evaluation (1EW03-FUS_CNA-EV-REP-C000-000002).

Some limited contribution via the wood and grass remains from the thin organic horizon and the morphological indication of palaeochannel features in section, indicative of temperate climate waterbodies, could provide a broad context for the nearby faunal remains of similar date. If the wood remains were to be radiocarbon dated. However, the nature of the Archaeological Monitoring, and the samples that could be obtained as part of it, as well as the limited incidence or and preservation within the organic horizon may restrict any contribution to the wider palaeoenvironmental context of the gravel unit.

1 Project Background and Scheme Design

1.1.1 High Speed Two (HS2) is a new railway network proposed by Government to provide a new link between London, the West Midlands, the East Midlands, South Yorkshire, Leeds and Manchester. Phase One of HS2 will involve the construction of a new railway approximately 230km (143 miles) in length between London and the West Midlands. Powers for the construction, operation and maintenance of Phase One are conferred by the High Speed Rail (London - West Midlands) Act 2017.

1.1.2 The overall framework within which archaeological investigation is to be undertaken is set out in the Environmental Minimum Requirements (EMR), in particular the Heritage Memorandum, the Code of Construction Practice (CoCP) for HS2 Phase One and the GWSI: HERDS. Accordingly, the nominated undertaker or the *Enabling Works Contractor* is required to implement appropriate and reasonable measures to identify, avoid or, where practicable, reduce impacts to the significance of heritage assets prior to the start of construction.

1.1.3 The Site was required for the construction of a temporary drainage pond associated with the Twyford Embankment, in the vicinity of Godington Padbury and Twyford Padbury Brook (Appendix 1, Figure 1). The pond was located within an area previously subject to extensive palaeoenvironmental evaluation (C25076) using boreholes, trial pits and window samples as part of the route-wide Palaeoenvironmental Project Plan 1EW03-FUS-EV-REP-C000-009813. The results of the evaluation identified gravel terraces which have potential to contain Pleistocene faunal remains.

1.1.4 The new pond was planned to be up to 3m deep and cover an area of 2800m² and 700m², and therefore excavation would result in the terrace gravels being exposed and truncated, with potential for faunal remains to be disturbed or removed.

1.1.5 The Fieldwork Change Control Form A for *Archaeological Monitoring at Twyford Padbury Brook, Twyford Embankment, Buckinghamshire, FCCFA034*, (Doc No: 1EW03-FUS-EV-FRM-CS06_CL09-000027), established the scope, methodology and deliverables for the Archaeological Monitoring in accordance with the Project Plan for Archaeological Monitoring and Construction Integrated Recording – Route Wide (Document No.: 1EW03-FUS-EV-REP-C000-009812) and commitments made in Environmental Minimum Requirements (EMRs) for HS2 Phase One; the objectives set out in the GWSI: HERDS and HS2 Technical Standards. The LSWSI for Route-Wide Palaeoenvironmental Investigation (Doc. No: 1EW03-FUS_CNA-EV-REP-C000-000001) established the requirements for information management, quality assurance and the results of engagement with the archaeological advisor to the local planning authority (Buckinghamshire County Council).

2 Description of the Site

2.1.1 The Site is located immediately north of the village of Twyford, Buckinghamshire (NGR 467122 226651), situated at around 84m OD.

2.1.2 The Site is within the valley floor of the Padbury Brook, which is a major south bank tributary of the River Great Ouse, which it joins approximately 13km downstream of the study area. Immediately east of Twyford village, an unnamed stream converges with Padbury Brook from the south.

2.1.3 At present the valley floor is occupied by rough pasture with several smaller tributaries and irregular depressions close to the brook. An abandoned railway line forms a boundary running roughly north-south between the brook and the village and is likely positioned on the edge of the valley floor terrace.

2.1.4 The scheme-wide GDBA (1D037-EDP-EV-REP-000-000031) assigns the Site to GCZ 16 (Twyford to Chetwode 'Padbury Brook').

3 Geology and Topography

3.1.1 The following is summarised from the Project Plan (Doc No: 1EW03-FUS-EV-REP-C000-009813) and LSWSI (Doc No: 1EW03-FUS_CNA-EV-REP-C000-000001), and the chronostratigraphy from the GDBA (1D037-EDP-EV-REP-000-000031).

Table 1: British glacial and interglacial chronostratigraphy

Geological Period	Chronostratigraphy		Age (ka)	Marine Isotope Stage (MIS)
Holocene	Holocene interglacial		11.7 – present	1
Late Pleistocene	Devensian Glaciation	Loch Lomond Stadial	11.7 – 12.9	2-5d
		Windermere Interstadial	12.9 – 15	
		Dimlington Stadia	15 – 26	
		Upton Warren Interstadial	40 – 43	
		Early Devensian	60 – 110	
	Ipswichian interglacial		115 – 130	5e
Middle Pleistocene	Wolstonian Complex	Unnamed cold stage	130-374	6
		Avery interglacial		7
		Unnamed cold stage		8
		Purfleet interglacial		9
		Unnamed cold stage		10
	Hoxnian interglacial		374 – 424	11
	Anglian glaciation		424 – 478	12
	Cromerian Complex		478 - 780	13 – 19

3.1.2 The bedrock geology of the Site includes Peterborough Member mudstone, a Jurassic formation laid down in shallow tropical seas between 166 and 163 million years ago (BGS, 2021).

3.1.3 Fragments of river terrace deposits are mapped by BGS on either side of the brook, and to the south it extends beneath Twyford village. These deposits were recorded as 'undifferentiated' and are likely of Late Pleistocene age (Devensian, MIS 2-4, 29-74 kya), supported by the recovery of large mammalian remains from Twyford and Steeple Claydon, including those of a mammoth, rhinoceros, and horse. The presence of these species together suggests that MIS 3 (*c.* 57kya) deposits are present within the general area (Currant and Jacobi, 2001). The remains of elephant are also recorded from Twyford and Steeple Claydon.

3.1.4 Holocene alluvium is mapped by BGS adjacent to the channel, illustrating the probable extent of the floodplain.

3.1.5 No glacial deposits, such as tills, are identified within the immediate vicinity of Twyford, and no deposits associated with mass movements of either Pleistocene of Holocene age have been noted (head; colluvium), within previously existing records.

4 Previous Works

4.1.1 The following is summarised from the Project Plan (Doc No: 1EW03-FUS-EV-REP-C000-009813) and LSWSI (Doc No: 1EW03-FUS_CNA-EV-REP-C000-000001), please refer to these documents for site references.

Archaeological Background

4.1.2 No Palaeolithic cultural material has been recorded in the vicinity of Twyford.

4.1.3 River terrace gravel sediments around Padbury Brook have yielded large Pleistocene faunal remains comprising horse, mammoth, and elephant, found in the immediate area of Twyford and a few kilometres downstream. These find indicate a Mid Devensian (MIS 3) date for the associated deposits, though due to the complexity of the data it is unlikely that all terrace gravel deposits are strictly of this date.

4.1.4 No Palaeolithic cultural material has been recorded in the vicinity of Twyford, though such evidence may exist given the suggested age range of terrace gravel deposits; evidence from elsewhere in Britain has shown Neanderthals to have been present into MIS 3 (Late Middle Palaeolithic), which is also a period of overlap with early modern humans (Pettit and White, 2012).

4.1.5 Subsequent to the glacial period, cultural records relating to the study area are unknown, with the nearest record of an early Neolithic polished stone axe from Steeple Claydon c. 800m to the east (HS2 asset reference: CAL 042).

4.1.6 Evidence dating to the Romano-British and Early Medieval periods is also absent. It is unclear as to whether this gap in the record between the Mesolithic and Early Medieval is true for the area, or whether other factors are affecting archaeological preservation and visibility. Twyford was recorded in the Domesday Book of AD 1086, which may suggest Early Medieval origins.

4.1.7 HS2 conducted a geophysical survey across the northern part of the Site area (CS 019) as part of the baseline Environmental Statement surveys, reference Twyford (AV0AB). The survey detected medieval ridge and furrow and demolition rubble from an early 20th century farm building.

4.1.8 The 2018 geophysical survey of the site identified archaeological remains that could be Saxon or medieval in date (Doc No: 1EW03-FUS-EV-REP-CS06_CL09-007287). In the western land parcel (beyond the limits of the site), a possible enclosure or series of ditches was identified. It is likely that they pre-date the ridge and furrow and could perhaps be late Saxon or medieval in date. They are located only 120 m east of the late Saxon / medieval manorial complex of Twyford. Other anomalies recorded across the rest of the area, within the site, were predicted to represent part of a co-axial field system, possibly of later prehistoric, Roman or Saxon date.

4.1.9 To the immediate adjacent and overlapping land to the south-east of the site, east of Twyford, an archaeological trial trench evaluation recorded Romano-British and early medieval remains indicative of the periphery of settlement activity (Doc No: 1EW03-FUS_COP-EV-REP-CS06_CL09-000001).

4.1.10 Evidence of medieval Twyford is also present in its current archaeological hinterland. Ridge and furrow can be observed approximately 300m to the northwest (HS2 asset reference: CAL 053) and has been confirmed by the Fusion trial trenching at the Three Bridge Mill site (Doc No: 1EW03-FUS_COP-EV-REP-CS06_CL09-000001). Ridge and furrow is also visible on LiDAR imagery.

4.1.11 The 1st edition historic Ordnance Survey (OS) map of AD 1880 indicates an enclosed landscape of open fields, with hedgerows and other tree-lined boundaries denoting field boundaries.

Preliminary Deposit Model (Based on AGS Data)

4.1.12 BGS mapping suggested that postglacial alluvium was restricted to a ribbon of sediment, immediately adjacent and parallel to the contemporary channel and the tributary stream entering the Padbury Brook to the east of Twyford village. Also mapped were three spatially extensive remnants of undifferentiated river terrace, one situated beneath Twyford village and the other two on the north side of the valley floor.

4.1.13 In contrast to the BGS mapping, the deposit model constructed from the AGS data (Doc No: 1EW03-FUS-EV-REP-C000-009813, Figure 9) suggests that alluvium forms a much more extensive blanket across the study area than previously considered, on average between 2 m and 3 m in thickness (Doc No: 1EW03-FUS-EV-REP-C000-009813, Figure 9, Sections A-A, B-B).

4.1.14 On the valley floor, the deposit model suggests that the thickest sediments are closer to Twyford village than the main contemporary channel of the Padbury Brook, with a notable thickening of deposits towards the tributary valley, which enters the area from the south, to the east of Twyford village. It is possible that this is a former major arm of the Brook, clearly predating the growth of Twyford. However, thicker deposits are also noted on the rising ground in the north-west and south-east and although mapped as alluvium, the physiographic context suggests that they may be associated with other processes. To the south-east, the topography suggests that this thicker wedge of material might reflect the upper weathered profile of a river terrace (hoggin?).

4.1.15 In the vicinity of the contemporary channel, the alluvium appears to range between 2.15 m and 2.75 m deep. In the central part of the study area, a single geotechnical record identifies 1.2 m of river terrace sediment overlain by 2.4 m of alluvium. Nearby, another geotechnical record indicates 1.8 m of 'head' overlain by 2.65 m of alluvium.

4.1.16 North of the Padbury Brook, alluvium up to 2.5 m thick is mapped, but it appears to be on rising ground beyond the contemporary floodplain; this suggests that it has been misinterpreted, perhaps reflecting colluvial deposits. A similar situation may exist in the far south of the study area where around 2 m of alluvium is mapped on rising ground.

Previous investigations

4.1.17 The Site has been evaluated as part of the route-wide palaeoenvironmental works (Site Code 1C20PAEBO; Project Plan: 1EW03-FUS-EV-REPC000-009813). The fieldwork report (1EW03-FUS_CNA-EV-REP-C000-000002) recorded a sequence of terrace gravel and overlying alluvium, centred on the two modern channel belts of the Padbury Brook. River terrace gravel deposits were identified across the site and OSL dated to MIS 3 (GL21012, 1EW03-FUS_CNA-EV-REP-C000-000002), and although no Palaeolithic cultural materials or Pleistocene faunal remains were identified during the 1C20PAEBO works, temperate organic remains have previously been found along the Great Ouse (Rogerson et al., 1992) and large mammalian remains have previously been recovered from Twyford and Steeple Claydon (Doc No: 1EW03-FUS-EV-REP-C000-009813). Therefore, the potential for Palaeolithic cultural materials or Pleistocene faunal remains from these deposits is still moderate and Archaeological Monitoring was recommended to accompany future works impacting these deposits.

4.1.18 The palaeoenvironmental assessment (1EW03-FUS_CNA-EV-REP-C000-000002) focused on the Holocene sequence and recorded very poor ostracod survival from two assessed sequences, Ws16 (c. 85m west of WM) and WS23 (over 840m north west). The diatom results were slightly better, with indications of wet soils and temporary pools of water initially in the upper part of the profile, likely to be of later Holocene date. Pollen preservation in the lower parts of the profiles was also poor but there was some minimal evidence for late prehistoric mixed pastoral and cultivation agriculture higher in the profile. The Holocene archaeological potential of the site was deemed low, and it will not contribute significantly to the Specific Objectives. The

Holocene geoarchaeological deposits recorded exhibit poor palaeoenvironmental preservation and do not warrant further investigation.

5 Specific Objectives and Aims

5.1 Aims

5.1.1 The general aims of the palaeoenvironmental Archaeological Monitoring were:

- To identify and record any Pleistocene faunal remains that may be present within the Site.

5.2 Specific HERDS Objectives

5.2.1 The Site includes sediments deposited during the Pleistocene epochs and therefore have the potential to contribute to the following HERDS objectives:

- KC2: Explore the location of Palaeolithic deposits, reconstruct past environments and investigate the relationship between climate variation and phases of hominin activity.
- KC4: Develop more refined chronostratigraphic models for Pleistocene River terrace deposits present throughout the route, such as those associated with the Great Ouse, and to correlate these with the more established elements of the Thames Valley sequence.
- KC 14: Identify sequences of environmental change for the Late Upper Palaeolithic-Early Mesolithic transition through investigation of sites in the Colne Valley and other locations along the route.

5.2.2 Further expansion of the potential of these studies to inform HERDS objectives is provided in Appendix 1, Section A of the Project Plan (Doc No: 1EW03-FUS-EV-REP-C000-009813).

6 Scope and Methodology

6.1.1 The fieldwork followed the Standard and Guidance: Archaeological Evaluation (CIfA 2014), the Management of Archaeological Projects 2 (English Heritage 1991), the Management of Research Projects in the Historic Environment (MORPHE): Project Managers' Guide (Historic England 2015a).

6.1.2 The FCCF identified two ponds for Archaeological Monitoring however one was descoped from the CONNECT works package. Archaeological Monitoring comprised excavation of a single pond (WMZ03A); Twyford Padbury Brook. Deposits were recorded by a geoarchaeologist from the edge of the excavations without entering them. At periodic intervals or based upon the horizontal and vertical distribution of recognisable and distinct units within the terrace gravel

deposits, upcast was set aside in a designated safe space for the Archaeological Contractor to sieve the material for recovery of faunal or lithic remains.

6.1.3 All geoarchaeological fieldwork (recording and sampling) adhered to the Technical Standard-Specification for Historic Environment Investigations (Doc No: HS2-HS2-EV-STD-000-000035), and was undertaken by an appropriately qualified specialist, with the support of a qualified archaeologist.

6.1.4 All archaeological fieldwork was carried out in accordance with the Project Plan (Doc No.: 1EW03-FUS-EV-REP-C000-009812), the LSWSI (Doc No.: 1EW03-FUS_CNA-EV-REP-C000-000001), the Field Change Control Form A, FCCFA034, (Doc No.: 1EW03-FUS-EV-FRM-CS06_CL09-000027) and any further instructions from the Contractor. This design takes into account the guidance and specifications set out in the HS2 Phase One EMRs, CoCP, GWSI: HERDS and Technical Standards, principally the Technical Standard Specification for historic environment investigations (Doc No: HS2-HS2-EV-STD-000-000035), and the guidance provided by the Chartered Institute for Archaeologists (CIfA) Code of Conduct (CIfA 2014a), the Standard and Guidance for Archaeological Field Evaluation (CIfA 2014b); as well as guidance provided by Historic England concerning Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England 2015b and Deposit Modelling and Archaeology: Guidance for Mapping Buried Deposits (Historic England 2020).

Fieldwork Recording

6.1.5 Recording of sediments followed established guidance (Jones et al., 1999; Historic England, 2015b; Technical Standard-Specification for Historic Environment Investigations Doc No: HS2-HS2-EV-STD-000-000035).

6.1.6 A written record of each individual context was created on site for each location, following standard geological criteria (Troels-Smith, 1955; Jones et al., 1999; Tucker, 2003) on pro-forma logs sheets. Photographs were also taken of site survey works whilst they were in progress.

Sampling Strategy

6.1.7 Mechanical excavation was undertaken in 200-300mm depth spits, 100 litres of sediment from at least every fifth machine bucket was sieved, recording location in meterage, and separating notable layers. In total 1400 litres were sieved. Sieving focused on the gravel deposits where there was potential for palaeolithic faunal remains and where the sieving method was most appropriate. Fined-grained deposits were not recorded. Organic deposits were bulk sampled with the aim to take 4 olitres but this was not possible in the one instance a bulk sample was required.

6.1.8 A bulk sample was taken from a very ephemeral organic deposit (1008) but due to the access restrictions and sampling from the machine bucket no more 10 litres was recovered.

6.1.9 A subsample of the bulk sample was processed by hand for plant macrofossil remains, the remaining sample was processed for faunal and carbonised remains. Processing and

environmental assessment was undertaken by appropriately qualified specialists in accordance with established guidelines (Campbell et al. 2011, Historic England 2015c, Technical Standard-Specification for Historic Environment Investigations HS2-HS2-EV-STD-000-000035).

7 Results

Palaeoenvironmental Summary

7.1.1 The deposit sequence included approximately 2m of terrace gravel (1004); a very ephemeral organic deposit (1008) was noted in the bottom c. 0.1m of the gravel. This was predominantly a loose grey clayey sand with organic fragments and ephemeral organic staining (Plate 1, Appendix 2). Specialist reports detailing the findings from the bulk sample taken from this organic deposit are provided in Appendix 5 and record no worked flint or faunal remains. Although, wood and grass remain do survive they are poorly preserved. Possible periglacial features or Pleistocene palaeochannel features (1005/1006/1007) were also recorded in the gravel (Plates 1 & 2, Appendix 2). Overall, the organic horizon indicates a period of stabilisation and vegetation growth (trees and grass) before being overlain by further gravel units and the formation of the later periglacial/palaeochannel features.

7.1.2 The gravel was overlain by c. 0.25m of thin weathered silt alluvium (1003) and sealed by subsoil (1002), measuring c. 0.1m in depth, and topsoil (1001), measuring c. 0.3m in depth (Plate 3, Appendix 2).

Artefact recovery

7.1.3 No lithic artefacts or faunal remains were recovered during works at Twyford Padbury Brook.

8 Assessment and Interpretation of Results

8.1.1 Archaeological Monitoring at pond WMZ03A, revealed no archaeological or palaeoenvironmental remains.

8.1.2 No artefacts were recovered from select sieving of gravel terrace deposits.

8.1.3 The previous the route-wide palaeoenvironmental works (Site Code 1C20PAEBO; Project Plan: 1EW03-FUS-EV-REPC000-009813) and associated palaeoenvironmental assessment (1EW03-FUS_CNA-EV-REP-C000-000002), recorded between 1.5 and 2.5m thickness of gravel deposits in the locations of pond WMZ03A. This was based predominantly on a geotechnical intervention within the footprint of the pond (ML081-CP022) and a number of geoarchaeological interventions within c. 55m of the pond (WS12-15 and TP8). The thickness and character of the deposits are comparable to that recorded as part of the WMZ03A Archaeological Monitoring.

8.1.4 ML081-CP022, the geotechnical intervention within the footprint of the pond, recorded mudstone bedrock from 2.8m bgl and below, with a yellowish brown fine to coarse clayey sand and gravel (quartzite limestone and flint). This was overlain by 0.9m of firm dark brown clay, with occasional sand and gravel inclusions, which was previously interpreted as possible Holocene alluvium (1EW03-FUS_CNA-EV-REP-C000-000002). Little detail was provided within the geotechnical data for subdivision of the alluvium and the Archaeological Monitoring on pond WMZ03A did record a thinner unit, c. 0.35m compared to the previous 0.9m, which was subdivided into c. 0.25m of thin weathered silt alluvium (1003) and sealed by 0.1m of subsoil (1002). Both the pond and geotechnical sequence were sealed by 0.2-0.25m of topsoil.

8.1.5 The deposit sequence was characterised by c. 2m of terrace gravel (1004); a very ephemeral organic deposit (1008) was noted in the bottom c. 0.1m of the gravel. This was predominantly a loose grey clayey sand with organic fragments and ephemeral organic staining (Plate 1, Appendix 2). A bulk sample was taken but due to the access restrictions and sampling from the machine bucket no more 10 litres was recovered. The bulk sample recorded no work lithic or faunal remains and only poorly preserved remains of tree and grass presence (Appendix 6). Possible periglacial features or Pleistocene palaeochannel features (1005/1006/1007) were also recorded in the gravel (Plates 1 & 2, Appendix 2). Broadly, the remains recovered from the organic horizon indicates a cessation of deposition within a temperate or periglacial climate, which enabled vegetation growth (trees and grass) before a return to gravel deposition and the formation of the later periglacial/palaeochannel features.

8.1.6 The BGS (2022) 50k scale superficial geology mapping places pond WMZ03A on the edge of surviving alluvium, with the south east of the pond in an area indicated to recorded bedrock only, with no surviving superficial what so ever. The BGS mapping only records surviving undifferentiated terrace gravels c. 60m to the south of pond WMZ03A.

8.1.7 The thin alluvial deposits recorded as part of the Archaeological Monitoring could support the BGS interpretation that the location is on the edge of surviving alluvium. However, the presence of terrace gravel does not support an absence, or even thinning, of terrace gravels at this location. The previous geoarchaeological interventions (1EW03-FUS_CNA-EV-REP-C000-000002), record up to c. 2m of terrace gravel c. 30-60m to the south of pond WMZ03A (ws12-13) but the gravel unit does start thinning down to c. 0.6m some 50m west of the pond (TP8). In addition, the terrace gravel was OSL dated to 45.6 +/-4.8 (4.5) kya (GL21012, 1EW03-FUS_CNA-EV-REP-C000-000002), which places the unit formation within MIS 3 (57 to 39 kya) and therefore of Late Pleistocene or Late Middle Palaeolithic date.

9 Conclusions and Recommendations

9.1.1 The Archaeological Monitoring met its primary objective, which was to determine, as far as reasonably possible, the presence of Pleistocene faunal remains within the Site.

9.1.2 Objectives outlined in the *Generic Written Scheme of Investigation: Historic Environment Research and Delivery System* (HS2-HS2-EV-STR-000-000015) were identified by the Fieldwork Change Control Form A034 as being relevant to the investigation of the Site (KC2, KC4, KC14).

9.1.3 The results of the Archaeological Monitoring have been unable to contribute to objective KC14 concerning the Late Upper Palaeolithic-Early Mesolithic transition.

9.1.4 The results do contribute to the understanding of Palaeolithic environments (KC2) with the identification of the palaeochannel and the lower organic fill residing within said feature. However, the poorly preserved wood, grass, plant stems and roots do not contribute significantly to a greater understanding of the Palaeolithic landscape beyond identifying that trees and grass grew in the vicinity before their detrital remains accumulated in the base of a temperate or periglacial channel.

9.1.5 The deposits recorded within pond WMZ03A are likely to be of a slightly older date than those recorded at other River Great Ouse sites nearby (e.g. Radwell, Rogerson et al., 1992), based on the previous OSL date of 45.6 +/-4.8 (4.5) kya (GL21012, 1EW03-FUS_CNA-EV-REP-C000-000002) from nearer by, and are also of a much higher elevation c. 82m OD. As such the findings do refine the chronostratigraphic understanding of Pleistocene River terrace deposits in the vicinity (KC4).

9.1.6 The previous geoarchaeological work (1EW03-FUS_CNA-EV-REP-C000-000002) recorded a sequence of terrace gravel and overlying alluvium, centred on the two modern channel belts of the Padbury Brook. River terrace gravel deposits were identified across the site and OSL dated to MIS 3 using a sample of the terrace gravel deposits from c. 700m north west of pond WMZ03A (GL21012, WS7b, 1EW03-FUS_CNA-EV-REP-C000-000002). Although no Palaeolithic cultural materials or Pleistocene faunal remains were identified during the previous works, temperate organic remains have previously been found along the Great Ouse (Rogerson et al., 1992) and large mammalian remains have previously been recovered from Twyford and Steeple Claydon (1EW03-FUS-EV-REP-C000-009813).

9.1.7 Two assemblages of large mammalian remains from Twyford and Steeple Claydon were discovered only 700m apart near Three Bridges Mill, c. 300m north east of pond WMZ03A. In 1876 AD at Steeple Claydon, a mammoth tooth and bone were discovered c.1.5m below the surface of a gravel pit. In the first half of the 20th century a mammoth (leg bone); rhinoceros (left femur, left humerus); rhinoceros? (7th cervical vertebra, thoracic vertebra); rhinoceros sp. (juvenile metatarsal); Elephas sp. (juv. Left tibia); horse (right scapula) were recovered at Twyford. Both assemblages are estimated to have come from c. 85 m OD (Farley, 2012), which is comparable but slightly higher than the recorded surface of the gravel within the area of pond WMZ03A (81.5 and 82m OD, GL21012, 1EW03-FUS_CNA-EV-REP-C000-000002).

9.1.8 Currant and Jacobi (2001), have postulated that horse, mammoth and rhinoceros remains, when located together, is indicative of the Pinhole Mammal Assemblage-Zone (PMAZ) attributed to the Middle Devensian (MIS 3), a period marked by higher species diversity than

earlier in the cold stage. This date for the gravel in the vicinity of pond WMZ03A is confirmed by the previously returned MIS3 OSL date (GL21012, 1EW03-FUS_CNA-EV-REP-C000-000002).

9.1.9 In addition, non-PMAZ remains of elephant are also recorded from Twyford / Steeple Claydon, suggesting there is complexity to the sequence. As was indicated in the palaeoenvironmental evaluation project plan (1EW03-FUS-EV-REP-C000-009813), the precise locations and contexts of all these discoveries are not know, making it difficult to comment further on the age or nature of faunal assemblage or its associated deposit sequence.

9.1.10 Even so, no Pleistocene faunal remains were present within the footprint of the pond, and there is no direct potential for further archaeological work at this location. It may be that the any faunal remains are limited to the elevation they were previously found at, estimated at 85m OD (Farley, 2012), and that gravels deposits at this lower elevation c. 82m OD have a lower potential for such remains but that is only conjecture at this stage.

9.1.11 The Pleistocene palaeochannel features and the thin organic deposit, which recorded poorly preserved remains of trees and grasses, are nominally of interest and do suggest watercourses and bodies of water with associated vegetation extant during the temperate periods characterised by MIS 3. Such ecotonal edges, from dryland to wetland, would have provided sources of water and vegetation attractive to the large mammals such as those remains found at Twyford and Steeple Claydon. This suggests that the MIS3 gravel deposits continue to have a potential for recovery of Palaeolithic faunal remains and the organic horizon indicates the possibility of further very localised palaeoenvironmental potential (KC2) not uncovered by the previous palaeoenvironmental evaluation (1EW03-FUS_CNA-EV-REP-C000-000002).

9.1.12 Currently the most comparable palaeoenvironmental sequence is from Radwell, approximately 45 km east of the pond and on the River Great Ouse. Organic remains associated with deposition in a pool off the braidplain of a fast-flowing river, were recorded between c.38 and 37.5m OD and radiocarbon dated to the Early-Middle Devensian (43250 +2010/-1610 BP, SRR-2980, and 40500 + 1380/-1180 BP, SRR-2981, Rogerson et al., 1992). The deposits recorded within pond WMZ03A are likely to be of a slightly older date, based on the OSL date of 45.6 +/-4.8 (4.5) kya (GL21012, 1EW03-FUS_CNA-EV-REP-C000-000002) from nearer by, and are also of a much higher elevation c. 82m OD.

9.1.13 Limited contribution would be possible via the wood and grass remains from the thin organic horizon and the morphological indication of palaeochannel features in section, indicative of temperate climate waterbodies, by providing only the broadest environmental context for the nearby faunal remains of similar date. The nature of the Archaeological Monitoring, and the samples that could be obtained as part of it – as well as the limited incidence of, and preservation within, the organic horizon – will restrict any contribution to the wider palaeoenvironmental context of the gravel unit (KC2). As such no further palaeoenvironmental work is recommended and therefore radiocarbon dating is also not recommended.

10 Evaluation of Methodology Used

10.1.1 The investigation included the excavation of drainage pond WXZ03A. Deposits were recorded by a geoarchaeologist from the edge of the excavations without entering them. It was possible to utilise the opportunity to sieve Pleistocene gravel for Palaeolithic cultural remains and Pleistocene faunal remains by putting aside large samples from appropriate deposits to be investigated as the excavation continued. Samples were sieved from each of these deposits, through a 10mm mesh. This did not yield any archaeological or faunal remains.

10.1.2 The machine used was well suited to the task, and it was possible to safely approach the excavations to record the stratigraphy when necessary.

10.1.3 All sections were photographed, with written records of stratigraphy describing each deposit in detail in order to produce a reliable dataset suitable for the task of generating deposit models as well as adding to the existing geological record.

10.1.4 If Archaeological Monitoring of drainage pond impacts are to continue in the future provision may need to be put in place for the geoarchaeological specialist to enter excavations in order to sample and record horizons of interest (e.g. Pleistocene organic deposits) to a greater degree.

11 Publication and Dissemination Proposals

11.1.1 Publication of the results of this fieldwork will be undertaken in a method and at an appropriate time as determined by HS2 Ltd.

11.1.2 The results of the Archaeological Monitoring at Twyford Padbury Brook reported on in this document should be integrated with the wider results but do not of themselves warrant publication.

12 Archive Deposition

12.1.1 All retained archaeo-environmental samples will be treated and conserved in accordance with the English Heritage guidance document, Guidelines for the Preparation of Excavation Archives for Long Term Storage (Walker 1990). Should no further work be required, an ordered, indexed and internally consistent Site archive will be prepared and deposited in accordance with Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation (Archaeological Archives Forum (Brown 2011). A summary of information from the project has been entered onto the OASIS online databases of archaeological projects in Britain.

12.1.2 Final deposition of the archive will be determined by HS2 Ltd.

13 List of acronyms

Acronym	Meaning
AGS	Association of Geotechnical and Geoenvironmental Specialists file format
BGS	British Geological Survey
CFA	Community Forum Area
ES	Environmental Statement
GIS	Geographical Information Systems
GPB	Godington to Padbury Brook
GWSI: HERDS	Generic Written Scheme of Investigation: Historic Environment Research and Delivery
LSWSI	Location Specific Written Scheme of Investigation
MIS	Marine Isotope Stage
NGR	National Grid Reference
OLS	Old Land Surface
OSL	Optically Stimulated Luminescence
PMAZ	Pinhole Mammal Assemblage-Zone
RT	Rotary
SA	Shell and Auger
TP	Trial Pit
WS	Windowless Sample

14 References

Title	Reference
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Chartered Institute for Archaeologists (CIfA) 2014b Standard and Guidance for Archaeological Field Evaluation	CIfA 2014
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Historic England 2008. Luminescence Dating: Guidelines on using Luminescence Dating in Archaeology	Historic England 2008
Historic England 2015. Management of Research Projects in the Historic Environment (MORPHE): Project Managers' Guide	Historic England 2015a
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HS2 AWHh – Fieldwork Change Control Form A for Construction Integrated Recording at Godington and Padbury Brook, Twyford Embankment, Buckinghamshire, FCCFA040,	1EW03-FUS-EV-FRM-CS06_CL09-000028
HS2 AWHh – Fieldwork Report for Palaeoenvironmental Investigations at C25075 and C25076 Twyford Padbury Brook, C25081 Godington Padbury Brook, C25065 River Great Ouse South, C30028 River Great Ouse North, and C32025 Thorpe Bridge River Itchen, Site Code: 1C20PAEBO	Document no.: 1EW03-FUS_CNA-EV-REP-C000-000002 C01
HS2 AWHh - Interim Report for Palaeoenvironmental Investigations at Twyford Padbury Brook (C25075 and C25076), Site Code: 1C20PAEBO	1EW03-FUS_CNA-EV-REP-CS06_CL09-000001
HS2 AWHh - Survey Report for Route-wide Palaeoenvironmental Investigations at Godington Padbury Brook (C25081), River Great Ouse North (C30028), River Great Ouse South (C25065, C25066), Thorpe Bridge River Itchen (C32025) & Twyford Padbury Brook (C25075 and C25076), Site Code: 1C20PAEBO	1EW03-FUS_CNA-EV-REP-C000-000003
HS2 Geoarchaeological Desk Based Assessment (GDBA): review of the geoarchaeological potential of High Speed Two Phase One	GDBA1D037-EDP-EV-REP-000-000031
HS2 Location Specific Written Scheme of Investigation for Route-wide (Central) Palaeoenvironmental Evaluation	1EW03-FUS_CNA-EV-REP-C000-000001
HS2 Project Plan for Route-wide (Central) Palaeoenvironmental Evaluation	1EW03-FUS-EV-REP-C000-009813
HS2 Project Plan for Archaeological monitoring and Construction Integrated Recording – Route Wide	1EW03-FUS-EV-REP-C000-009812
HS2 Technical Standard: - Route wide soil resources plan	HS2-HS2-EV-STD-000-000008
HS2 Technical Standard: Specification for historic environment investigations	HS2-HS2-EV-STD-000-000035
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15 Appendix 1 - Figures

Tywford
Padbury
Brook

Godington
Twyford
Poundon
Hillesden
Steeple
Claydon
Charndon
Calvert
Grebe Lake

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Legend

Phase One Final Preliminary Design alignment January 2017

- Cutting
- Embankment
- Viaduct
- LLAU Limit of Land to be Acquired or Used
- Site Boundary

High Speed Two

AWHi – Fieldwork Report for Construction Integrated Recording at C25145 Twyford Padbury Brook Site Code: 1C21TPBAM

Figure 1 - Site Location

Published

HS2

Scale at A3: 1:20,000

0 200 400 600 800 Meters

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Map Number 1EW03-FUS_CNA-GI-MAP-CS06_CL09-000003 **Date:** 27/09/22

C25145

WMZ03A

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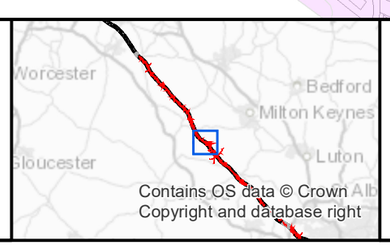
Legend

- Site Boundary
- **Phase One Final Preliminary Design alignment January 2017**
- Cutting
- Embankment
- Pond WMZ03A
- LLAU Limit of Land to be Acquired or Used



High Speed Two

AWHi – Fieldwork Report for Construction Integrated Recording at C25145 Twyford Padbury Brook Site Code: 1C21TPBAM

Figure 2 - Pond WMZ03A location

Published

HS2

Registered in England. Registration number 06791686. Registered office: 2 Snowhill, Queensway, Birmingham, B4 6GA.

Scale at A3: 1:2,500

0 24 48 72 96 Meters

Map Number: 1EW03-FUS_CNA-GI-MAP-CS06_CL09-000003 **Date:** 27/09/22

16 Appendix 2 – Plates

Plate 1: Organics in section

Plate 2: Pleistocene Paleochannel

Plate 3: Section showing stratigraphy

17 Appendix 3 – Context Register

Context	Depth (m)	Description	Interpretation
1001	0.30	Mid to dark grey brown clay silt with occasional small to medium stones. Turf and ploughed – agricultural land	Topsoil
1002	<0.10	Mid yellow grey brown clay silt, patchy, mostly ploughed away	Subsoil
1003	0.25	Mid to light bluish grey, grey brown, yellow brown silty clay	Alluvium
1004	1.0	Mid grey and orange patchy gravel with small patches and lenses of dark grey silty sand	Terrace Gravels
1005	0.50	Mid orange brown clay sand with very frequent gravel	Pleistocene colluvium
1006	0.20	Palaeochannel <1m depth running SW-NE ('cut')	Pleistocene paleochannel
1007	0.20	Fill of Palaeochannel, mid grey silty sand gravel	Paleochannel fill
1008	0.05 – 0.10	Patches of mid grey clay sand within gravels. Frequent plant remains and ephemeral organic staining	Organic rich deposits within gravels

18 Appendix 4 – OASIS Form

18.1 OASIS Entry

OASIS ID (UID): hs2conne2-508882
Project Name: 1EW03 - Enabling Works Central, AWHi – Fieldwork Report for Construction Integrated Recording at C25145 Twyford Padbury Brook, Site Code: 1C21TPBAM
Activity type: Field Observation (Monitoring)
Project Identifier(s): Site Code: 1C21TPBAM
Planning Id: [no data]
Reason for Investigation: Planning requirement
Organisation Responsible for work: HS2 Connect Archaeology
Project Dates: 03-Aug-2021 - 10-Aug-2021
HER: Buckinghamshire Historic Environment Record
HER Identifiers: [no data]

Site name: C25145 Twyford Padbury Brook, Site Code: 1C21TPBAM
Coordinates: SP 66610 26800

Administrative Areas:
Country : England
County : Buckinghamshire
District : Aylesbury Vale
Parish : Twyford
Project Methodology: Recording of sediments followed established guidance (Jones et al., 1999; Historic England, 2015b; Technical Standard-Specification for Historic Environment Investigations Doc No: HS2-HS2-EV-STD-000-000035). A written record of each individual context was created on site for each location, following standard geological criteria (Troels-Smith, 1955; Jones et al., 1999; Tucker, 2003) on pro-forma logs sheets. Photographs were also taken of site survey works whilst they were in progress. Mechanical excavation was undertaken in 200-300mm depth spits, 100 litres of sediment from at least every fifth machine bucket was sieved, recording location in meterage, and separating notable layers. In total 1400 litres were sieved. Sieving focused on the gravel deposits where there was potential for palaeolithic faunal remains and where the sieving method was most appropriate. Fined-grained deposits were not recorded. Organic deposits were bulk sampled with the aim to take 4 0litres but this was not possible in the one instance a bulk sample was required. A bulk sample was taken from a very ephemeral organic deposit (1008) but due to the access restrictions and sampling from the machine bucket no more 10 litres was recovered.A subsample of the bulk sample was processed by hand for plant macrofossil remains, the remaining sample was processed for faunal and carbonised remains. Processing and environmental assessment was undertaken by appropriately qualified specialists in accordance with established guidelines.

Project Results: The deposit sequence included approximately 2m of terrace gravel (1004); a very ephemeral organic deposit (1008) was noted in the bottom c. 0.1m of the gravel. This was predominantly a loose grey clayey sand with organic fragments and ephemeral organic staining (Plate 1, Appendix 2). Specialist reports detailing the findings from the bulk sample taken from this organic deposit are provided in Appendix 5 and record no worked flint or faunal remains. Although, wood and grass remain do survive they are poorly preserved. Possible periglacial features or Pleistocene palaeochannel features (1005/1006/1007) were also recorded in the gravel. Overall, the organic horizon indicates a period of stabilisation and vegetation growth (trees and grass) before being overlain by further gravel units and the formation of the later periglacial/palaeochannel features. The gravel was overlain by c. 0.25m of thin weathered silt alluvium (1003) and sealed by subsoil (1002), measuring c. 0.1m in depth, and topsoil (1001), measuring c. 0.3m in depth. No lithic artefacts or faunal remains were recovered during works at Twyford Padbury Brook.

Keywords:
Archive:
Reports in OASIS:

Marshall, N. C., (2022). 1EW03 - Enabling Works Central, AWHi – Fieldwork Report for Construction Integrated Recording at C25145 Twyford Padbury Brook, Site Code: 1C21TPBAM. London: HS2 Connect Archaeology.

20 Appendix 5 – Specialist Reports

20.1 Macro-Botanical Assessment

Introduction

20.1.1 One 10 litre waterlogged bulk sample (Sample 80 from context 1008) was submitted for environmental assessment in August 2022 from the palaeoenvironmental Archaeological Monitoring undertaken at Twyford Padbury Brook, Buckinghamshire. The sample was extracted from the bottom of a Pleistocene terrace gravel deposit. A small quantity of waterlogged ecofacts were recovered and the aim of this report was to assess the archaeological potential of this assemblage for further study.

Methodology

20.1.2 A sub sample of 2.5kg, taken from the 10litre bulk, was gently disaggregated by hand to retrieve both waterlogged ecofacts and any artefacts (Kenward et al. 1980) at AOC Edinburgh. The remaining bulk sample was processed at AOC Milton Keynes and the flots and residues retained. No faunal remains or finds were recovered, the lithic remains were assessed for worked flint and reported on separately (Section 20.2). The sediment was composed of a clayey sand with frequent inclusions of flint and gravel.

20.1.3 Once the sediment was broken down, the wash over was fed through a stack system of 4.0mm, 2.0mm, 1.0mm and 300µm sieves. The wash over was stored in distilled water and assessed using a high-powered microscope at x10-450 magnification. The heavy fraction was air dried at room temperature and sieved using a stack system of 4.0mm, 2.0mm and 1.0mm sieves. Plant identifications were confirmed using modern reference material and seed atlases (Cappers et al. 2006). Taxonomy and nomenclature for plants follows Stace (2010).

Results and observations

20.1.4 Context (1008) was described as a very ephemeral organic deposit and the waterlogged plant assemblage in terms of species diversity was very small. The ecofacts were composed mostly of wood fragments alongside much smaller inclusions of grass caryopses (Poaceae sp), stems and roots. The preservation was poor and it was not possible to identify any of the material further.

Discussion and statement of significance

20.1.5 Inclusions of poorly preserved wood, grass, plant stems and roots were noted during the assessment of context (1008) but its significance in contributing to a greater understanding of the development of the landscape during this early period is limited. The most information that can be derived from this material is that trees and grass grew in the vicinity before becoming accidently trapped within the confines of this terrace deposit.

Recommendations for retention or discard

20.1.6 The sample has been processed and along with some of the larger wood fragments is currently stored in distilled water in cold store at AOC archaeology in a stable condition. Once all work has been completed at this site the sample is recommended for discard.

Potential for analysis of plant remains

20.1.7 Context (1008) has been assessed in full and no further work is required. The ecofact assemblage is of little environmental interest and has nothing further to offer in understanding the formation of this landscape. If material is needed for radiocarbon dating the larger wood fragments are the most suitable.

Table 2: Waterlogged Assemblage (Key: *=<10, **=10-29, *=30-99, ****=>100)**

Sample			**1**
Feature			**Deposit**
Context			**1008**
Vol (kg)			**2.5**
% Analysed			**100**
Species	**Name**	**Part**	
Poaceae sp.	Grass	Caryopsis/es	*
Wood	Wood	Frag(s)	****
Wood	Wood	Roundwood	****
Stems	Stem	Frag(s)	*
Roots	Root	Frag(s)	*
Other			
Snail	Snail	Shell frag(s)	*
Flint	Flint	Frag(s)	****

20.2 Flint Assessment

Introduction

20.2.1 One 10 litre waterlogged bulk sample (Sample 80 from context 1008) was submitted for environmental assessment in August 2022 from the palaeoenvironmental Archaeological Monitoring undertaken at Twyford Padbury Brook, Buckinghamshire. The sample was extracted from the bottom of a Pleistocene terrace gravel deposit. The sample was processed by water flotation method and the heavy fractions sorted into 4mm, 2mm, and 1mm fractions.

Initial sorting revealed a total of 312 pieces of flint (512 g) recovered during the excavation of a single deposit (context 1008). These pieces of flint are the subject of this assessment with the aim of determining if any are the result of or affected by anthropogenic processes (e.g., knapping debris, cores and tools). No bone or find remains were recorded in the sample.

Methodology

20.2.2 The 10-litre soil sample (Sample 80) from context 1008 had been processed by water flotation method and the heavy fractions sorted into 4mm, 2mm, and 1mm fractions. Only those deriving from the 4mm fractions were examined in detail and are recorded here. These were examined macroscopically and with the aid of a low-powered binocular microscope in order to identify any potential working traces on individual fragments and to allow broad characterisation of the assemblage. The flint deriving from the smaller 2mm and 1mm fractions was visually scanned to eliminate the possibility of any working debris being recognised. No evidence of working was noted on these small fragments and no further examination nor recording of these materials was conducted.

The Lithic Assemblage

20.2.3 A total of 312 pieces of natural cream and grey coloured flint were identified and recovered from a sub-sample (Sample 80) of an ephemeral organic deposit (1008) collected in the field. Sample 80 was processed post-excavation for faunal and carbonised remains. The flint pieces represented approximately a third of the sub-sample collected.

20.2.4 None of the flint showed signs of secondary modification. The majority of the flint was heavily patinated and showed numerous signs of natural fracture and abrasion. Where present the cortex was smooth, rolled and abraded, typical of a locally derived gravel origin.

Table 3: Summary of lithic assemblage by contextual unit

Context	Context type	Description	Weight (g)	Count
1008	Ephemeral organic deposit	Pieces of natural gravel derived flint	512	312

Significance of the Assemblage

20.2.5 The nature of the assemblage suggests that it is a component of a natural gravel deposit of no archaeological significance that it is of low significance.

Potential for Further Work

20.2.6 No further work on the lithics is proposed.