MONITORING AND MODELLING OF THE PALAEOLITHIC ARCHAEOLOGICAL RESOURCE AT CHARD JUNCTION QUARRY, HODGE DITCH PHASES II & III ASSESSMENT STAGE (5695)

Project Report Stage I

Prepared for

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MONITORING AND MODELLING OF THE PALAEOLITHIC ARCHAEOLOGICAL RESOURCE AT CHARD JUNCTION QUARRY, HODGE DITCH PHASES II & III ASSESSMENT STAGE 1

This report of Stage 1 activities is structured by the Stage 1 Assessment Stage Aims and Objectives as per the Updated Project Design (UPD) of 11th February 2009. These are reported on in the order in which the objectives were specified in the UPD with additional information contained in the Appendices.

1 Summary

This report gives the results of the Stage I of the Project 5695 on Chard Junction Quarry conducted between March and May 2009. The report includes a description of the 2008 biface finds and details of the stratigraphy and sedimentary context of the artefacts. The finds are compared to previous un-provenanced finds from the area. Additionally during the course of this work a third biface was found and this has been included with a preliminary description. All three bifaces appear to be within the lowest gravel unit in Hodge Ditch Phase I and there are indications of a possible disturbed ground-surface at this level. These finds are compared with validated previous finds from the site.

The report describes how commercial borehole logs and gamma cps log data have been used in conjunction with site records and observations of microstratigraphy to construct a simple model-sequence for Hodge Ditch Phase 1 and in a preliminary fashion for the whole of the Hodge Ditch sector of Chard Junction Quarry.

The dating for this sequence is taken from both previous OSL dates and 5 additional dates done as part Stage 1 of this project and reported here. These dates strongly suggest that the bifaces either just pre-date MIS 12 (and are of Cromerian age) or a late Wolstonian (Complex) age possibly MIS 9. This important question can only be resolved by further OSL dating of Hodge Ditch II when it reaches the same levels. An inter-laboratory comparison of two OSL dates is also underway but the results are not yet available.

The report highlights the unusual nature of the site and its high potential for methodological research (gamma cps logs, digital granulometry, laser scanning and direct sediment dating) as well as for Lower-Middle Palaeolithic archaeology. The report includes as an appendix the summary of the project design for a methodologically focussed Stage 2 of the project.

2 The 2008 Biface Finds and their Archaeological Context

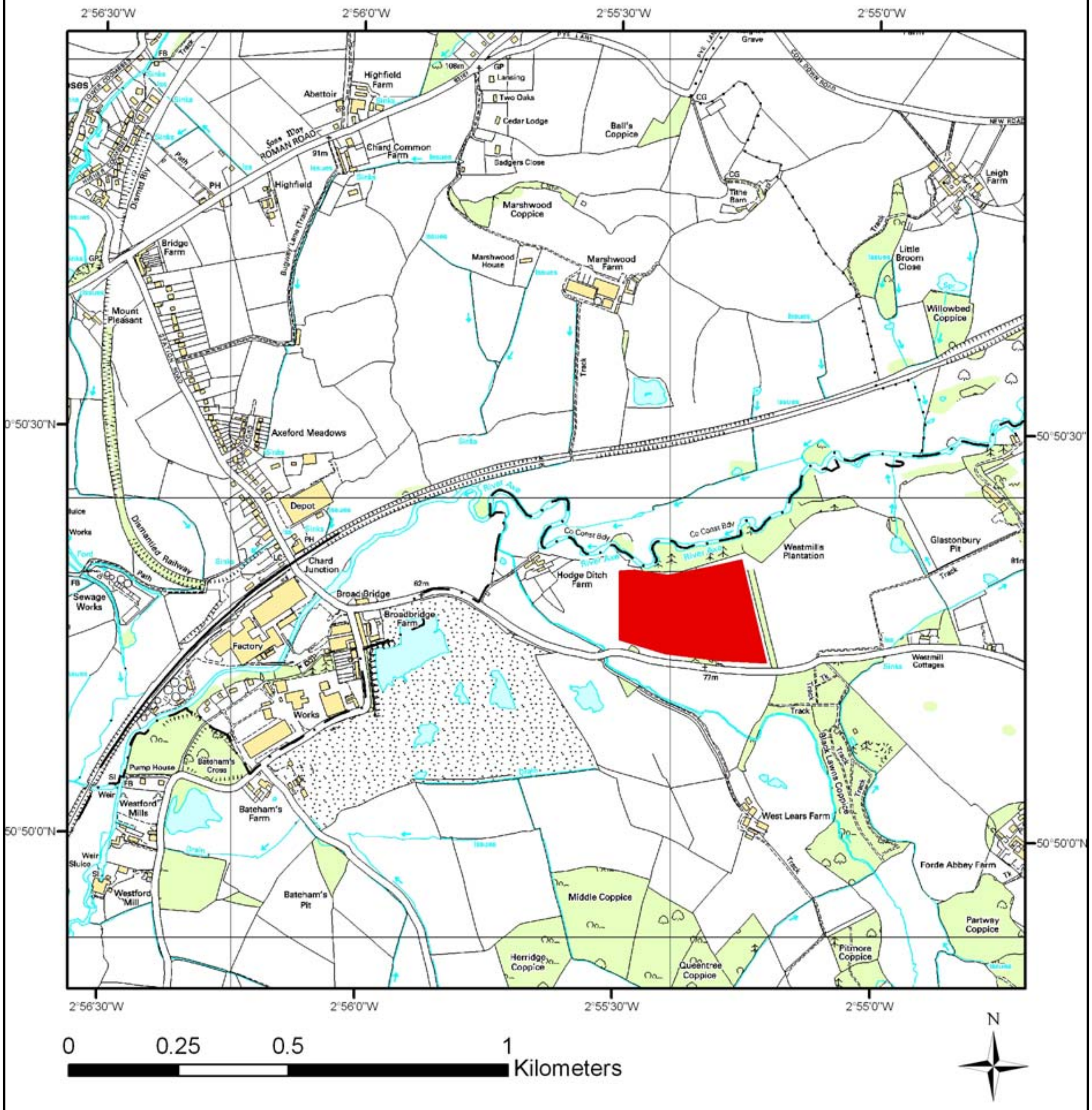
Objective 1: Collate all the archaeological and sedimentological information in existence pertaining to the area of Chard Junction Quarry and related to the 2008 finds. This will include museum visits and the collation of records spanning back into the 1950s which were identified by PRoSWEB (PNUM 3847).

This objective includes two parts the collation of the material relating to the 2008 biface finds and the collation of archaeological material relating to the site prior to 2008.

2.1 Report on 2008 bifaces

The Axe Valley has long been known for its Palaeolithic finds particularly from the site at Broom (Evans 1872, Calkin and Green 1949, Shakesby and Stephens 1984, Green 1988, Marshall 2001, Hosfield et al. 2003, Toms et al. 2005). Whilst research has continued at Broom (Hosfield et al. 2003), other sites have also been investigated in the valley as part of the English Heritage managed ALSF funded project “Palaeolithic Rivers of South West Britain” (PRoSWeB). This project was completed in March 2007. Between March 2007 and March 2009, research focussing on the Quaternary geology and Palaeolithic archaeology of south west region has been continued at selected locations by Prof Tony Brown (University of Southampton), Dr Laura Basell (University of Oxford) and Dr Phil Toms (University of Gloucestershire), with assistance from Dr Ramues Gallois and Dr Richard Scrivener (formerly British Geological Survey). As a result of funding from the University of Southampton, and the kind permission of Bardon Aggregates, an Aggregate Industries Business, Chard Junction quarry is one of the key sites at which work continued during this period. This research included monitoring the changing sedimentology as aggregate extraction progressed. On 10th July 2008, Tony Brown found two bifaces whilst working in the pit with Laura Basell and Phil Toms. The importance of these finds lies in their stratigraphic location, comparison with previous finds, potential for dating and confirmation of a Lower Palaeolithic hominin presence in the Axe Valley South West England. From March 2009, work at Chard Junction has been supported by English Heritage via the project reported on here. This has allowed the dating of deposits from which the bifaces came, the contextualisation of the bifaces, continued monitoring of extraction and some preliminary developments of new methodologies for sites of this kind.

For the last few years the primary extraction location at Chard Junction Quarry has been the Hodge Ditch area, centred on 2°55'21" W 50°50'17" N. This lies just to the south of the River Axe, and to the east of an unnamed tributary of the River Axe draining Hewood Bottom (Figure 1). More than 20 metres of sands and gravels, which are predominantly fluvial in origin, are known to exist in this area. Once thought to be related to the overflow of Lake Maw, which was supposed to have occupied the Somerset Levels, the gravels have in recent years been interpreted as mixed, fluvial terrace and fan gravels, with some solifluction deposits. As part of the PRoSWeB project, we demonstrated that this is a stacked terrace sequence, as opposed to the more typical staircase terrace sequences of the rivers Exe, and Otter (Brown et al. in prep). This means that, broadly speaking, the ages of Axe valley terrace deposits increase with depth. On the date of discovery some 16 – 18 metres of gravel had been extracted from the pit. The bifaces were found on the surface of the pit floor in an area which had recently been worked by mechanical excavator, one on top of a small (~2 metres in height) section, and the other at its base (Figures 2 - 3). Following discussion on the day of discovery, with Bardon Aggregates staff who had been excavating that area, it is clear that the bifaces could only have come from the section (level) that was being worked at the time. The exact find location of the bifaces was recorded and a preliminary report was prepared for PAST (Brown and Basell, 2009).



Location map of Hodge Ditch Extraction area (Phases 1 and 2) highlighted in red. Background data is Ordnance Survey available via Digimap licenced to Southampton University and manipulated within ArcMap.

Figure 1

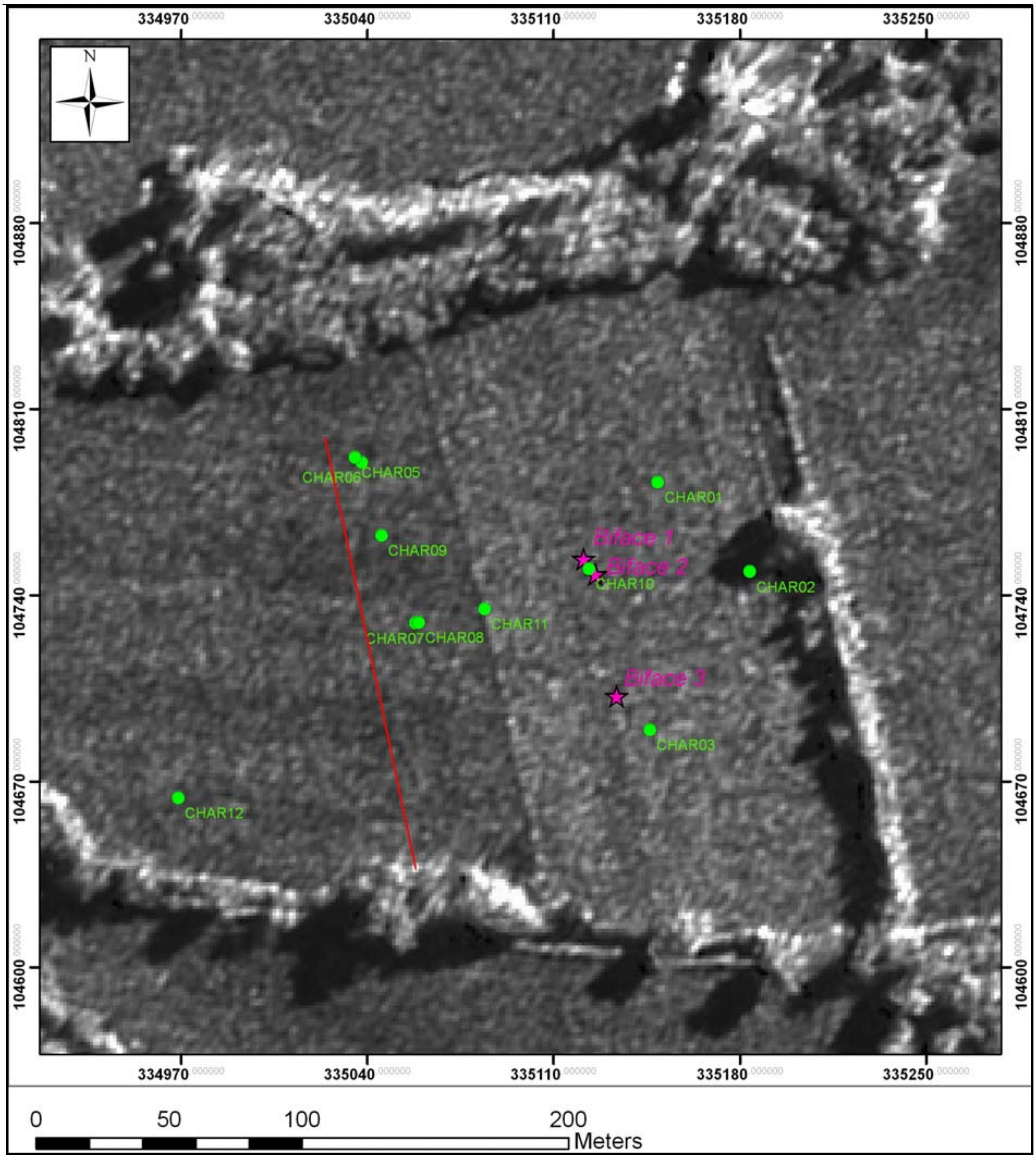


Figure 2: Location of Hodge Ditch OSL dates taken so far (excluding CHAR04 which is in the silt ponds of an old extraction area to the west) and the Biface Locations. The red line marks the boundary between Hodge Ditch Phase 1 and Hodge Ditch Phase 2 approximately. (This has changed over the last 4 years as extraction has proceeded and landscaping of the extraction margins has begun in Hodge Ditch Phase 1). Background is an Orthrectified aerial photograph of the Chard Junction area purchased during PROSWeB from Bluesky.

Figure 3: The face from which both bifaces were derived showing the hole where one OSL sample was taken as safety measure and pending funding. B1 was lying on the surface and B2 was in a bund of gravel that had just been raked up by the excavator from the face surface (operator pers comm..). Photo 10th June 2008 by A G Brown, looking South.

The lithics are both bifacially worked (Figures 4 -7). Biface 1 (Figure 4) retains an area of cortex near the butt on the proximal right side. Both bifaces are patinated on one side more than the other, and this could indicate that they were lying on a surface for some time prior to their incorporation within the river gravels, although this is not certain and cannot easily be proven. How rapidly patina forms on an artefact depends on many factors including the raw material and conditions (e.g. Burroni et al 2002), so it is not possible to estimate how long this might have been. The arêtes on both bifaces are moderately-heavily abraded and there is some edge damage. This is unsurprising given their probable age and context. Nonetheless it is possible to see clear and regular flake scars, particularly on Biface 1, and this suggests either that they have not been displaced too far, or that they suffered only limited abrasion rubbing against other clasts when they were transported. Biface 1 is particularly symmetrical. Both bifaces are elongate with straight (Biface 1) and slightly convex (Biface 2) sides. In profile, their butts are quite thick, and they fine towards the tip. Typologically their form is lanceolate (sensu Bordes (Debénath & Dibble 1994)) and both are made from Greensand chert. Basic morphometrics in millimetres are:

Biface 1:

Box Length: 218.12

Box Width: 117.61

Maximum Thickness: 60.54

Width 1/5 from base: 116.52

Width 1/5 from tip: 38.70

Biface 2:

Box Length: 188

Box Width: 101.11

Maximum Thickness: 50.32

Width 1/5 from base: 101.08

Width 1/5 from tip: 46.18

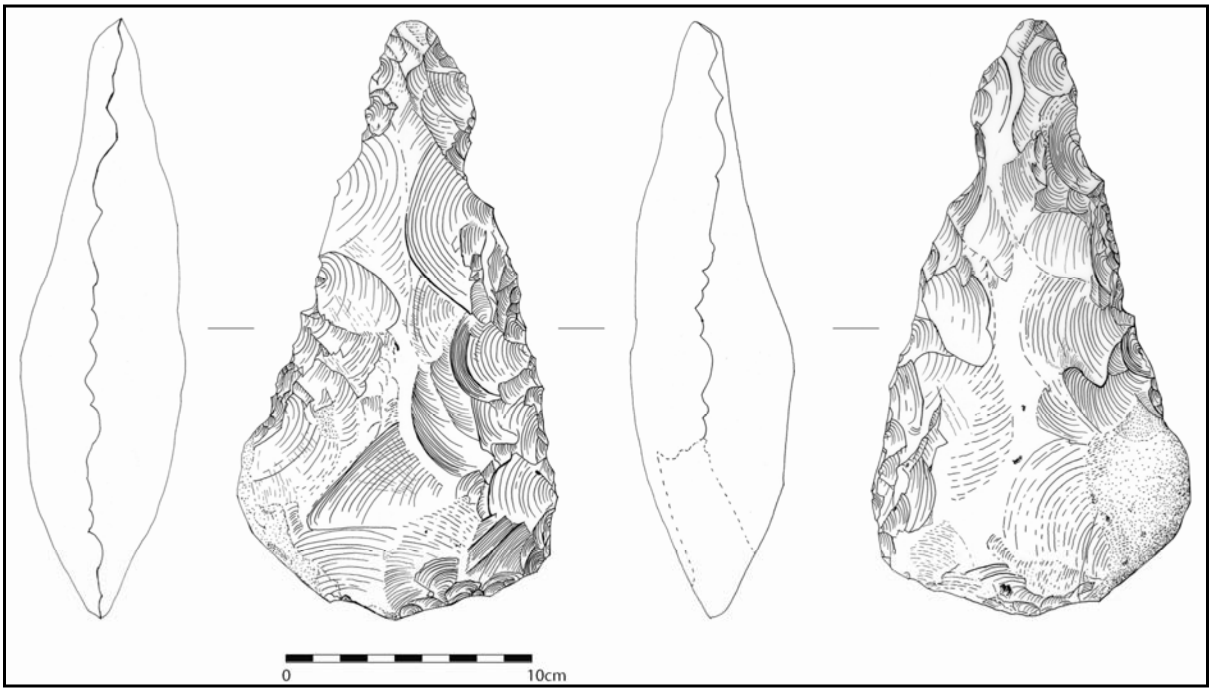


Figure 4: Biface 1. Illustration by L. Basell ©

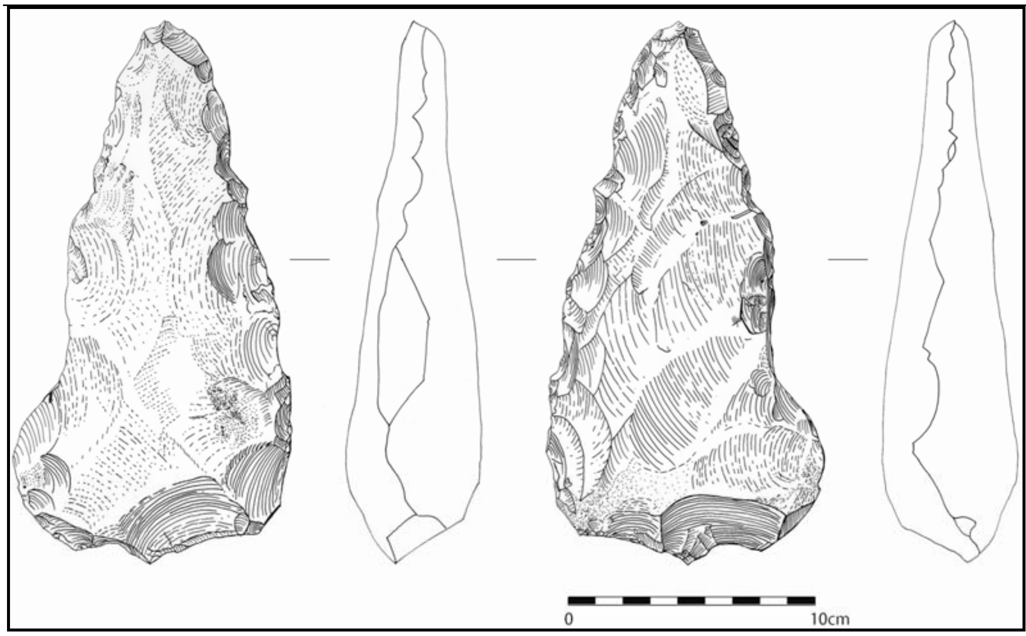


Figure 5: Biface 2. Illustration by L. Basell ©

Figure 6: Biface 1. Photograph L.S. Basell

Figure 7: Biface 2. Photograph L.S. Basell

Assigning an age to a biface on the basis of its typology should only be done with extreme caution, and needs to be supported by dating evidence wherever possible. However, given the context of the finds and what we know about very general trends in biface form in Britain (e.g. Wenban Smith 2004) it is possible these could be as early as Marine Isotope Stage 13 - 11; they are certainly Lower Palaeolithic.

Samples were taken for Optically Stimulated Luminescence (OSL) dating by Phil Toms, from the biface-yielding deposit, and the section was logged. During PROSWeB, the deepest unit exposed at Chard were at about 65 metres OD and resulted in dates of 367±35 ka BP and 284±36 ka BP (Toms et al. 2008). (The OSL dating at Chard Junction is discussed in further detail below and in Appendix B). As the new finds come from a deposit some 6 metres below the dated unit, it was anticipated that their age should be considerably in excess of 367±35 ka BP. The sample taken from the face closest to the biface find spots was CHAR10. This yielded a date of 334.3±35.7 ka BP. This seems surprisingly young given that between 5 and 6 metres of sediment separate the two samples, (but see discussion of sedimentology below).

Subsequent to these finds before and during Stage 1 we conducted a fieldwalking exercise across the NE quadrant of the pit floor of an area of approximately 100m x 30m. This area was walked using a standard 2m transect width per person. Although no bifaces were discovered several clasts which appear to have been sub-aerially weathered were found and these are discussed further in section 5.

An additional biface was found in the same area (NE quadrant of Hodge Ditch Phase 1) just after the commencement of Stage 1 which is of a similar form but fresher condition and from the same stratigraphic level. A report on it is included as Appendix A. This is particularly exciting and as Steve Minnitt (Taunton Museum) has noted, together these finds are of high significance because so many of the previous bifaces found in the Chard area lack a good provenance and context. When the third biface was found, some spreads of dark grey clayey silt were noticed in patches on the bottom of the pit. It was thought that this might indicate the presence of organic deposits. Given the discovery of Biface 3, it was decided to excavate a section at the level of the new find which was the lowest working floor of Hodge Ditch Phase I. The aim was twofold: first to ascertain whether these were organic deposits and second to identify if possible a sand lense for a comparative dating sample as all the original sections extant when the first two bifaces were found had gone by this time. The trench was excavated by Bardon Aggregates Ltd. and a trench approximately 9.7 metres long by 3.68m wide was excavated with a step into a deeper trench (see Figures 8 - 9) of 7.76 m long by 2.44 metres wide through the gravels into the bedrock (Lias Clay) and not Pleistocene organic deposits as had first been thought.

This is the first time that bedrock has been seen in this extraction area, and is important because it allowed the observation of the basal gravels/bedrock junction and record the height OD of this interface in Hodge Ditch 1. The junction was quite disrupted, and the upper part of the Lias had clearly been reworked. Some bedding was apparent at the junction, and a clear erosional boundary surface was observed with a line of clasts immediately above it (lag gravel) (Figure 9d). Several elongate clasts were observed in these lowermost gravels, often stained black from the Lias, which had not been seen in the immediately overlying gravels. As the trench became deeper the Lias became more compact and there were an increased proportion of large grey sandstone boulders. Although sandy lenses did exist in the exposure, they were too clast rich to allow sampling for OSL.

It is clear that all three bifaces come from the lowest gravel unit at Chard Junction pit (Hodge Ditch Phase I). The position of the third biface in relation to the results of the trench confirms that they are most likely associated with the first depositional floodplain of the Axe and a remnant land-surface buried in the Mid Pleistocene. This sedimentary unit may also have contained a shallow silt-filled channel (or pool in a channel) cut into the bedrock which is a very well known phenomenon in Pleistocene terrace sequences as exemplified by several Thames terraces (Brown 2009). The upper part of the reworked Lias has been processed for pollen analytical evaluation which will be completed under the provisions of Stage 2. More discussion of this sedimentary context is given in Section 5.

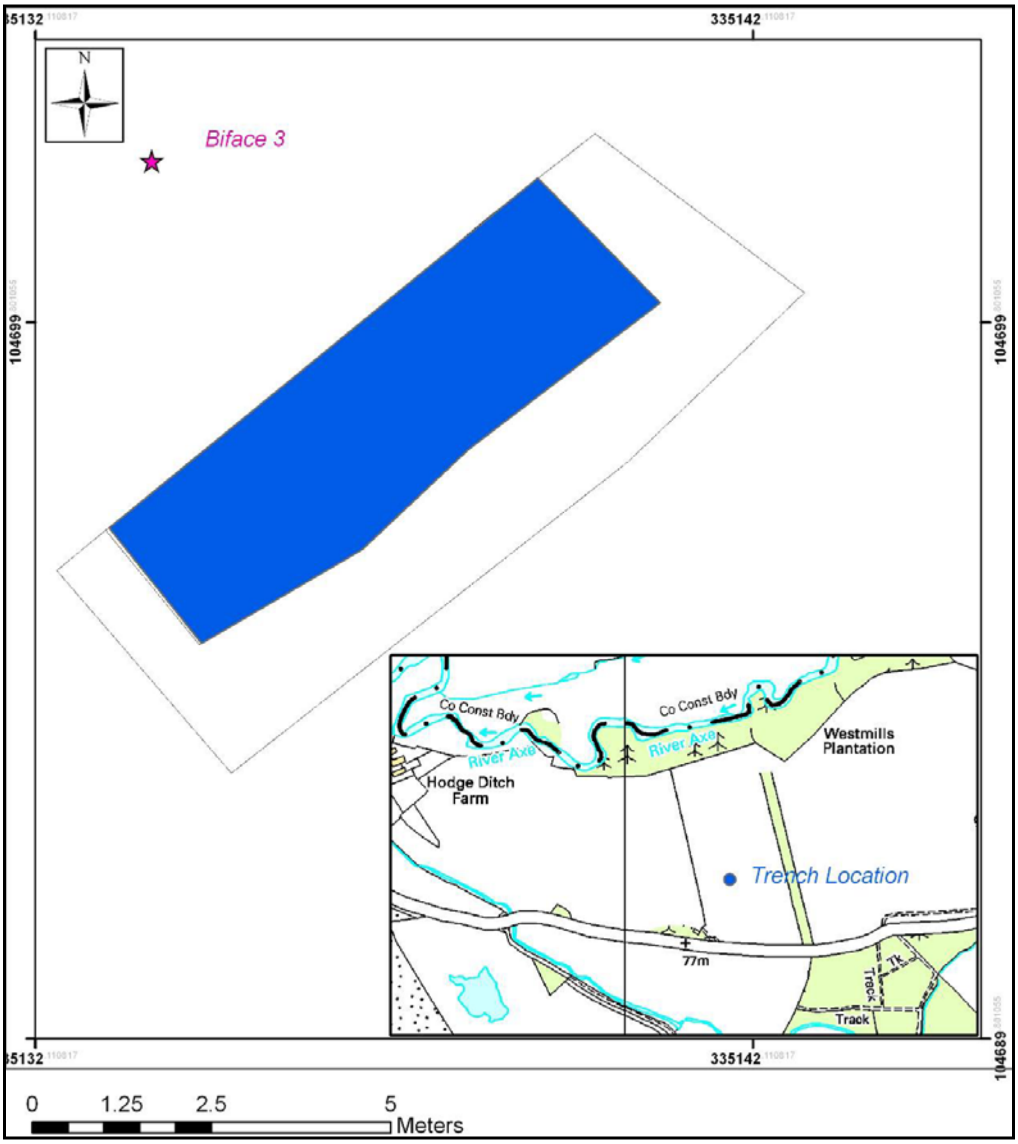


Figure 8: Figure showing the size and location of the excavated pit in relation to the Biface 3 find location. Outer grid units are in metres. Inset situates the trench in the wider Hodge Ditch context.

Figures 9 a, 9 b, 9c and 9d showing the excavation of the deep trench which exposed the junction with bedrock in Hodge Ditch Phase 1. The small pink square at the top of the trench in 9c indicates the position of the Biface 3. Note 10 cm scale in 9d.

2.2 Previous Finds

The second component of the objective was the collation of data on previous finds. Bifaces from the Axe valley are widely dispersed across museums in the UK. It would be impossible to visit every museum and sort through their collections to identify material from Chard. It was decided that visits to museums further afield e.g. Cambridge, Bristol, London and the British Museum were beyond the scope of Phase 1. Instead, it was decided to target four large museums close to Chard Junction. Contact was made regarding museums visits with Salisbury (Jane Ellis-Schon), Dorchester (Peter Woodward), Exeter (Tom Cadbury) & Taunton (Steve Minnitt). Jane Ellis-Schon reported that no bifaces from the immediate Chard vicinity, including Thorncombe or Tatworth were housed in Salisbury. Peter Woodward is away on holiday until June 2009. Exeter and Taunton are both undergoing refurbishment/rebuilding, so access to collections is difficult. However, Steve Minnitt has kindly agreed to a visit on June 5th and a visit to Exeter will be arranged as soon as it is possible to identify the location of the bifaces. For Stage 1, examination and analysis of the information from Taunton collected by Simon Hounsell as part of PRoSWEB Phase 1 has allowed quite detailed comparisons to be made and these results are discussed instead. As the majority of finds identified as coming from the area during PROSWeB are housed at Taunton, it is hoped that examination of the bifaces and any records associated with them, may allow further matches to be made between HER records/Wymer's and Roe's Records (discussed below) and artefacts, although discussion with Steve Minnit and examination of Wymer

1977 suggests that identifying specific contexts for bifaces in this area is notoriously difficult, and that many artefacts are likely to have gone into private collections.

Using a 2km search radius a total of 13 findspots had been identified from the Chard Junction Quarry area. These data were gathered during PROSWeB from the HERs and by Simon Hounsell. 11 findspots are located within the 2km red boundary shown in Figure 10 . An additional two findspots within the outer grey circle can be considered as potentially having come from within the 2km boundary as their accuracy is not known (white point) or is recorded as a 1000 m (red point). The data on these points is summarised in Table 1 which relates to the numbered points in Figure 11.

Careful examination of these data shows that there is likely to be some duplication between the records because the top 3 records summarise several findspots. For example Record 687 (derived from Dorset County HER) is one of the 4 ‘handaxes’ recorded for 641 (Unpublished Southern Rivers Project data examined by Hounsell during PROSwEB and Wymer 1999). However, it is not always clear how the single or unknown quantity findspots relate to the grouped top 3 Wymer derived records. In addition there are anomalies such as record 691 which seems very similar to 685 although the Wymer “NSA” reference recorded in the HER is different. It has been possible to establish some facts, but identifying which artefacts relate to which HER records has been difficult.

The two most important surveys of British Palaeolithic material are those of Wymer (1999) and Roe (1968 CBA publication). If Wymer’s 1999 records are considered, then a minimum of 14 handaxes, 4 retouched flakes and one flake have come from the Chard Area. Roe (1968) lists 3 handaxes from Chard Junction Pits (ST327044 for implement at Dorchester Museum) others are from the same general area), and 1 retouched flake, 1 handaxe from South Chard (ST328055), 1 handaxe from Tatworth (ST326057), 2 from Tatworth Railway, and 6 from Thorncome (Bateman’s Dairy Gavel Pit ST341042 E). This is a total of 10 handaxes, and 1 retouched flake. He also cautions that some of the early collections appear to label bifaces from Broom, “Chard”.

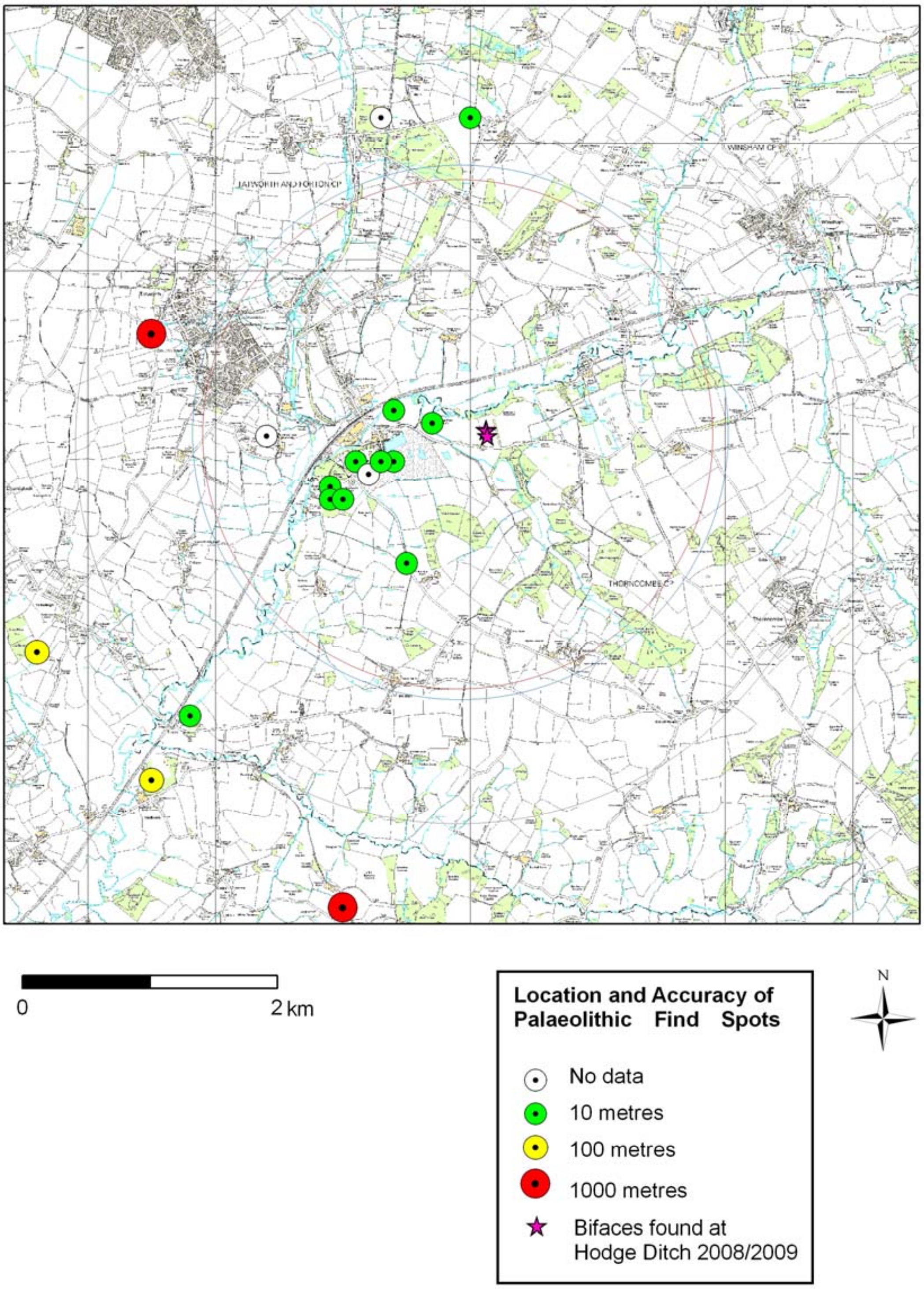


Figure 10: Map to establish which PROSWeB find spots fall within a 2km radius of the new finds.

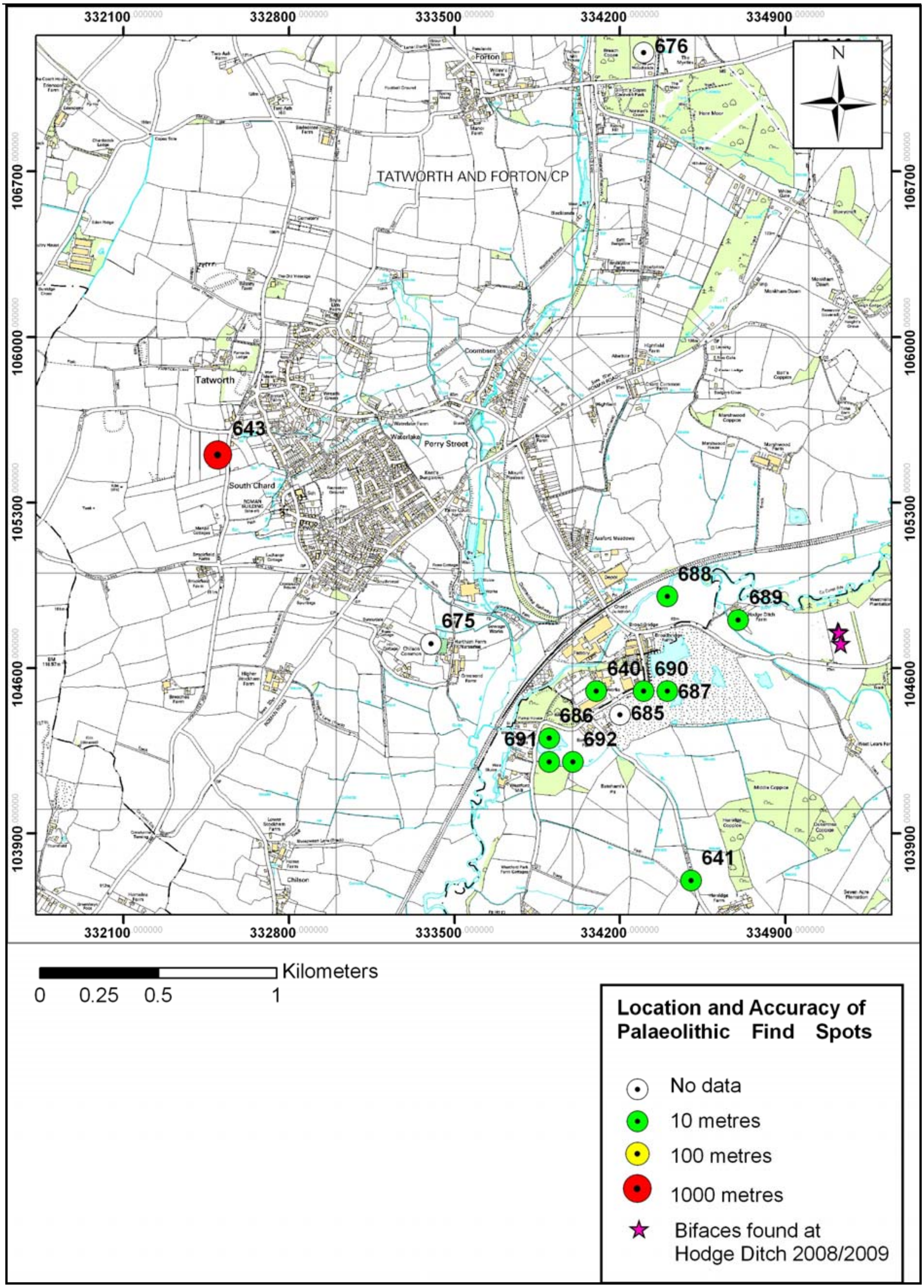


Figure 11: Palaeolithic findspots within 2km of the new biface finds from Hodge Ditch 1. Numbers are DATABASE_CODE to relate findpots to those listed in Table 1.

DATABASE_CODE	EASTINGS	NORTHINGS	COUNTY	LOCATION	ACCURACY_CODE	WYMER_ACCURACY	GRID_REF_ACCURACY	CONTEXT	GEOLOGY	WYMER_REF	SMR_SOURCE	SMR_NOS	QUANTITY	FURTHER LITHIC INFO	FIND LOCATIONS?
640	334100	104500	D	Bateman's Dairy Gravel Pit, Thorncombe	1	Accurate Position	10	Recovered from pit. Part back filled, part open, but occupied by industrial estate.	River Gravels	AX-1/1	Dorset County HER	62	6	6 handaxes.	Cambridge Archaeology and Anthropology Museum, Taunton Museum
641	334500	103700	D	Chard Junction Pits, Thorncombe	1	Accurate Position	10	Reject heaps or scree of pit. E.C.C working pit.	River Gravels	AX-1/2	/	0	5	4 handaxes, 4 retouched flakes, 1 flake	Bristol City Museum, Dorset County Museum Dorchester, Exeter Museum, Taunton Museum
643	332500	105500	S	Tatworth & South Chard and Tatworth Railway, Tatworth & Forton	3	General Location	1000	/	/	AX-1/4	/	0	4	4 handaxes	British Museum, Exeter Museum, London University Institute of Archaeology, Taunton Museum. SH relocated artefact/s of this SWRP classification at Taunton Museum.
675	333400	104700	S	Lower Hurtham, South Chard & Tatworth	0	/	0	Found in spoil heap from shallow trench. Handaxe, tip broken.	/	NSA-10/5	Somerset County HER	0	1	1 handaxe	To Be Determined. SH could not relocate artefact of this SWRP classification
676	334300	107200	S	The Drift, east of Forton	0	/	0	Found on surface of tracks, probably imported to site as bricks etc? to form surface here.	/	NSA-10/6	Somerset County HER	0	1	1 handaxe	To Be Determined. SH could not relocate artefact of this SWRP classification
685	334200	104400	D	Gravel pit, Thorncombe	0	/	0	Dug up in gravel 14 ft down. Found by Mr G. Osborne in 1955. Ovate handaxe.	/	NSA-11/7	Dorset County HER	46	1	1 handaxe	Dorset County Museum, Dorchester. SH could not relocate artefact of this SWRP classification
686	333900	104300	D	Westford Farm gravel pits, Thorncombe	1	Accurate Position	10	Dug up in gravels. Palaeoliths, including handaxes.	/	NSA-11/8	Dorset County HER	47	0	Artefacts came from this site, but exact number unknown.	To Be Determined. SH could not relocate artefact of this SWRP classification
687	334400	104500	D	Thorncombe quarry	1	Accurate Position	10	Found below screening plant & spoil heap. Found by J. Wymer in 1974. Handaxes & flakes. Same findspot as AX-1/2.	/	NSA-11/9	Dorset County HER	0	0	1 handaxe and unknown number of flakes.	To Be Determined. SH could not relocate artefact of this SWRP classification
688	334400	104900	D	Thorncombe quarry	1	Accurate Position	10	Found on surface. Found by C. Waller in 1986. Same findspot as AX-1/2.	/	NSA-12/1	Dorset County HER	65	1	1 handaxe.	To Be Determined. SH could not relocate artefact of this SWRP classification
689	334700	104800	D	Hodge Ditch, Thorncombe	1	Accurate Position	10	1m below surface during ditch digging. Found by Mr. D. Waller in 1988.	/	NSA-12/2	Dorset County HER	67	1	1 handaxe.	To Be Determined. SH could not relocate artefact of this SWRP classification
690	334300	104500	D	North side of present quarry, Thorncombe	1	Accurate Position	10	Abraded, twisted ovate handaxe (flint) found by J. Wymer in 1959. Same findspot as AX-1/2.	/	NSA-12/3	Dorset County HER	63	1	1 handaxe.	To Be Determined. SH could not relocate artefact of this SWRP classification
691	333900	104200	D	Thorncobme gravel pit	1	Accurate Position	10	Findspot palaeoliths found by G. Osbone at 1-5m depth.	/	NSA-12/4	Dorset County HER	0	0	Artefacts came from this site, but exact number unknown.	To Be Determined. SH could not relocate artefact of this SWRP classification
692	334000	104200	D	Thorncombe gravel pit	1	Accurate Position	10	Implements including handaxe found by W.G Larcombe on north side of road opposite Bateman's Farm. Probably same findspot as AX-1/1.	/	NSA-12/5	Dorset County HER	0	0	Artefacts came from this site, but exact number unknown.	To Be Determined. SH could not relocate artefact of this SWRP classification

Table 1: Summary of data of findspots from Chard area extracted from database for the whole of South West Britain, created for GIS during PROSWeB by LS Basell including data supplied by S Hounsell.

The following images taken by S. Hounsell as part of PROSWeB all have Chard, Chard Junction or Tatworth written on them. No bifaces photographed by Hounsell appeared to have Thorncombe written on them, but he frequently only photographed one side of the artefact. However, had there been any additional information on bags/boxes or the artefact it is very likely Hounsell would have recorded that in the database information and the bifaces could be identified from the database. Few additional records exist at the museums relating to the bifaces from this area (Hounsell pers. comm., Minnitt pers. comm.). Hounsell's code (e.g TAU** or CAA**),and the Museum housing the artefact is noted under each photograph. Some attempt has been made as part of this project to correlate the photographs with the records in Table 1, and a description of the biface form has also been added.

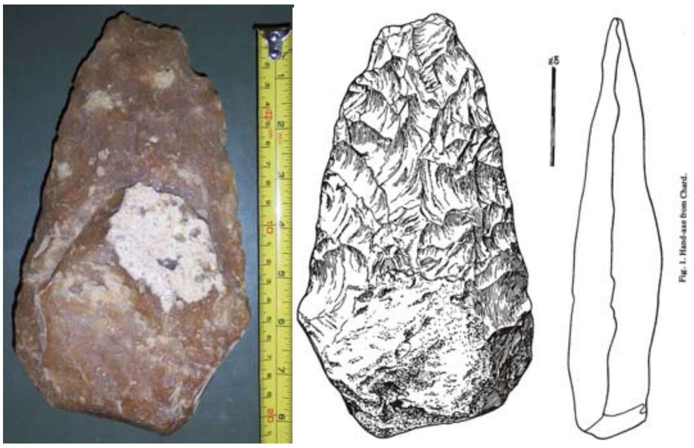


Figure 12: TAU33. Taunton Museum. Wymer's 1974 biface from Chard Junction Pit. Record 687 and one of 641. Found below screening plant on spoil heap. Wymer's (1977) illustration of the same artefact.

Figure 13: TAU2. Taunton Museum. Wymer's 1959 Biface. Record 690 and one of 641. Cordiform/Amygdaloid.

Figure14: TAU 4. Taunton Museum. Biface from Chard Junction. Date reads 1985. No further data known. Elongated Cordiform.

Figure 15: TAU17. Taunton Museum. Biface from Chard Junction. Date reads 1950. No further data known. Lanceolate Ficron.

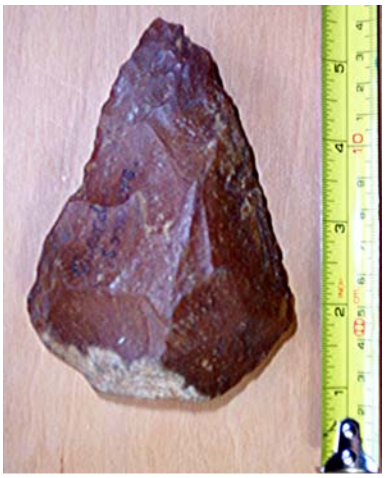


Figure 16: CAA23. Biface from Chard Junction Cambridge Museum of Archaeology and Anthropology. Possibly from Bateman's Dairy Gravel Pit as it is housed in Cambridge? Although Hounsell's condition table (below) records the site as Broom gravels near Chard. Record 640? Irregular Cordiform.

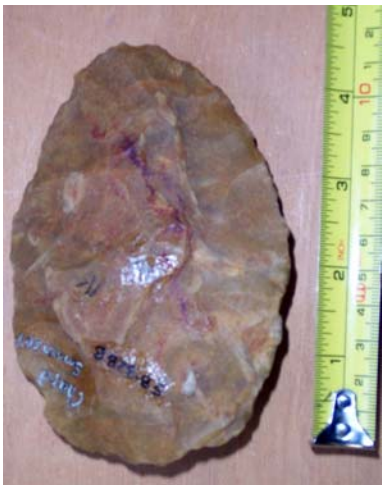


Figure 17: CAA63. Biface from Chard. Cambridge Museum of Archaeology and Anthropology. Possibly from Bateman's Dairy Gravel Pit as it is housed in Cambridge? Record 640? Elongated Cordiform.

Figure 18: CAA67. Biface from Bateman's Gravel Pits. Cambridge Museum of Archaeology and Anthropology. One of record 640. Small Ovate.

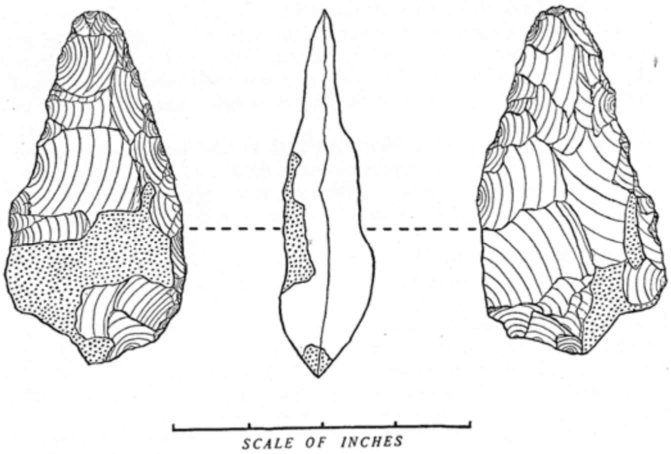


Fig. 1. An Acheulian handaxe from Chard Junction.

Figure 19: DOR 46. Dorset Museum, and described and drawn in Fagan (1958). Drawing reproduced here. This is one of the bifaces referred to by Wymer under record 641. It is not clear if it relates to any of the other HER records. However, in the publication a specific grid reference is given, ST 341044, which is 334100 E, 104400N. This is more specific than that given by Wymer for record 641 but does not match any of the grid references in the PROSWeB database. Fagan notes the biface is made of flint and said that the biface was found “in situ” within a deposit of fluviatile gravel with sand lenses, in a gravel face exposed in the 100 ft terrace of the River Axe on the left side of the Chard Junction to Broom Road. Lanceolate.

Figure 20: TAU1: Taunton Museum from Railway at Tatworth Chard. Accession number reads 1989, but red script reads 1912 – an alternative and more likely date? Probably one of ID 643. Sub-triangular biface.

Figure 21: TAU3. Taunton Museum from Railway at Tatworth Chard. Dates as for example above. Probably one of 643. Cordiform? Full examination of piece necessary.

Figure 22: TAU10. Taunton Museum from Tatworth Chard. Dates as for example above. Probably one of 643. Elongated Cordiform.

Figure 23: TAU11. Taunton Museum from Tatworth Chard. Dates as for example above. Probably one of 643. Biface with cordiform aspect.

Figure 24: TAU13. Taunton Museum. Accession number includes 1989, but label is clearly older than this. Subtriangular biface.

Figure 25: TAU18 Taunton Museum from Tatworth Chard. Accession number reads 1989, but red script reads 1912 – an alternative and more likely date? Probably one of ID 643. Lanceolate biface.

Figure 26: TAU20. Taunton Museum from Tatworth Chard. Accession number reads 1989, but red script reads 1912 – an alternative and more likely date? Probably one of ID 643, and the broken tip suggests it may be 675. Tip snapped off? Typological attribution not possible.

Figure 27: The three Hodge Ditch Bifaces from Chard Junction for visual comparison. Photograph LS Basell.

The total number of bifaces which came from this 2 km radius as identified from Hounsell's photographs is 14 excluding CAA23 which could come from Broom. This equates with Wymer's sum, but 6 of these have written on them Tatworth, or Tatworth railway. This indicates that Wymer's record AX- 1/ 4 (database reference 643) must be an underestimate. It is therefore possible to say from this analysis that >14 bifaces come from the area. Because none of those described above come from Thorncombe with exception of the Bateman's Dairy specimen CAA67 it is also likely that some of the 1980s finds listed in the HERs for Thorncombe (e.g.689, 688) would further add to this quantity. The distribution of finds within the 2km radius is interesting, being focussed to the south west of the tributary. The gross geomorphological situation is very similar to that at Broom. This find distribution must partly be related to aggregate extraction in this area, but not all finds came from pits, so this cannot is not entirely the case.

Site	Location	County	Finder/Collector	Collection Date	Finder/Collector Location	Museum	Accession No	Accession Date	Broken?	Raw Material Type	Artefact Condition	Length (cm)	Thickness (cm)	Comments	Photograph
Broom gravel near Chard	-	Somerset	-	-	-	Cambridge Archaeology & Anthropology	2.31075	-	FALSE	Chert	2	11.2	3.7	-	CAA23.Plan & CAA23.Side
Chard	-	Somerset	-	-	-	Cambridge Archaeology & Anthropology	58328B	-	FALSE	Chert	2	12.2	3	-	CAA63.Plan & CAA63.Side
Batehams gravel pit	-	-	-	-	-	Cambridge Archaeology & Anthropology	Z15144	-	FALSE	Chert	3	7.8	1.6	-	CAA67.Plan & CAA67.Side
Chard Junction, Dorset	-	Somerset	-	1958	-	Dorset County Museum	1958.43.1	1958	FALSE	Flint	4	11.9	3.6	Box EM/16. Semi cortical	Dor46.Plan & Dor46.Side
Railway, Tatworth, Chard	-	Somerset	-	-	-	Taunton City Museum	280/1989/25a	1989	FALSE	Chert	2	6.6	2.5	Bifacially flaked all over	Tau1.Plan & Tau1.Side
Tatworth, Chard	-	Somerset	-	-	-	Taunton City Museum	280/1989/25b	1989	FALSE	Chert	2	10.2	2.5	Poorly knapped, piece missing from edge	Tau3.Plan & Tau3.Side
Chard Junction	-	Somerset	-	-	-	Taunton City Museum	280.1989.26.b	1989	FALSE	Chert	2	19.6	3.6	-	Tau4.Plan & Tau4.Side
Tatworth, Chard.	-	Somerset	-	-	-	Taunton City Museum	280/1989/25f	1989	FALSE	Flint	3	15.4	3.4	-	Tau10.Plan & Tau10.Side
Tatworth, Chard	-	Somerset	-	-	-	Taunton City Museum	280/1989/25c	1989	FALSE	Chert	3	13.9	4.7	99% white chalky cortex, crude ovate	Tau11.Plan & Tau11.Side
Chard	-	Somerset	-	-	-	Taunton City Museum	280.1989.24	1989	FALSE	Chert	2	9.9	2.4	-	Tau13.Plan & Tau13.Side
Chard Junction	-	Somerset	-	-	-	Taunton City Museum	280/1989/26a	1989	FALSE	Chert	2	21.5	5.4	-	Tau17.Plan & Tau17.Side
Tatworth, Chard	-	Somerset	-	-	-	Taunton City Museum	280/1989/25d	1989	FALSE	Chert	3	16.8	3.2	-	Tau18.Plan & Tau18.Side
Tatworth, Chard	-	Somerset	-	-	-	Taunton City Museum	280.1989.25e	1989	TRUE	Chert	3	11.4	3	Circular implemen t	Tau20.Plan & Tau20.Side
Chard Junction gravel pits	Scree, river gravels. ST 342045	Somerset	J. Wymer	1976	-	Taunton City Museum	76.AA.41	1976	FALSE	Chert	4	9.7	2.4	-	Tau2.Plan & Tau2.Side
Chard Junction pit	Found on tip. ST 342045	Somerset	J. Wymer	1976	-	Taunton City Museum	76.AA.41	1979	FALSE	Chert	3	20.9	4.1	2nd handaxe with this reference number	Tau33.Plan & Tau33.Side

Table 2: Condition, length, thickness and context data of artefacts from within a 2km radius of Hodge Ditch Phase 1.

Unfortunately none of these come from well described contexts which permit the artefacts to be linked into any sedimentary sequence. Several come from spoil heaps or talus/scree. The only artefact with a good “in situ” context DOR46 offers no height OD or proper description of the sediments except gravel with sand lenses. Several finds have come from gravels during digging but the measurements are too imprecise to allow an accurate attribution to a particular unit. The length measurements are interesting however, as this shows that the three new bifaces are in the uppermost part of this range, with Biface 1 being larger than any other found in the area to date.

The typological range and degrees of abrasion are varied. One recurrent theme is the retention of some cortex towards the proximal end (base) of many of the bifaces. In addition, they seem to be made on large flakes or slabs of chert retaining a cortical or flat portion towards the base. Wymer (1977) notes the disparity between the fresh and rolled palaeoliths, and also realised that several other authors had made the same observation. Looking at the data recorded by Hounsell for the 15 artefacts described above, there is a very high proportion of sharp or only slightly rolled bifaces. The new finds from Hodge Ditch Phase 1 will not alter this pattern significantly as Biface 1 would fall into the category slightly rolled, Biface 2 would be rolled, and Biface 3 would fall into the sharp category. Although this is a necessarily subjective assessment, these data strongly suggest that the majority of the bifaces discovered in the Chard area have not been transported long distances.

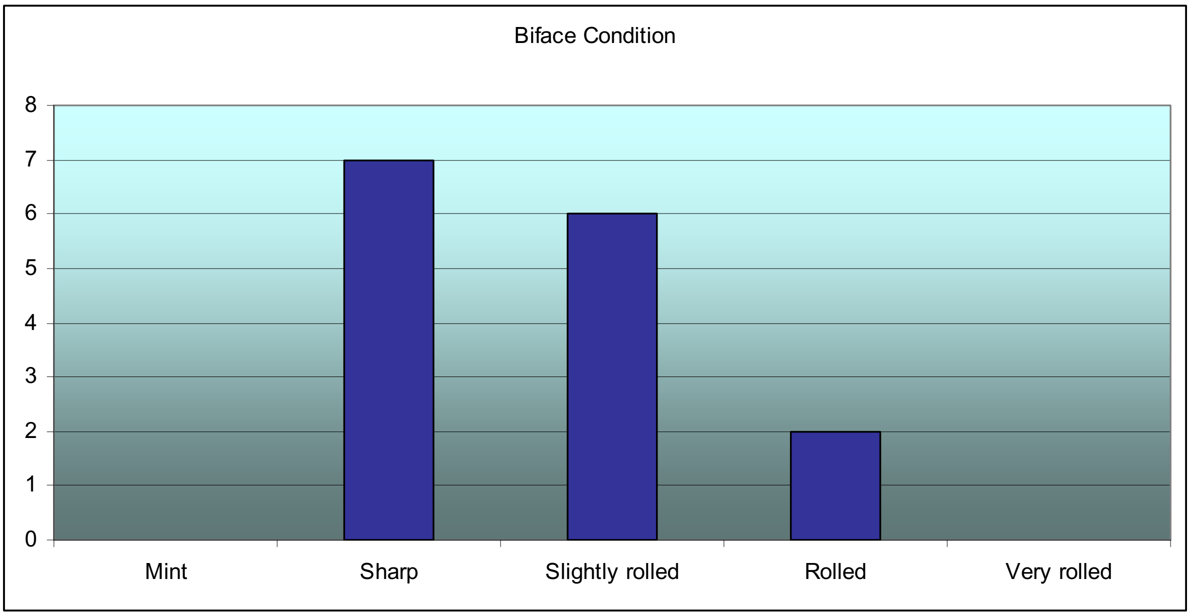


Table 3 Condition data for the previous artefact finds within 2 km of Hodge Ditch Phase 1.

3. The Sedimentary Context of the 2008 Finds

Objective 2: Provide a clear understanding of the Hodge Ditch II sequence from which the bifaces were discovered in July 2008. This will be done from a small remaining exposure preserved by the company and from the records taken by Brown and Basell at the time of the discovery and shortly after.

In order to achieve this objective the site was re-visited, photographed, logged and drawn-up. The state of excavation on the day the Bifaces 1 and 2 were discovered can be seen in Figures 28 - 29. By Spring 2009 extraction in Hodge Ditch Phase 1 had ceased (See Figure 20) and work had begun on Hodge Ditch Phase 2.

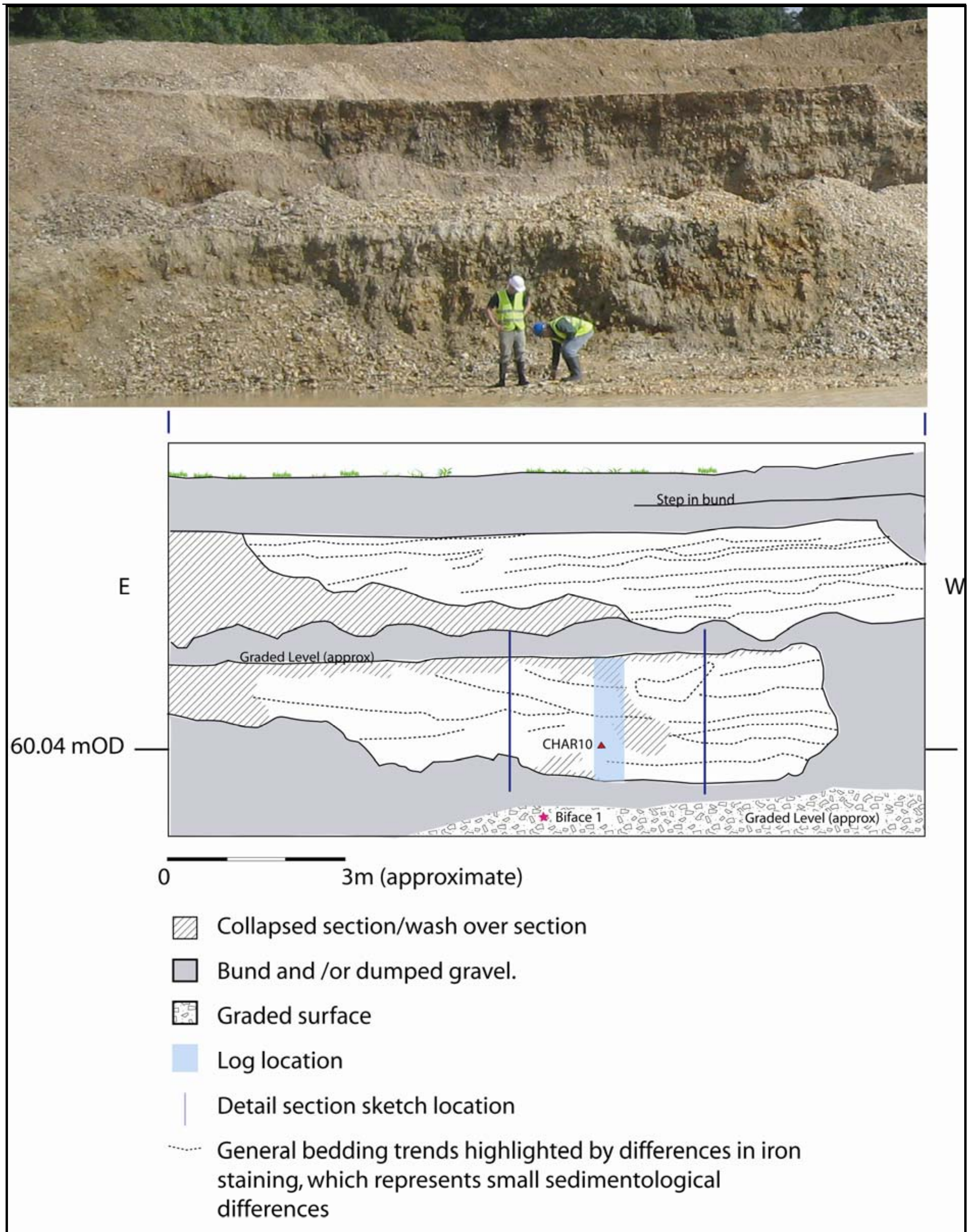
Figure 28: Hodge Ditch Phase 1 looking North, 10th June 2008. Photo L S Basell.

Figure 29: Hodge Ditch Phase 1. The location of the face (arrowed). Photo 10th June 2008 by A G Brown.

Figure 30 Hodge Ditch Phase 1 at the end of May 2009 looking north. Photo L S Basell

Figure 31 shows the general bedding of the gravels and the location of the biface section. The upper section is crudely bedded from east to west. This is in accordance with the present day flow direction of the river. In the lower biface-bearing section the bedding is less uniform, though some clearly dipping beds could be differentiated some in keeping with the upper beds of Figure 31, but some dipping to the east. At this scale, it is clear that these beds represent large sheets of cross bedded gravel. Figure 32 shows a detailed sketch of the stratigraphy from the biface section. Three principal units can be defined. A lower clast supported unit, a matrix rich unit or sand lenses, one of which was sampled, and an upper unit of matrix supported chaotically oriented gravel. The lateral continuity of these units is not known, as the gravel to the east had been extracted at the time the bifaces were found.

Figure 33 is the detailed log of the sample location. This shows a clast supported gravel at the base, which is almost a framework gravel, with discontinuous cross bedded sands and slightly silty sand units above it. There is no evidence of cryoturbation or other disturbance. Above this is a chaotic matrix supported gravel with discontinuous sand lenses. Overall the gravel is poorly sorted, but there are patches of better sorted material. Taken together with the data from the new trench discussed above these sections and logs can be taken to represent a braided river meandering across a wide floodplain, with intermittent higher energy pulses bringing larger quantities of gravel down the valley. These deposits covered an earlier landsurface which had been a focus of human activity, and during the early stages of gravel deposition it is very likely that hominins continued to frequent the area, exploiting the increasingly available raw material.



Sketch and photo of section from which Bifaces 1 & 2 came, and extraction and section bench above this. Principal bedding directions shown, OSL sample location, detailed sketch and log locations. N.B. scale is approximate.

Figure 31 General location and bedding sketch to contextualize the Biface 1 location.

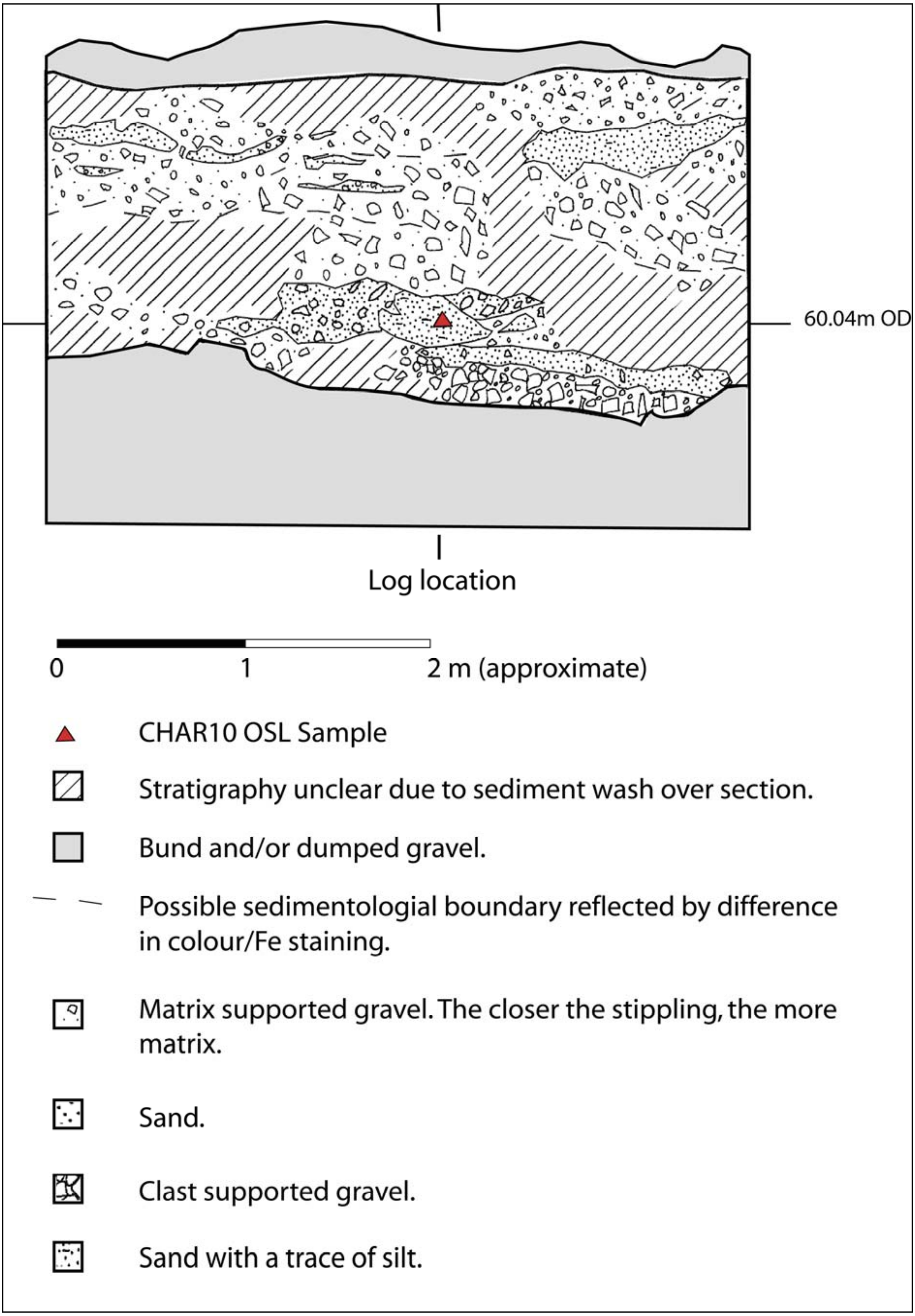


Figure 32 Stratigraphic section of the CHAR10 sample and face.

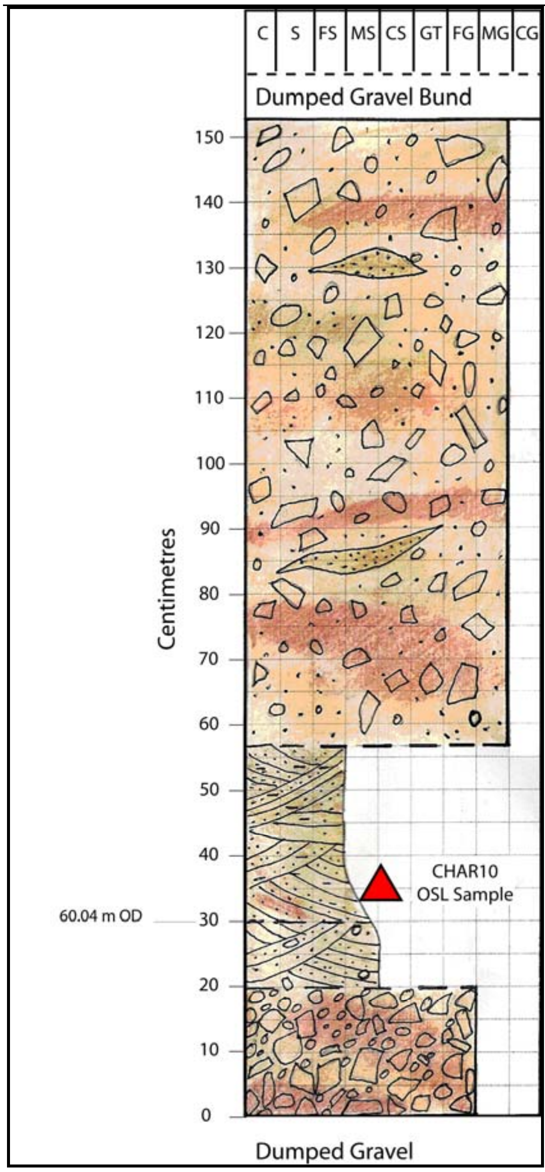


Figure 33 Sedimentary log through OSL sample locations CHAR 10

4 OSL Dating

Objective 3. Purchase 5 further optically stimulated luminescence (OSL) dates from the University of Gloucestershire and 2 duplicate/validation OSL dates from the Research Laboratory for Archaeology & the History of Art (RLAHA) Oxford. Assess the benefit of undertaking some single-grain analyses as part of Stage 2.

Five OSL samples were obtained from the find-face of the 2008 bifaces and a correlative face to the west. These have been analysed and the results are given in Appendix B. The duplicate analysis has been discussed with both laboratories and it was decided to use two different methods to duplicate the samples. One duplicate will be on a sample which was taken and prepared by P. Toms (CHAR10). Toms will provide J-L Schwenninger with the prepared quartz, De value and raw dosimetry data. Following discussions with J-L Schwenninger and P Toms, both specialists agreed that it would be methodologically useful to prepare a second duplicate sample independently. Due to the loss of the 2008 biface find section and the lack of suitable material from the excavated trench it was decided on 19th May to sample a suitable face in Hodge Ditch Phase II using small tubes placed next to each other. The samples have been thoroughly mixed by P.Toms in the lab to ensure that both specialists are dating material which is effectively the same. It was not possible to do this on the original five samples because insufficient material was left, and the faces no longer exist to allow additional samples to be taken. Both duplicate samples have been submitted to RLAHA and a report is awaited.

4.1 Age-Depth Modelling

The additional samples in Hodge Ditch I brings the total number of OSL dates on the Phase to 13, with CHAR12 being a duplicate. The samples have been plotted in Figure 34 below with the exception of CHAR 12 which is the comparative sample.

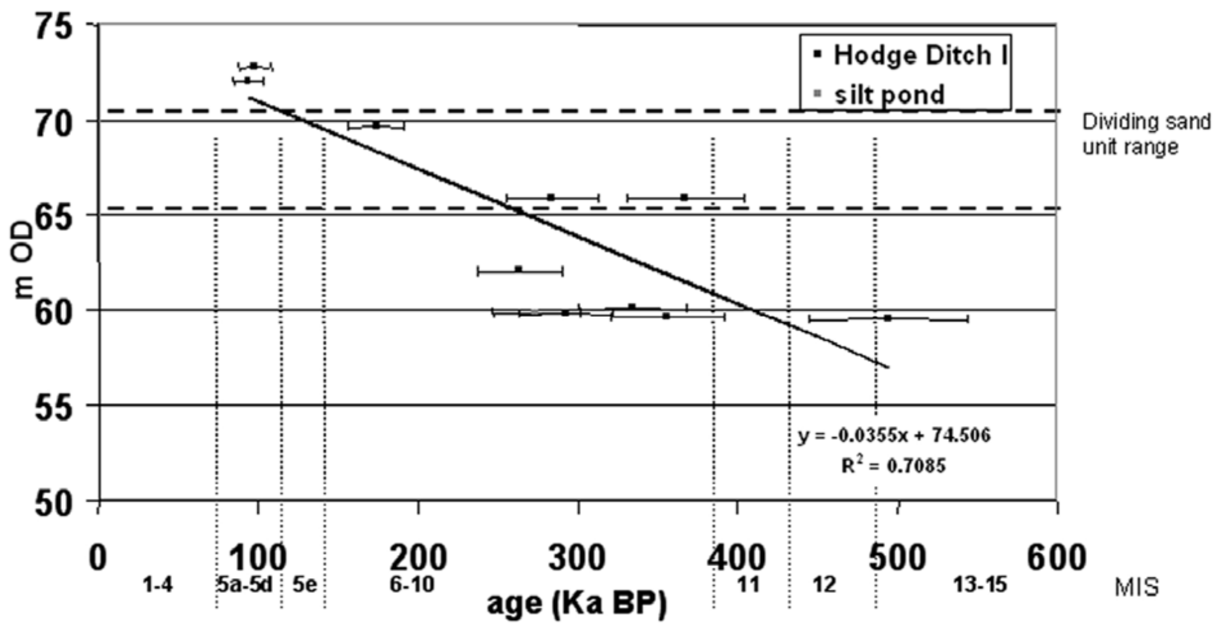


Figure 34 The raw age-depth model for the OSL dates at Chard Junction Hodge Ditch Phase I.

There are two unusual aspects to this age-depth model. Firstly it is clearly non-linear even allowing for the relatively wide uncertainty ranges (approximated her as 10% but see Appendix B) and is stepped with relatively high rates of deposition in between hiatuses or periods of very low rates of deposition. Secondly the difference in age of the sample from the exposure in the old workings (silt pond section) although lower than the Hodge Ditch Phase I set is significantly younger than all but one of the Hodge Ditch Phase 1 samples from a similar level. As can be seen from Figure 34 there is a strong relationship between the dates and altitude/depth, but when the dates are regressed against northings no relationship is found (Figure 35; R square 0.031) although a weak relationship does exist with eastings (R square 0.439). This suggests that there may be a decrease in age (younging) to the west, and the tributary junction, but only further OSL dating of Hodge Ditch Phase II can resolve this question partly because it may be a function of the spatial distribution of suitable sediment beds (sand lenses) and/or a function of the shape of the accommodation space which the valley gravels filled. However, both of these aspects have been incorporated into the model illustrated in Section 5.3. This is the most comprehensive set of dates on any single terrace in the UK and requires confirmation by the dating of the westward extension of the site into Hodge Ditch Phase II.

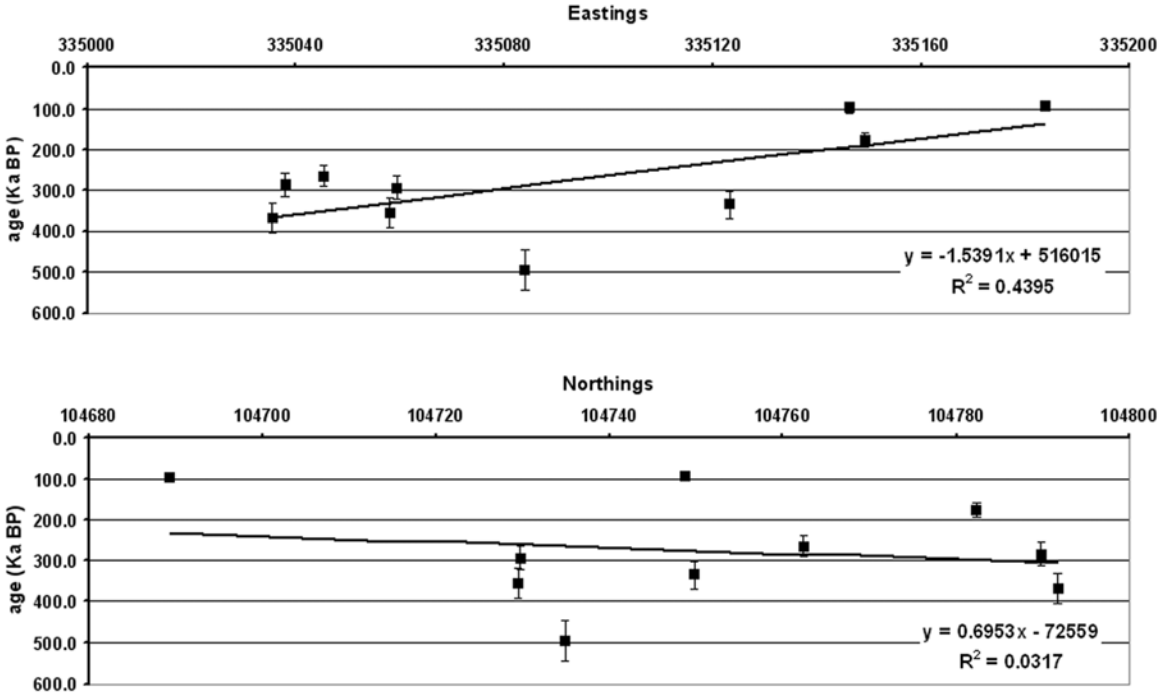


Figure 35: Hodge Ditch Phase I OSL dates regressed against eastings and northings.

5. Finds: Sedimentological and Environmental Context

Objective 4: Produce a succinct report of the finds, their sedimentological and environmental context and archaeological importance.

This report uses the work done on the 2008 find location as well as previous studies conducted under PRoSWEB Phase II and is divided into 3 sections.

5.1 Microstratigraphy.

The monitoring of Hodge Ditch Phase I has allowed the observation and recording of a number of sedimentary features that are *very valuable for the palaeoenvironmental interpretation* of the gross stratigraphy. The most relevant to an archaeological interpretation are discussed and illustrated below;

Subaerially Weathered Clasts

These fall into two categories, large boulders and “sarsens” found in the upper stratigraphic units and smaller, generally sandstone clasts which show differential weathering. The large boulders and sarsens exhibit pothole and shelling-type features on one side but not the other. An example is given in Figure 36. This is indicative of one side of the clast having been exposed to the atmosphere whilst the other side was protected by the ground surface. This is a common feature with sarsens (Summerfield 1979). Their large size, up to 0.96m x 0.75x 0.35m (equivalent to approximately 0.6 metric tonnes) at Hodge Ditch Phase I and lack of evidence of rolling strongly suggests that they have been transported into the site by slope mass-movements or solifluctive rafting under periglacial conditions. This is also in agreement with the stratigraphic heights noted by the excavator operators and suggests that they were transported onto the site during the Devensian stage (MIS 4-2). Their ultimate source is probably the Tertiary weathering surface that has been recorded on the plateau of the Blackdown Hills and which is still in situ in places like Bywood Farm near Dunkerswell. The smaller sandstone clasts (typically 100-300mm) are asymmetric in their long-axes sometimes with a slight equatorial flange (Figure 37). This asymmetry and flange rules out fluvial abrading and is interpreted as the result of a prolonged period of partial burial in a land-surfaces with subaerial weathering diminishing the upper side of the clast through both chemical and physical processes. The archaeological significance is that this suggests the local presence of a gravel land-surface post gravel deposition but prior to renewed fluvial deposition. This may also relate to the common observation of differential patination on the ventral vs dorsal sides of bifaces. More consideration of this and its implications for the distance of travel is underway and would form part of Stage 2.

Figure 36: The upper weathered surface (left) and unweathered lower surface (right) of a sandstone sarsens from Hodge Ditch Phase II.

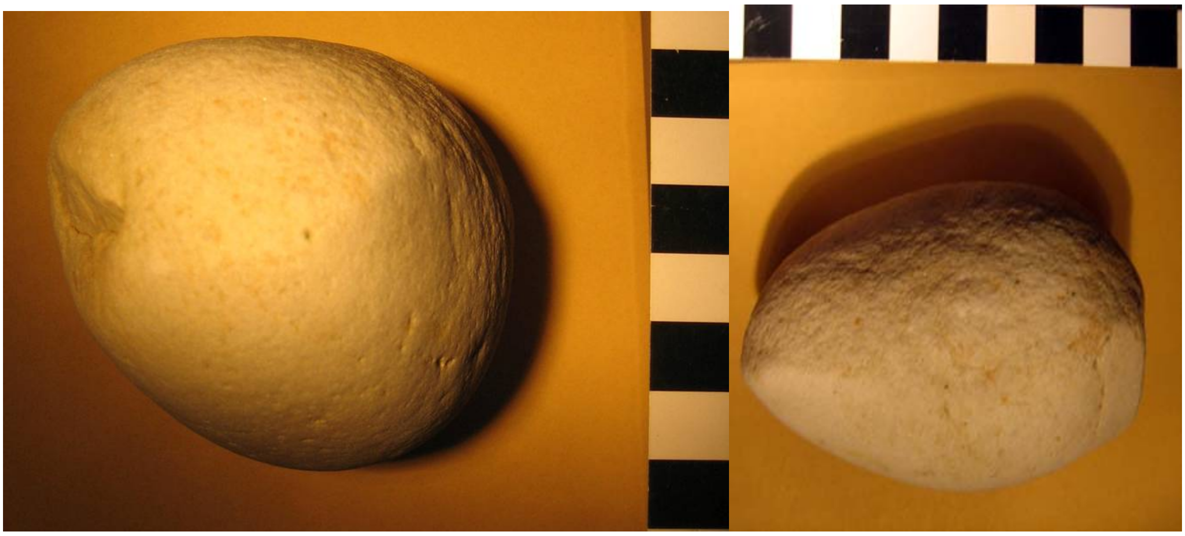


Figure 37: Photograph of 2 asymmetrically weathered clasts from the basal gravels of Hodge Ditch Phase 1. (Upper images are of the same clast).

Transported Sediment Blocks

In many places particularly in the upper 2-3 m of the sedimentary sequence there are tilted and abruptly terminated blocks of stratified silts and sands varying from a few cms to over 1m in length (Figure 38a). The tilting of the blocks and that lack of any sedimentary structures corresponding to the transporting flow, suggests that the sediments have been transported as blocks possibly whilst frozen. This may only be seasonal freezing of the sediments in depressions on the floodplain surface and they are unlikely to have travelled any significant distance.

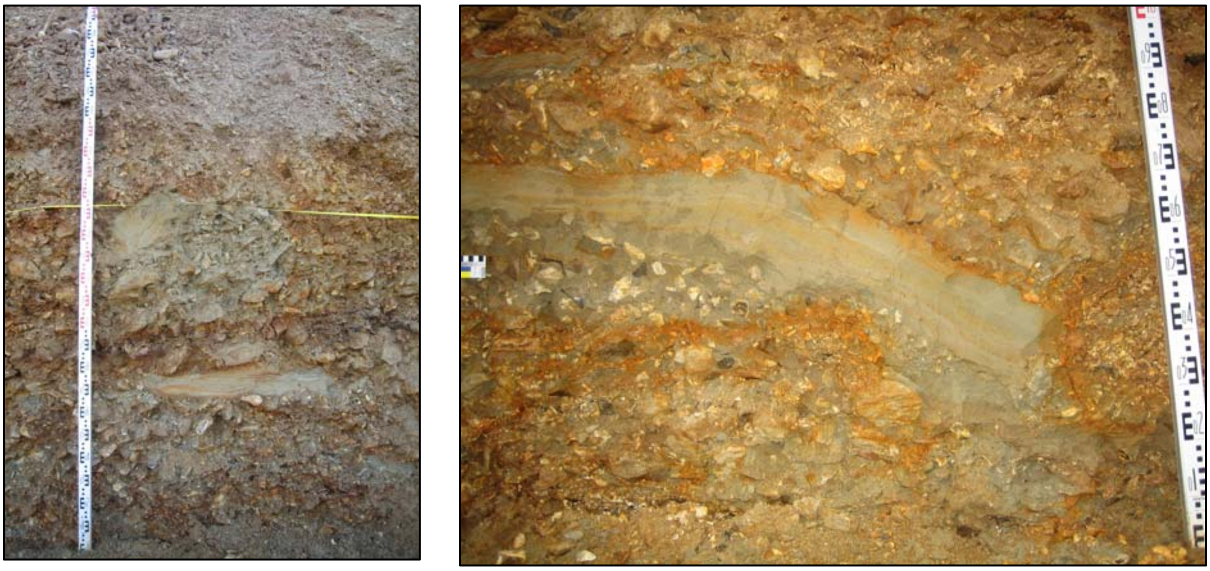


Figure 38: (a) A disrupted transported clast (crossed by the yellow tape measure) of fine silty sand with pebbles (b) a slumped silt-sand lens.

In some cases the form suggests a lens that has been disturbed and slumped again probably under seasonally frozen or periglacial conditions. The distribution of these features is being recorded and it is recommended that they be recorded as part of Stage 2 in Hodge Ditch Phase II. They may be of value in the interpretation of the entire dataset of OSL dates as they may relate to phases of possible periglacial disruption of the sediment body.

5.2 Sedimentology of beds and the stratigraphic sequence

Bardon Aggregates Ltd. have supplied the authors with the data enabling the construction of a total quarry grade curve. Whilst this is not of great value for any one location within the pit it does provide an envelope curve into which most beds should lie. From the curve it can be seen that as a body the gravels is extremely poorly sorted ranging from silt/fine sand (0.002-0.25 mm) to large cobbles (64-256mm) and occasionally boulders (>256mm, including sarsens). However, as can be seen from the grade curve the overwhelming majority of the sediment by weight or volume is pebble or cobble sized with the d_{50} being approximately 100mm (medium cobbles). The poor sorting and large d_{50} reflects the wide range of transporting mechanisms and energy conditions over the later Pleistocene rather than occasional high discharges capable of transporting the entire load. Samples have been taken for both clast analysis and in-situ grain size determination which will a component of the methodological research in Stage 2.

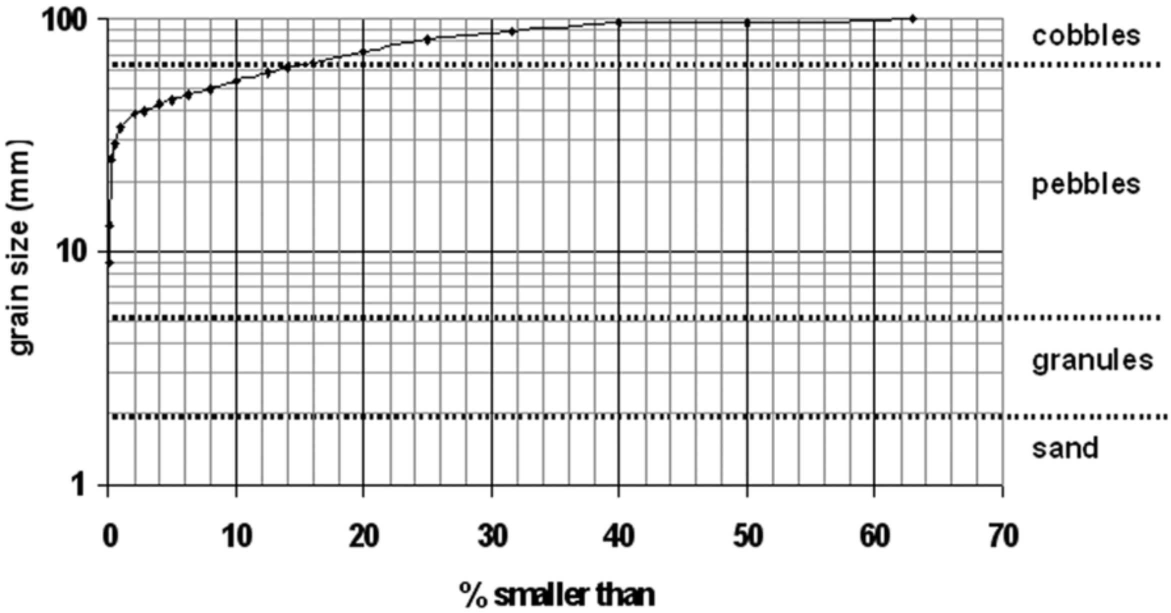


Figure 39: The composite (total) grain size (grade) curve for Hodge Ditch Phase I (data courtesy of Bardon Aggregates Ltd.)

Whilst undertaking this sampling some soft-rock clasts were noticed including chalk (Figure 40). Sub-angular clasts of chalk are rare probably because they are normally crushed during transport. The closest source to Hodge Ditch would be the Upper Chalk which outcrops at Thorncombe some 3 kms upslope from the Hodge Ditch area and also around the plateau edge in the upper Axe valley. Given the altitude of the chalk it cannot have entered the valley by basal or lateral erosion of the river into bedrock and so must have entered overland from the upper valley-side slopes.

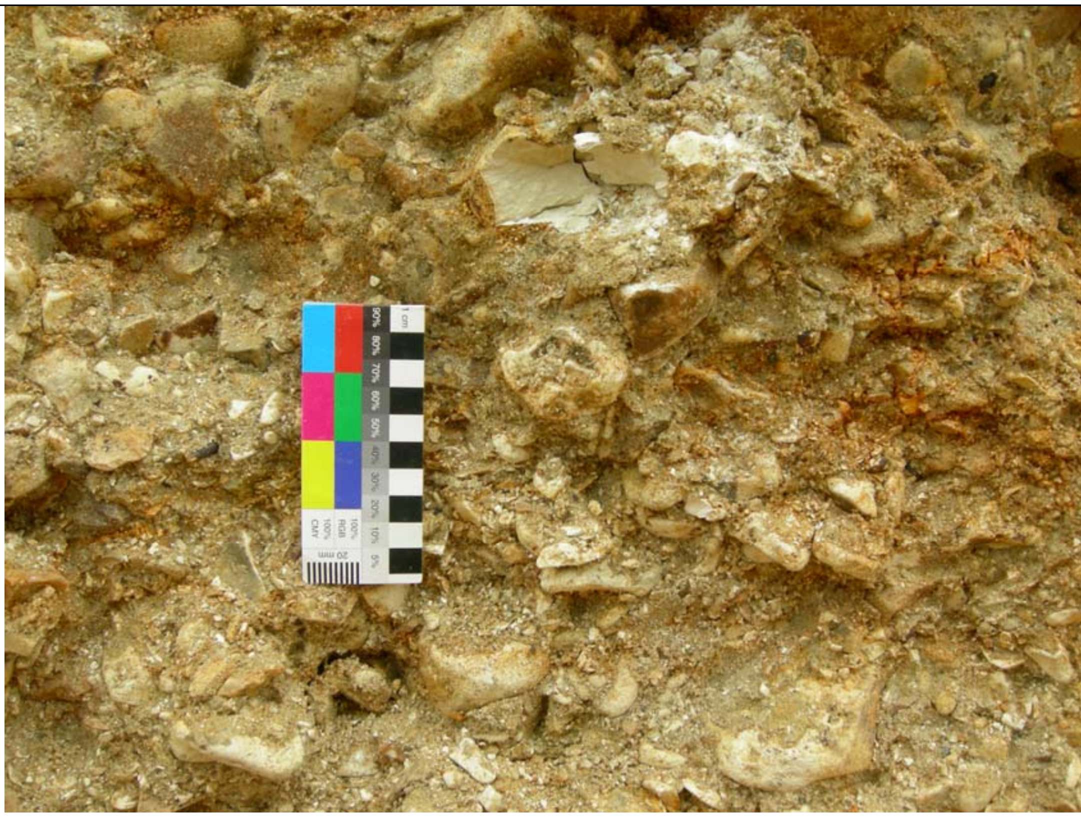
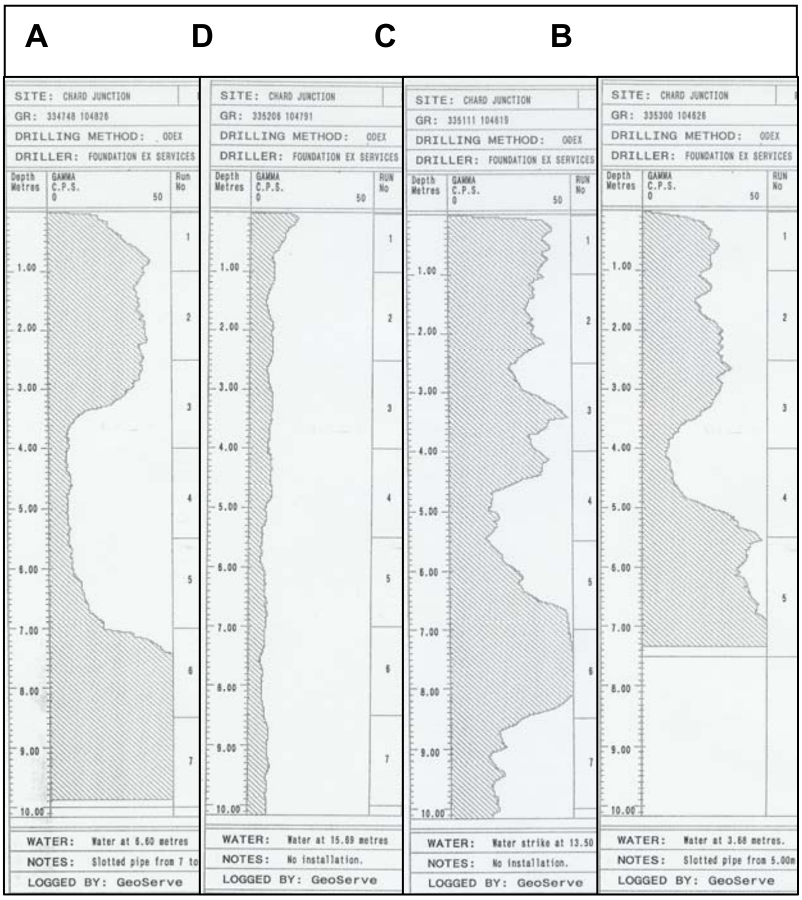


Figure 40 A sub-angular clast of chalk at Hodge Ditch II.

5.3 stratigraphy and sub-surface topography

The provision of boreholes drilled by a Dando rig by GeoServe Ltd. for Bardon Aggregates has allowed us to relate the finds from Hodge Ditch I and the OSL dates to an overall model of the stratigraphy for this part of the quarry (kindly supplied by Barton Aggregates Ltd.), an example of which is illustrated in Appendix C. The borehole logs make no sedimentological distinctions within the major body of the gravels, however, they do provide the altitude of bedrock, gravel thickness and the presence of clayey silts, sand and gravels and distinct from the (clean) sandy chert gravel. Also supplied with the sediment description was the gamma cps (Gcps) profile of each borehole. This is a standard geological technique and can be used to distinguish sedimentary units (see Figure 41 for more details). It is possible from the borehole logs and the gamma CPS logs to divide the sediment body into 4 categories; **A** fine silts and sands under the modern floodplain (Holocene), **B** slope and periglacial deposits, **C** tributary gravels and **D** main valley bedded terrace gravels (Figure 42). The logs show that solifluncted gravels (B) exist on the slopes up to an altitude of 80m at least 5m above the highest occurrence of fluvial sand and gravel. Due to high gamma radiation by the Lower Lias bedrock the gamma logs supplied along with the stratigraphic columns proved invaluable for differentiating between the soiflucted gravels (high to medium Gcps due to the inclusion of a bedrock-derived matrix), the tributary units with medium Gcps and the main valley fluvial units which had a very low to negligible Gcps. A full evaluation of the archaeological utility of Gcps is to be included in Stage 2.



Gcps

Gcps measures the natural gamma radiation of sediments. This is a function of the mineralogy of the sediments and particularly the content of gamma radiation emitting elements such as Potassium, Thorium and Uranium-Radium. These are found in rock sequences containing potassium feldspars (e.g. granites), volcanic and igneous rocks, sands containing volcanic ash and clays. In general quartz sand and chert or flint dominated gravel have low emittance levels whereas clays and volcanic materials have high emittence. At Chard Junction the Lias bedrock (clay) has a high Gcps and the chert/flint gravels a low Gcps so Gcps is a proxy for the bedrock component of the matrix

Figure 41: The Gcps logs from four representative logs (courtesy of Bardon Aggregates Ltd.)

From this data a composite cross-section has been constructed and an interpretation upon which the Hodge Ditch Phase I window has been superimposed.

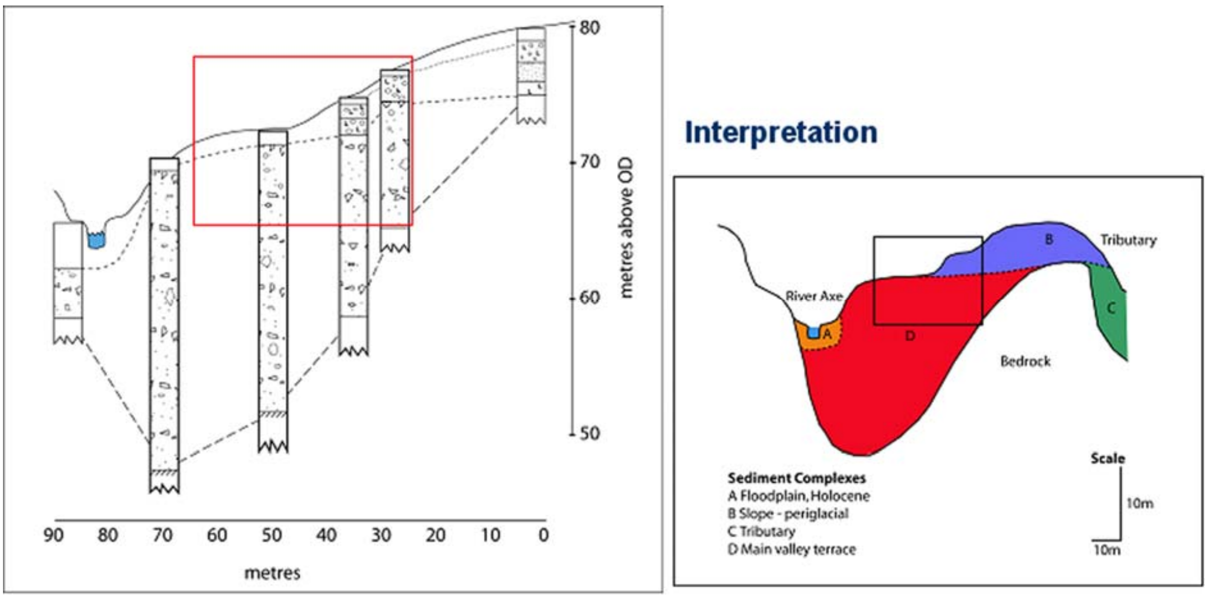


Figure 42: A composite cross-section though Hodge Ditch Phase I and interpretation in relation to the facies classification.

The division of the main valley gravels into a soliflucted facies (0-3/4 m) and a fluvial facies (3/4-23 m), comparison with the OSL age-depth model and incorporating environmental information from the microstratigraphy allows the postulation of a preliminary evolutionary model for Hodge Ditch Phase II. This is summarised in Table 5.

Period	**Sediment Facies**	**typical microstratiogrphic features**	**Environment & processes**	**Archaeology**
MIS 2 *(LGM-Lateglacial)*	incision into gravels and deposition of lower gravels	-	high discharges gravel output exceeding input, solifluction on slopes	none recorded
MIS 3-4 *(early-mid Devensian)*	gravely head with occasional channelled deposits	transported clasts, frost-shattered pebbles, cryoturbation features	periglacial conditions with slope-driven solifluction	none recorded and
MIS 5a-d *(late Ipswichian)*	sandy braid-plain	occasional frost cracks	temperate to continental with occasional ground freezing	none recorded but conditions do not preclude a presence
MIS 10-6 *(Wolstonian Complex)*	gravely braid-plain with multiple shallow gravel-bedded channels and bars	sand lenses, lenses of framework gravels in channels, scour features	varying flow conditions with high sediment input	none recorded but not precluded by the conditions
MIS 12-11 *(Anglian – Hoxnian)*	gravel braid-plain	sub-aerially weathered clasts	varying flow conditions but also indications of stable floodplain surface(s)	Mode bifaces being worked on the floodplain surface at or very close to the find locations
MIS 12? *(Anglian)*	bedrock erosion	-	-	-
MIS >12	bedrock erosion?	-	-	-

Table 5. The proposed Pleistocene sequence at Hodge Ditch 1.

This stratigraphic sequence is extremely unusual if not unique within the British Isles. However, it does accord with the studies at Broom by Hosfield (1999) and Hosfield and Chambers (2002) and the sequence at Kilmington studied under PRoSWEB (Hosfield et al. 2007) as well as previous observations by Green (1974) and Shakesby & Stephens (1984). This compound sediment body or terrace can be correlated down the Axe Valley from slightly upstream of Hodge Ditch at Forde Abbey right down to Kilmington and probably below as shown by the long-section (Figure 43) – in all a distance of 18 km.

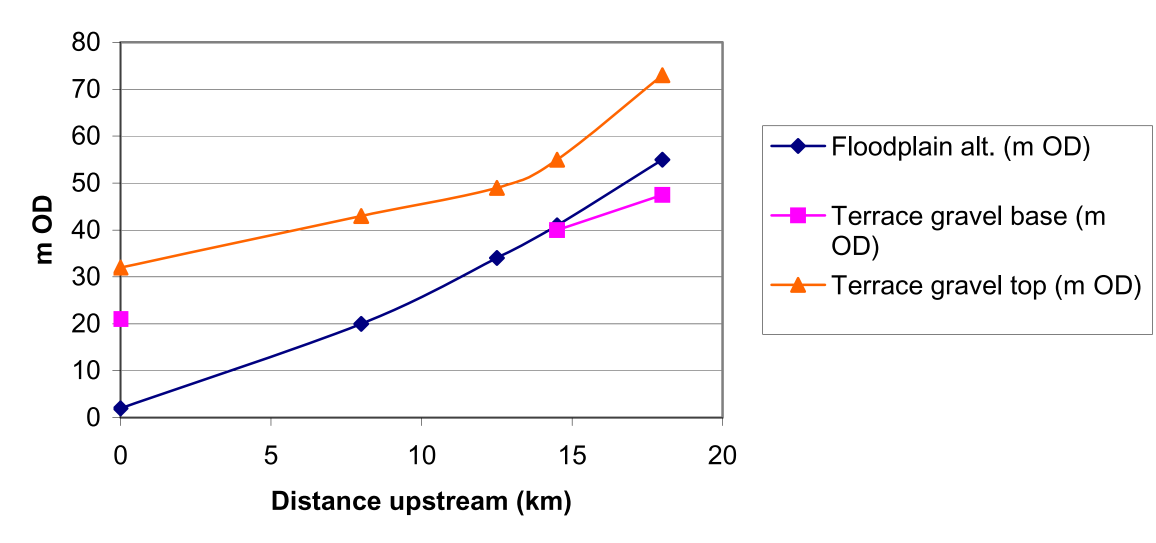


Figure 43: A partial terrace long section for the Axe valley with Hodge Ditch Phase I depth shown.

What is most noticeable from this long section is that whilst the modern floodplain of log-linear form and grades to the present sea level the top of the terrace unit is not parallel, or of a steeper gradient grading to a lower sea level (as is common with most terrace long-profiles) but instead has a lower gradient with an elevated upper surface upstream causing concavity. There are several possible causes of this anomalous long-profile. Firstly it may be at least in part due to an oversupply of coarse bedload and a lack of discharge available to remove it and incise in response to uplift with a possible cause being abundant local input of chert but a reduction in catchment size due to capture as suggested by Gallois (2006) and discussed further below. An alternative is that the Axe was graded to a main river or marine channel much further south than the present position of the coast and prior to the breaching of the Straits of Dover. A similar change in terrace/valley gradient has traditionally been postulated for the effect of the breaching of the Purbeck Ridge on the Frome-Piddle system in the upper Solent basin (Westaway et al, 2006). More studies at other sites in the valley are needed to investigate this question further. By comparison this sequence encompasses at least 12 terraces on the lower Thames (Bridgland 1994; Brown 2009), and closer to the Axe, 8 on the Exe (Brown et al. in press) and up to 15 on the Upper Solent (Briant et al. 2009). The reasons for this anomalous evolutionary history are not fully understood but there are, in theory, two possible causes. The first would be that the Axe valley has not undergone the regional uplift that has driven terrace formation in the adjacent valleys. This is most unlikely as, although a series of faults are known in the area faulting the Miocene surface they do not align with or down-throw the valley. The second is that the valley has a similar history to the Exe and the Solent until the Anglian? when the valley floor is cut into the Lower Lias bedrock in response to the low sea level but after that date the valley has discontinuously aggraded until the Devensian. This would normally produce an inset terrace system as indeed it does at the end of the last glacial cycle as evidenced by the lower Axe terrace and 20m of bedrock incision at the present coast. However, under conditions of very high local sediment supply and low stream power it is possible that the system oscillated between aggradation, stasis (stable floodplain) and minor incision never strong enough to reach the bedrock head and cause old floodplains to be transformed into terraces. The very high sediment input is derived from the steep scarp edges of the Blackdown Hills with both the clay with flints and the Greensand Chert beds cropping out on the slopes above the river within 0.5-1km. The low stream power is more problematic but as mentioned earlier it has been suggested that the Axe catchment may have lost part of its catchment to stream capture by the Exe and Otter rivers competing to drain the Blackdown plateau (Gallois 2006). This model which echoes comments made by Shakesby (pers. com.) is illustrated in Figure 44.

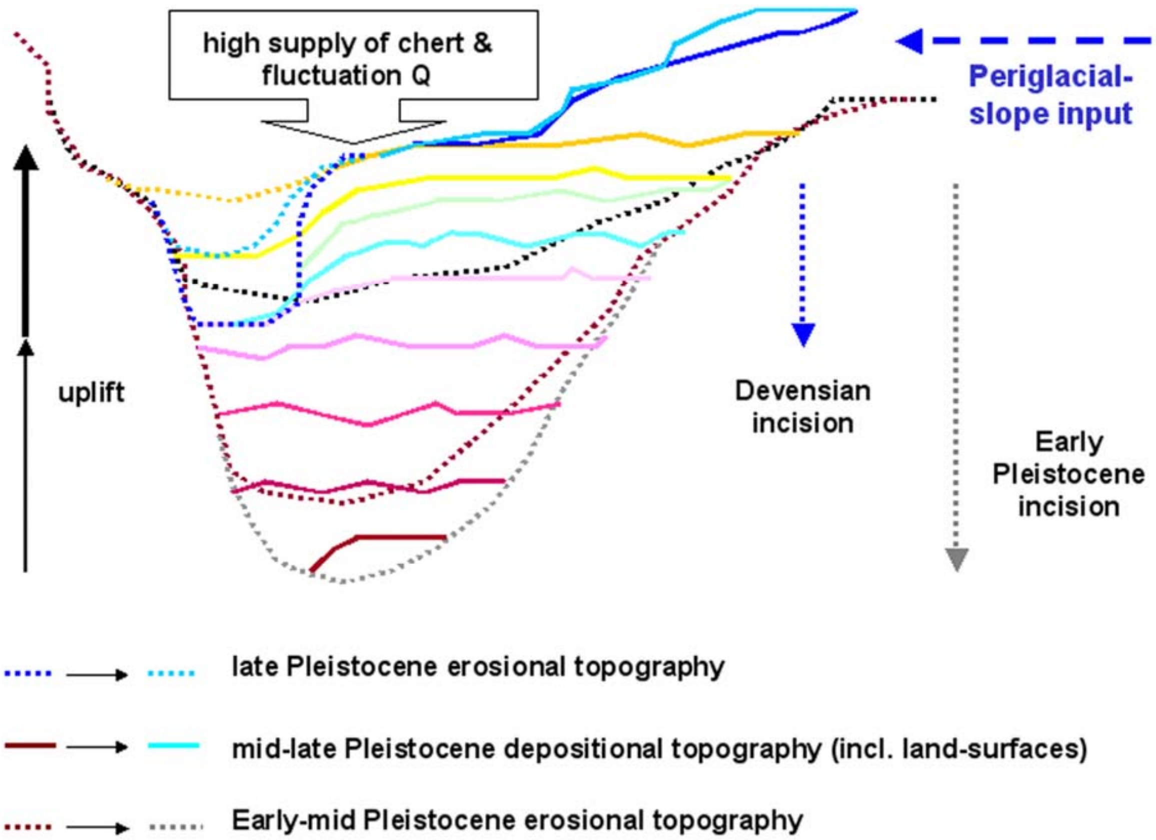


Figure 44 Simple schematic model of Pleistocene evolution of the Middle Axe Valley in the Chard Junction area. All lines are hypothetical and undulations represent the relief of the braid-plain.

A critical test of this hypothetical model is the age of the gravels close to or underlying the present channel which will be exposed in Hodge Ditch Phase II. There are also important archaeological implications of this model. The first is that the sequence will contain many hiatuses with time gaps covered by stable floodplain surfaces, later disrupted but not totally destroyed. Under this scenario the concentrations of hand axes seen in the lowest unit at Chard Junction and at Broom are probably the result of local knapping of the chert on the floodplain and not long-distance transport as postulated as part of the 'proximal secondary context' (PSC) concept which will be evaluated in Stage 2 of this project. Fundamentally it is the lack of incision and lateral erosion which has preserved such sites. Further work is required on this model with a multi-site 3D model construction using data from all of the Chard Junction Quarry including Hodge Ditch Phase 2 and 3.

6. Project Design For Stage 2

Objective 5: To provide an updated Project Design for the Main Project described here in summary form

This has been completed and is simultaneously submitted to English Heritage as a separate document with the summary being reproduced in Appendix C.

7. Recording Grid and Datums for Hodge Ditch Phase II

Objective 6: Establish a recording spatial grid with datums for Hodge Ditch Phase III and initiate a 3 weekly monitoring plan based on face evaluation in conjunction with Bardon Aggregates.

This has been completed using differential GPS (Leica 1250) and has been tied into the datum used by Bardon Aggregates Ltd. at the entrance to the Hodge Ditch Phase I. This will allow future monitoring of Hodge Ditch Phase II to be conducted using only a total station. Additionally this will allow precise location of the scanning stations to be used in the methodological components of Stage 2.

8. Concluding Comments

This stage of the project has confirmed the context and approximate age of the bifaces that continue to be found at Chard Junction Quarry. The studies of Hodge Ditch Phase I confirm that the terrace is composed of a stacked sequence with hiatuses but spanning the period from the middle to upper Pleistocene and probably from MIS 12 to MIS 2. This report provides the first finds of bifaces from the site, and from the Chard Junction Area which are both fully recorded, and from a secure sedimentary context. Further dating and examination of the adjacent sediments in Hodge Ditch II is required to resolve the antiquity of the biface-bearing gravels and this is proposed in Stage 2.

However, the studies described here have highlighted the urgent need, and opportunity, for technical and methodological improvements. The size, depth and speed of working of the site mean that even with a dedicated monitoring programme it would be very difficult to both record the archaeological resource and all the contextual information that can contribute enormously to the interpretation of finds. This is a problem which faces all recording projects in similar aggregate sites such as watching briefs. Pilot work in this stage has suggested that four methodological areas should be pursued:

- The use of gamma cps logs for site assessment and evaluation. Advice and background information is required.
- The use of digital granulometry to record sediment grain sizes without large and cumbersome gravel sampling and sieving
- The use of ground Laserscanning for the semi-automated recording of face stratigraphy and sedimentology. This will only be appropriate in selected locations abut guidance and technical advice is required.
- Start the evaluation of other methods of direst sediment dating which could compliment OSL – in this case burial dating using cosmogenic isotopes.

It is felt that these are very important areas which would greatly advance our ability to record and understand Palaeolithic archaeology from aggregate sites and form the basis of Stage 2 of this project.

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Appendix A. Preliminary Notes on Biface Found 26th March 2009 (confidential)

Location: SE quadrant of Hodge Ditch Phase 1 on the quarry floor but within 1m of disturbed integrated masses of organic-rich silts and gravels. At approximately the same level as the first two bifaces.

Description/Classification: This is an average sized, flat biface of reddish orange chert, found in abundance locally, with no clear patination, although one side does have a very slight bluish grey bloom (see Figures 1-2). The biface is made on a flake, and retains some of its cortical platform at the proximal end. It has been bifacially worked and the removals are invasive, but some cortex remains on both sides. The sides are straight/slightly convex, and the form is sub-triangular as the base is slightly rounded. Basic and preliminary morphometrics are:

Box Length: 146.04

Box Width: 100.80

Maximum Thickness: 37.41

Width 1/5 from base: 100.13

Width 1/5 from tip: 50.55

Condition: The arêtes and edges are remarkably fresh, with minimal edge damage unlike the two earlier finds.

Preliminary Assessment: Taken together these factors suggest that the biface was not lying exposed for a significant period of time, and has not moved far from where it was last put down. It has certainly not been subjected to significant rolling in fluvial gravels. Given its proximity to reworked Lias deposits (initially thought to be organics, but following excavation of trench described in report known to be related to the gravel/bedrock contact), it is very likely that this biface lay on a former landsurface, possibly by a very early Proto River Axe, but was rapidly buried. There is clearly a spatial association between this biface and the two earlier finds, and it is very likely that they are of similar antiquity despite the difference in form.

Notification & Deposition: The Dorset HER will be notified as soon as the county designation is agreed. The biface is probably owned by Forde Abbey Estates as landowner of this part of the quarry and so will be offered to them for display at the Abbey as has been done for the previous finds.

Figures 45 and 46: Biface 3 from Hodge Ditch Phase 1. Preliminary photographs. L.S. Basell 2009.

Appendix. B OSL Report for Stage 1

Please see separately sent document (PDF) which cannot be combined with this document.

Appendix C: Project Design For Stage 2 (Summary only)

METHODOLOGICAL ADVANCES IN PALAEOLITHIC ARCHAEOLOGICAL RESOURCE ASSESSMENT AND MONITORING AT CHARD JUNCTION QUARRY, HODGE DITCH QUARRY PHASES II & III: STAGE 2

1 Summary

1.1 This project aims to improve our methodologies for problematic aggregate sites through a combination of technological advances (gamma log analysis, digital granulometry & laser scanning) and improvements in recording and assessment practices all of which will be trialled and refined at Chard Junction Quarry, Dorset.

1.2 A second methodological aim is to apply a new dating technique (cosmogenic burial dating) to the deep sequence at Chard in order to try and validate the OSL chronology and provide an alternative method of dating such sites. This will also involve further OSL dating at the site.

1.2 This stage will also provide for the monitoring of the artefact-bearing Lower-Middle Palaeolithic deposits at Hodge Ditch Phase II, Chard Junction Quarry (Dorset). Following on from stage 1, which covered the finds and stratigraphy of Hodge Ditch Phase I the stratigraphic and sedimentological recording of Hodge Ditch Phase II will allow a complete stratigraphy and dating programme for the quarry and most importantly may provide data on the lowest (and oldest) sediments that are believed to be artefact bearing.

1.3 The background to the site is elaborated, and why it is both important to our understanding of the British Palaeolithic and why it is representative of a very difficult type of site (stacked sequence or compound terrace) for the monitoring and management the archaeological resource.

1.5 The project is urgent as from the dating done on the upper sediments from Hodge Ditch I, we estimate that the new phase (Hodge Ditch Phase II) will descend through the Palaeolithic levels at approximately a rate of 20-30 Ka per month on average (see section 2).

1.6 The study at this quarry will help redefine our understanding of the primary/secondary context division in fluvial gravels working towards identifying 'proximal secondary contexts' (PSCs, see later discussion).

1.7 The project lies within both the EH ALSF Theme 1 and two key themes in the Research and Conservation Framework for the British Palaeolithic (strategic themes 2 and 3).

1.8 The project team is specified, all of whom are experts in their respective fields (geoarchaeology/stratigraphy, Palaeolithic archaeology/lithics and OSL).

1.9 The methods statement gives detail of the methods to be employed in Stage 2 and an outline of the methods for Stage 3.

1.10 The project stages, products and tasks are specified in detail for Stage 2 and in outline for Stage 3.

1.11 The interfaces with other projects in the UK are outlined including work at Broom and AHOB.

1.12 The budget is presented in detail for Stage 2 and outline for Stage 3.