

EVALUATING AND ENHANCING THE GEOARCHAEOLOGICAL RESOURCE OF THE LOWER SEVERN VALLEY (TABLES)

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Field Code	Lab Code	Location	Overburden (m)	Grain size (μm)	Moisture content (%)	NaI γ -spectrometry (in situ)			γ D_r ($\text{Gy}\cdot\text{ka}^{-1}$)	Ge γ -spectrometry (lab based)			α D_r ($\text{Gy}\cdot\text{ka}^{-1}$)	β D_r ($\text{Gy}\cdot\text{ka}^{-1}$)	Cosmic D_i ($\text{Gy}\cdot\text{ka}^{-1}$)	Total D_i ($\text{Gy}\cdot\text{ka}^{-1}$)	Preheat ($^{\circ}\text{C}$ for 10s)	D_e (Gy)	Age (ka)
						K (%)	Th (ppm)	U (ppm)		K (%)	Th (ppm)	U (ppm)							
CLIF04	GL08060	52°N, 2°W, 10m	0.5	5-15	18 ± 5	1.48 ± 0.03	8.26 ± 0.26	3.49 ± 0.17	1.15 ± 0.04	2.32 ± 0.10	11.69 ± 0.70	2.35 ± 0.13	0.44 ± 0.05	1.88 ± 0.19	0.19 ± 0.02	3.66 ± 0.20	200	2.9 ± 0.1	0.78 ± 0.06 (0.05)
CLIF03	GL08059	52°N, 2°W, 10m	1.7	125-180	16 ± 4	0.84 ± 0.02	3.89 ± 0.19	1.90 ± 0.13	0.60 ± 0.03	1.41 ± 0.07	5.44 ± 0.41	1.24 ± 0.08	-	1.03 ± 0.11	0.16 ± 0.01	1.79 ± 0.11	240	4.4 ± 0.5	2.5 ± 0.3 (0.3)
CLIF01	GL08057	52°N, 2°W, 10m	5.0	125-180	8 ± 2	0.98 ± 0.02	3.43 ± 0.18	1.57 ± 0.12	0.58 ± 0.02	1.22 ± 0.06	3.89 ± 0.36	0.89 ± 0.07	-	1.00 ± 0.08	0.09 ± 0.01	1.67 ± 0.08	220	11.0 ± 1.6	6.6 ± 1.0 (0.9)
CLIF05	GL10021	52°N, 2°W, 10m	3.5	125-180	5 ± 1	0.88 ± 0.02	2.48 ± 0.15	0.98 ± 0.09	0.44 ± 0.02	1.16 ± 0.06	2.54 ± 0.30	0.60 ± 0.06	-	0.93 ± 0.07	0.12 ± 0.01	1.49 ± 0.08	240	24.6 ± 2.4	16 ± 2 (2)
CLIF06	GL10022	52°N, 2°W, 10m	3.5	180-250	4 ± 1	0.86 ± 0.02	2.13 ± 0.12	1.25 ± 0.09	0.45 ± 0.02	1.18 ± 0.06	2.42 ± 0.31	0.66 ± 0.06	-	0.94 ± 0.07	0.12 ± 0.01	1.51 ± 0.08	240	22.9 ± 2.1	15 ± 2 (1)
CLIF07	GL10023	52°N, 2°W, 10m	3.0	125-180	8 ± 2	1.17 ± 0.02	4.02 ± 0.15	2.35 ± 0.10	0.74 ± 0.03	1.30 ± 0.06	4.12 ± 0.39	0.87 ± 0.07	-	1.05 ± 0.08	0.13 ± 0.01	1.92 ± 0.09	260	22.8 ± 3.7	12 ± 2 (2)
FRAM01	GL10017	52°N, 2°W, 20m	0.9	125-180	11 ± 3	0.17 ± 0.01	1.49 ± 0.11	1.41 ± 0.09	0.27 ± 0.01	0.54 ± 0.03	2.02 ± 0.26	0.72 ± 0.06	-	0.46 ± 0.04	0.18 ± 0.02	0.91 ± 0.05	240	16.4 ± 6.1	18 ± 7 (7)
FRAM02	GL10018	52°N, 2°W, 20m	0.9	125-180	11 ± 3	0.19 ± 0.01	1.23 ± 0.10	1.30 ± 0.08	0.25 ± 0.01	0.53 ± 0.03	1.69 ± 0.30	0.64 ± 0.06	-	0.44 ± 0.04	0.18 ± 0.02	0.87 ± 0.05	240	8.5 ± 0.9	9.7 ± 1.2 (1.1)
BMIL01	GL10024	52°N, 2°W, 30m	0.7	125-180	16 ± 4	1.00 ± 0.02	3.73 ± 0.16	1.85 ± 0.11	0.63 ± 0.02	1.48 ± 0.07	7.10 ± 0.48	1.45 ± 0.09	-	1.17 ± 0.11	0.18 ± 0.02	1.98 ± 0.11	260	181.3 ± 25.9	92 ± 14 (13)
BMIL02	GL10025	52°N, 2°W, 30m	1.0	125-180	8 ± 2	0.93 ± 0.02	2.42 ± 0.14	1.42 ± 0.10	0.50 ± 0.02	1.34 ± 0.06	2.79 ± 0.27	0.70 ± 0.06	-	1.04 ± 0.08	0.18 ± 0.01	1.71 ± 0.09	280	161.6 ± 22.1	94 ± 14 (13)
BMIL04	GL10027	52°N, 2°W, 30m	4.5	125-180	5 ± 1	0.94 ± 0.02	1.93 ± 0.12	0.95 ± 0.08	0.43 ± 0.02	1.11 ± 0.05	2.68 ± 0.31	0.62 ± 0.06	-	0.90 ± 0.07	0.10 ± 0.01	1.43 ± 0.07	280	118.8 ± 16.7	83 ± 12 (12)
BMIL03	GL10026	52°N, 2°W, 30m	2.0	180-250	14 ± 4	0.91 ± 0.02	2.61 ± 0.13	1.49 ± 0.09	0.51 ± 0.02	1.05 ± 0.05	2.48 ± 0.33	0.59 ± 0.06	-	0.73 ± 0.07	0.15 ± 0.01	1.40 ± 0.08	280	151.3 ± 18.2	108 ± 14 (13)

Table 1: D_r , D_e and Age data of submitted samples, listed in stratigraphic order at each site. Uncertainties in age are quoted at 1σ confidence, are based on analytical errors and reflect combined systematic and experimental variability and (in parenthesis) experimental variability alone (see 6.0). Blue indicates samples with accepted age estimates, red, age estimates with caveats (see Appendix 3: Table 2).

Depth below ground surface (m)	Sedimentary description
0	ground surface
0-0.15	dark brown sandy loam with a stone-rich A horizon (largely overburden and made ground)
0.15-0.30	brown silty sandy loam (undisturbed other than by normal pedogenesis and bioturbation)
0.30-0.70	abrupt wavy boundary to fine to medium matrix supported gravels dipping (17° – 19° to the south, sub-beds alternating imbricated with bedding, occasional pebbles. Matrix coarse to medium sand. (FRAM02/GL10018. In sand lens in lower part of this bed. 18.43m AOD))
0.70-0.90	finely bedded medium sand with very well sorted sand in weak bands (FRAM01/GL10017. At top of bed. 17.83m AOD)
0.90-1.15	S dipping fine to medium clast supported imbricated gravels (with charcoal)
1.15	abrupt boundary to light grey clay (weathered Lias mudstone)

Table 2: Sedimentary log of Section 1 at Frampton-on-Severn Quarry

Depth below ground surface (m)	Sedimentary description
0-1	graded face
c. 1-1.90	red silty-fine sand planar bedded unit (1.85m; CLIF01/GL08057)
1.90-2.5	X-laminated sands of very well sorted medium sand with a trace of silt. Some internal grading to c-m sands also some wavy bedding with silt flasers within ripples (<i>Unit 1</i>)
2.52-2.55	Mn coated c-sand
2.55-2.62	red X-bedded c-sand
2.62-2.74	poorly sorted rounded gravel m-supp in c-sand (5cm max axis)
2.74-2.92	clast-bedded planar sand (2.80m CLIF02)
2.92-2.95	matrix supported fine gravel
2.95-3.00	flaser-bedded fine to medium sand with silt
3.00-3.10	grey wavy-bedded silty medium sand with clay lenses, drapes & flaser/lenticular beds
3.10-3.15	X-bedded medium brown medium sand with small Xsets
3.15-3.23	course sand-supported fine gravel
3.23-3.26	red coarse to medium sand lens
3.26-3.55	coarse to medium sand supported fine to medium gravel planar bedded units 1cm thick

Table 3: Sedimentary log of Clifton Quarry Section 1

Depth below ground surface (m)	Sedimentary description
0m:	ground (real) level – grass turf
0-0.10m:	medium-brown sandy fine silt, homog. structure with B pedofeatures
0.10-0.50	(CLIF04/GL08060)
0.50-0.65	red blocky to prismatic silty clay with fine sand, gradual lower wavy boundary (0.5m below ground surface)
0.72-1.05	compressed fibrous & woody peat with some fine sand (incl. wood fragments, bark, leaves, twigs, stem macros..)
1.05-1.23	grey mottled silty fine sand with vertical mottling, occasional rounded stones (sub-angular to angular) (BCLIF03/GL08059)
1.23-1.40	laminated sand and sandy fine-gravel with Fe staining
1.40-1.60+	medium to coarse bedded grey-red sand (1.25m below ground surface)
	sharp boundary dipping to the west with fine to medium sandy gravel with weak horizontal bedding. Base not seen

Table 4: Sedimentary log of Clifton Quarry Section 2

Depth below ground surface (m)	Sedimentary description
0	made ground (bund material)
0-1.10	red matrix supported clay rich gravel with wavy lower boundary (1.10 = datum 123)
1.10-1.40	cemented red coarse sand with weak bedding
1.40-1.67	horizontally bedded dipping (10° to west) fine to medium matrix supported gravels
1.67-1.75	cross-bedded sand with stones forming the upper contacts of dipping beds (CLIF05/GL10021, CLIF06/GL10022)
1.75-2.35	cross-bedded sands with stone laminae (edge of bedrock channel)
2.35-2.55	bedded sand and medium gravel (CLIF07/GL10023 revealed in comparable sequence in Section 4 opposite)
3.05	bedrock

Table 5: Sedimentary log of Clifton Quarry 2010 Section 3

Depth below ground surface (m)	Sedimentary description
0-0.40	made ground (bund material)
0.12-0.60	matrix supported fine planar (low angle) cross-bedded sandy (medium) fine gravel
0.60-0.7	red medium & fine sand with a trace of silt (laterally the same unit as BMIL01/GL10024)
0.70-0.77	olive silt with fine sand (loess)
0.77-0.80	red medium to coarse sand
0.80-0.83	red sandy silt grading into red silt
0.83-0.86	dark red silty sand (BMIL02/GL10025)
0.86-1.10+	low angle cross-bedded coarse sand, frequent comminuted coal increasing in lower coarser cross bedded sands

Table 6: Sedimentary log of Ball Mill Quarry Section 1

Depth below ground surface (m)	Sedimentary description
0-3.40	cross-bedded well sorted medium sand with the upper gravel seen in section 1 at 0-0.5m depth (BMIL04/GL10027)
3.40-6.05	a wavy abrupt boundary overlying dark red silty sand with uniform planar bedding medium to fine sand sub-beds sands (BMIL03/GL10026 at 6m)
6.05-7.00	medium to fine sand with weak horizontal bedding
7.00+	Triassic mudstone bedrock

Table 7: Sedimentary log of Ball Mill Quarry Section 2

δ18) (Maddy 1999)	Member	BGS No.	Field code (this study)	Lab Code (this study)	OSL Ages (Ka)	Proposed MIS Stage
1	Elmore	alluvium	CLIF04 CLIF03 CLIF01	GL08060 GL08059 GL08057	0.78±0.06 2.5±0.3 6.6±1.0	1 1 1
2	Power House	1	FRAM01 FRAM02	GL10017 GL10018	18±7 9.7±1.2	2-1
2	Worcester?	2	CLIF07 CLIF06 CLIF05	GL10023 GL10022 GL10021	12±2 15±2 16±2	2 2 2
2	Holt Heath	4 (Kidderminster)	BMIL04 BMIL01 BMIL02 BMIL03	GL10027 GL10024 GL10025 GL10026	83±14 92±14 94±14 108±14	5a-d 5a-d 5a-d 5d

Table 8: Correlation of terrace sequence and OSL dates

Names, chronological ascription from Maddy (1999), BGS terrace number and new OSL dates from Frampton (FRAM), Clifton (CLIF) and Grimley (Ball Mill Quarry, BMIL).

Note. Colour refers to the caveats on dating described in the OSL report (Appendix 3, table 2).

Depth below ground surface (m)	Context	Sedimentary description	Interpretation
0		undisturbed ground level – grass turf	Turf
0-0.10	1000	medium-brown sandy fine silt	Topsoil/subsoil
0.10-0.92	1001	mid to dark brown fine red prismatic silty clay (no inclusions)	Alluvium
0.92-1.08	1002	grey silty clay with green/blue mottling	Channel infill
1.08-1.14	1003	very dark brown, organic rich (felted compressed peat)	Channel infill (alder carr)
1.14-1.28	1004	organic clay	Channel infill
1.28-1.40	1005	dark brown organic	Channel infill
1.40-1.54	1006	dark grey/blue clay	Alluvium
1.54-1.59	1007	v dark brown, organic, peaty clay	Channel infill (alder carr)
1.59-1.67	1008	mid brown, slightly organic, clay	Channel infill
1.67-1.77	1009	light brown-grey, silty clay	Channel infill
1.77-2.04	1010	blue grey sandy silt	Alluvium

Table 9: Sedimentary log of Clifton Quarry Section 5

Laboratory code	Sample	Identification	$\delta^{13}\text{C}$ (‰)	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-32235	1002a	plant macrofossil, <i>Rubus</i> Sect <i>Glandulosus</i> (seed)	-28.6	1285 ± 30	cal AD 660–780
OxA-23547	1002b	Sediment (humic acid)	-28.5	1338 ± 25	cal AD 650–770
OxA-23546	1002b	sediment (humin)	-28.5	1338 ± 24	cal AD 650–765
OxA-23548	1005a	plant macrofossil, <i>Potamogeton</i> sp. (seed)	-23.7	1729 ± 26	cal AD 240–400
OxA-23549	1005d	plant macrofossil, <i>Sagittaria sagittarifolia</i> (seed)	-26.5	1748 ± 27	cal AD 230–390
SUERC-32236	1005b	sediment (humic acid)	-29.7	1980 ± 30	50 cal BC–cal AD 80
SUERC-32240	1005b	sediment (humin)	-29.6	2065 ± 30	180 cal BC–cal AD 10
SUERC-32241	1008c	plant macrofossil : <i>Schoenoplectus lacustris</i> (seed)	-24.9	3660 ± 30	2140–1940 cal BC
OxA-23552	1008b	sediment (humic acid)	-28.7	3718 ± 30	2210–2020 cal BC
OxA-23586	1008b	sediment (humin)	-29.9	3812 ± 33	2400–2130 cal BC
OxA-23550	1009c	plant macrofossil, <i>Schoenoplectus lacustris</i> (seed)	-23.2	3712 ± 30	2200–2020 cal BC
SUERC-32242	1009b	sediment (humic acid)	-29.2	3850 ± 30	2470–2200 cal BC
SUERC-32243	1009b	sediment (humin)	-25.0	4000 ± 30	2580–2460 cal BC

Table 10: Clifton Quarry. Radiocarbon dates from palaeochannel deposits recorded in Section 5