Wicor Primary School Excavation

01 November 2021 – 05 November 2021

Paul Ramsay

with

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Conducted by the Rainbow Bar Community Research Project team in partnership with the Wicor Primary School teaching team and Year 4 pupils.

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1. SUMMARY

A small-scale archaeological excavation was carried out at Wicor Primary School to further the objectives of the 2021 Alan Saville Grant award to the Rainbow Bar Community Project (see Annexe 1). Two key elements of this were a) to trial the action research methodology to community engagement proposed in the grant application and b) to contribute to year 4 curriculum development (method and content) in relation to the National Curriculum in England History programme of Study: Key Stage 2 (DfE, 2013) as outlined in the grant application. The excavation consisted of a 2m by 3.5m trial trench excavated by layer to an approximate depth of 0.30m, at which point natural (in this context the glacial outwash Holocene land surface, as opposed to the bedrock) was reached. The trench revealed simple stratigraphy with no cuts of archaeological significance; a modern land-drain installed approximately 10 years ago ran diagonally mid-trench. A parallel biological examination of the excavated layers was conducted as part of the curriculum activity. Finds were limited to one small glass bead of possible Roman origin, a scattering of post-medieval pottery sherds and glass fragments, a few indeterminate ferrous objects and a scatter of Palaeolithic and Mesolithic lithics and debitage. The nature, size and condition of ceramic and glass scatters support the conclusion that there has likely been no near proximity pre or post-medieval habitation, with artefact distribution arising solely from plough action and post-medieval soil improvement activities. The small lithics scatter further suggests a plough disturbance and distributive process from the Holocene land surface which lies at approximately 30cm below current land surface. A scatter of apparently fire burnt flint was also recovered which may be worthy of future investigation.

2.0 INTRODUCTION

2.1 Wicor Primary School (WPS) (National Grid: SU 60544 05566) lies about 1km West of Portchester village centre in Hampshire and approximately 3km East of Fareham town centre (Figure 1). To the North is the Portsdown escarpment, and to the South is the Wicor shoreline which forms part of the northern edge of Portsmouth Harbour.

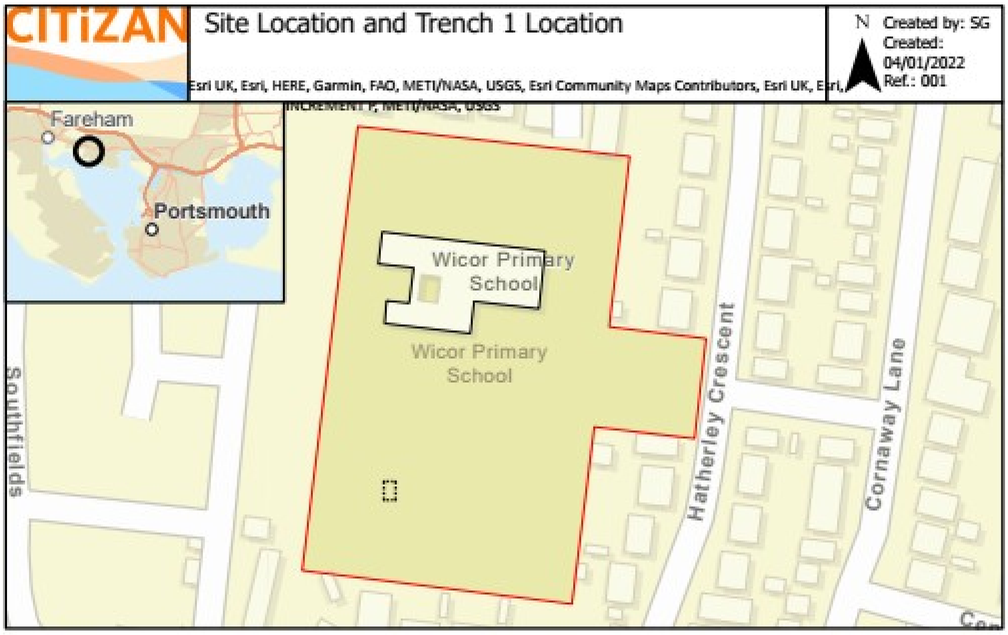


Figure 1: Site and trench location

2.2 WPS's approximately 0.01km^2 grounds were previously arable land prior to the school's move to the site in 1963 but WPS is now completely bounded by residential occupation. The historic OS 25 inch to the mile mapping (Hampshire Sheet LXXV. 10.) for the area has been reviewed as follows:

- Second Edition 1897 map -surveyed 1868, revised 1895, published 1897
- Edition of 1910 -surveyed 1868, revised 1907, published 1910
- Edition of 1932 -surveyed 1868, revised 1930-31, re-levelled 1907, published 1932
- Revision of 1940 -surveyed 1868, revised 1940, re-levelled1937-45, published 1947

The Land Utilisation Survey of Britain 1931-33 Map Sheet 32 (surveyed on the 6 inch scale and reduced to the scale of 1 inch to 1 mile)) records the land usage as "Arable land – Including fallow, rotation grass and market gardens".

Finally the 6inch to 1 mile mapping (Sheet SU60 NW) of 1968 shows WPS and its Playing Field with a boundary co-terminus with the contemporary school estate. At this time the land North and West of the school remains undeveloped and presumed to remain in arable use.

Contemporary satellite imaging (Microsoft Bing © 2021 Microsoft Corporation) shows recent development of land (2017-19) to the West boundary of the school (Figure 2). The image, taken during drought conditions, shows land drainage installation to the WSP playing field (circa 2011) with a central drain running diagonally from NE to SW and radial pipes from this to the rest of the field.

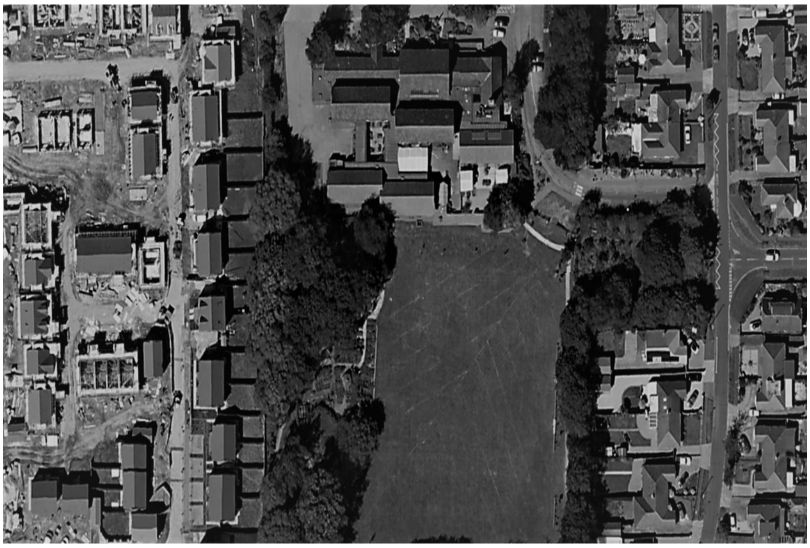


Figure 2: Satellite image of school site

The Hampshire Historic Environment Record (HER) shows no evidence of previous excavation of the site; HER ID: 69932, Land at Cranleigh Road (HER, 2021a) summarises the evaluation prior to development of the adjacent land to the West of WSP grounds. With the exception of an undated pit and a previously known prehistoric well (dated from pottery fragments), it concludes that its 17 trenches revealed no further archaeological features. The prehistoric well depth cited (3.74m) is indicative of the likely river terrace deposit depth anticipated at the site of excavation. A core bore or GPR survey would clarify this.

The bedrock is part of the Portsdown chalk formation (Undifferentiated). WPS is approximately 8m above mean sea level on a superficial river terrace deposit (Undifferentiated) of sand, silt and clay – predominantly sand and gravel with local lenses of silt, clay or peat (British Geological Survey data, 2022). This terrace deposit has been mapped by the Palaeolithic Archaeology of the Sussex/Hampshire Coastal Corridor project (PASHCC) and subsequently dated to MIS 7 (c. 245 – 200 ya) (Bates *et. al.* 2008).

Some of the horticultural teaching curricular activities for which WPS is noted have produced occasional ceramic artefacts, including one possible Roman tessera. In summary (Figure 3), the broader context constitutes Wenban-Smith's 1975 excavation at Red Barns [approximately 1km NNE from and on a higher terrace than WPS, which found a Lower Palaeolithic lithics manufactory later described as "...an undisturbed palimpsest of flint tools and debitage." (Gamble, Wenban-Smith & Apsimmon, 2000)]; a single palaeolithic flake from geoarchaeological investigations by the PASHCC at Cams Hall, c.1.5km W (Bates *et al.* 2008); a bronze age hoard found in 2020 approximately 200m SSW of the WPS southern perimeter (Hampshire Cultural Trust, 2021); and the Roman, Saxon and Medieval Portchester Castle monument and environs approximately 2km to the ESE (English Heritage, N.D.). HER Record ID's 30122 (HER, 2021b) and 30888 (HER, 2021c) approximately 1km West of WPS, report surface scatters of Medieval and Palaeolithic material respectively. Finally, Hampshire Cultural Trust's Westbury Manor Museum in Fareham has a small holding of Mesolithic artefacts found on the Wicor foreshore approximately 1km south of WPS.

Fiaure 3: Selected local find sites

3.0 OBJECTIVES

3.1 To conduct a small scale excavation with, and that engages, year 4 pupils as part of their History curriculum at Key Stage 2, and which foregrounds a beach survey activity in Spring 2022 with the same cohort.

3.2 To undertake a parallel biological survey of the ecology of the site with, and that engages, year 4 pupils.

3.3 To develop curriculum content to assist with classroom-based learning that builds upon the practical field work undertaken.

3.4 To test the approach with intention to conducting similar activity with other Primary Schools in the Rainbow Bar Community Project catchment area.

3.5 To conduct an excavation that demonstrates sound field work practices and contributes to an understanding of the historical record and archaeology of the Portchester locality.

4.0 METHODOLOGY

4.1 The proposal to excavate clarified that a single trench of 3m x 2m to a maximum depth of 85cm (or less, if finding significant archaeology or natural) would be dug. A constraint was that the trench would be dug manually with the participation of Year 4 (8-9 years of age) students, thus safety was of primary importance. A further constraint was the available timescale and resource. The trench was excavated stratigraphically. The exact trench location was governed by a requirement not to infringe on the school sports area and to be adjacent to a suitable spoil deposit area with sufficient space for the WPS Year 4 cohort to conduct sieving, sorting and cleaning activities.

4.2 Recording used MOLA-derived recording documentation, sourced from Past Horizons, with trench and section planning at 1:20 on drafting film.

4.3 Photographic recording was done digitally using a Nikon D3500 DSLR with an AF-P DX NIKKOR 18–55mm VR zoom lens. RAW & JPG format images constitute the photographic archive. The former are held on a SanDisk Ultra 80MB/s SDHC 16Gb memory card with the label ‘RBCP 2021’. The latter were converted from RAW using the application RAWTHERAPEE v5.7 and are held on the CD-R labelled ‘WPS_2021’. It is from these full size .JPG files that the thumbnail .GIF images in this report’s Digital Photograph Catalogue were derived.

5.0 RESULTS

5.1 The field work was undertaken between 01 November and 05 November 2021. The weather was fair and dry, with the exception of a short shower in the afternoon of day 1. The turf topsoil was regular across the site at a depth of 8cm to 9cm with a silty sandy clay natural encountered at a depth of between 25cm to 33 cm. Datum line was at 3cm above turf level; the land fall was less than -1cm over the 3.5m north to south axis of the trench.

The datasets from the excavation are presented in the Appendices as follows:

- Appendix 1 Context list
- Appendix 2 Photographic list
- Appendix 3 Finds list

5.2 The trench was a single 3m by 2m excavation that was extended by 0.5m southwards once topsoil removal revealed that a contemporary land drain cut ran diagonally through the initial trench. The main intent behind this decision was to ensure that there was sufficient surface area for all members of the 60+ Year 4 cohort to engage with the basic field-craft activities (i.e. soil removal, trowelling, sieving, cleaning, ecological investigation). The WPS campus and the trench location (National Grid: SU 60520 05480) are shown in Figure 1. Handheld GPS (Garmin eTrex running software v2.14) was limited to, and provided, a best location accuracy of 5m.

> 5.2.1 A single trench of a final surface area of 7.5m^2 to a maximum depth of 31cm was dug. A modern (circa. 2010) land drainage cut, in the form of a porous plastic woven membrane filled with pea shingle of approximately 50cm width, was encountered running diagonally SW-NE across the trench. Stratigraphy was unremarkable with no other cuts or localised deposits found within the trench extent

(see Appendix 1). Topsoil overlay a thin pan previous surface, which overlay a plough disturbed subsoil that in turn overlay natural. The modern turf topsoil layer [000], unworked and untreated since 1963 and at 7cm-9cm thick, produced no artefacts other than a modern paper-clip. Ecological analysis concluded (see Section 6.1) that the earth worm count is approximately 340 worms per m^2, compared to the national average of approximately 220 per m^2 (Natural History Museum, 2021). Such a healthy environment suggests that the topsoil accumulation since 1963 is largely attributable to worm activity and other natural organic decomposition processes. The 'thin pan surface' layer [010] (predating 1963 and 1cm-2cm thick) was identifiable by a lightening in hue and change in composition from the topsoil, and a distinct change in texture (predominantly flint fragment and shingle/gravel inclusion) detectable by sight, feel and sound when trowelling. This layer produced small ceramic fragments (median average 20x20mm), 1 small glass fragment, lithics and a pipe stem fragment. The plough disturbed subsoil [020] (at 17cm-22cm thick) was of similar hue and composition minus the compacted nature of the stone inclusion. It produced small ceramic fragments (median average 15x15mm), small glass fragments (median average 10x10mm), a turquoise hand-made glass bead (oblate 2mm x 1.8mm) two pipe stem fragments, a few lithics and debitage. 020 also contained a number of chalk 'pellets' typically 2cm (l) x 1.5cm (w) at a density of approximately 3 per M^2; it is possible that these are associated with soil improvement methods. Literature is sparse on this subject, although Mathew (1993) provides some indication that marling with chalk, despite the risk of 'thickening' the soil, was a recognised practice (variously in and out of fashion) spanning Roman to modern times. Natural [030] was identifiable by distinct colour and composition change; at the interface with the overlaying plough-disturbed subsoil and to a depth of approximately 5cm, there was evidence of root incursion in the form of silty smearing. This was clarified by investigation in the NE corner of the trench to a further depth of 30cm below the natural layer surface, which also confirmed the conclusion that natural (for the purposes of this investigation and not withstanding the possibility of similar findings to Wenban Smith (op. cit.) at much greater depth) had been reached.

5.3 Artefacts

5.3.1 Ceramics

All pottery appears to be post-medieval and of late Georgian/Victorian date with tin/metal glazing, with the exception of the single piece each in 010 and 020 that are salt-glazed stoneware.

5.3.2 Glass

Glass fragments all appear to be post-medieval with the possible exception of a small, oblate hand-made turquoise glass bead that is of possible Roman, or possible recycled medieval origin.

5.3.3 Metalwork

5 metal artefacts were recovered, all iron, and in a state of corrosion defying identification or dating with the resources available to the project team.

5.3.4 Brick, tile and slate

Fragments of all 3 materials were recovered, all believed to be post medieval.

5.3.5 Lithics

A lithic point of likely Palaeolithic origin, a possible arrow head blank and flakes of likely Mesolithic origin, a possible microlith a possible scraper and cores were recovered. See Section 6.2 for a detailed account.

5.3.6 Coal/charcoal

6 fragments of coal and charcoal were recovered. All considered to be post medieval.

5.3.7 Shell

1 badly eroded shell of indeterminate identity.

6.0 REPORTS

6.1 Ecology. David A Rogers

The ecology of the excavation site was simple and uncomplex. We were told by staff at the school, some of whom had been pupils of the school when they were children decades previously, that prior to the building of the school in the 1960s the site was ploughed farmland that was farmed for crops, including brassicas. This information is consistent with what was seen of the soil layers and type during the dig. The top layer was of humus rich soil of approximately 10cm in depth topped by turf of rough grasses (layer 000), the species of which could not easily be identified because it was routinely mown because it was part of the school playing field and there were therefore no seed heads to help identify species. Because it was November, the grasses and other plants in the turf were not in flower. A pre-dig inspection only identified one other plant species growing in the turf. This was clover, probably common white clover, but no flowers were seen to confirm this identification.

Being Autumn, the surface turf layer was covered in fallen leaves from trees growing on the boundary of the school site. Pupils collected the leaves on the top of the 7sq metre excavation trench site before the dig began. 570 leaves were found from nine different species of tree. Many of the leaves were in poor condition making the species of tree from which they came hard to identify, though some could clearly be identified as coming from stands of Grey Poplar and Hornbeam near the dig site. These leaves provided and abundant food source for earthworms which were found to be numerous in the top humus rich soil. Pupils of the school counted earthworm numbers from seven turf samples. The average earthworm density per square metre was 364, which is at the higher end of UK soil earthworm population densities, showing that the site was an excellent earthworm habitat. This explains the humus rich top 10cm turf layer of the site. It is consistent with the build-up of a rich soil principally from earthworm and microorganism activity in the sixty years since the site stopped being ploughed farmland. No chemical fertilizers or weedkillers are used on the school playing field, which also benefits earthworm and microorganism populations. The top layer was also richly penetrated by grass roots. Black and red ants nests were also found in the top turf layer and a small number of small (1.2mm) white insect larva and a few black beetles. Microscopic examination of soil samples and agar plate cultures showed fungal, bacterial and single celled motile protozoans present in the soil.

The second layer below the turf (layer 020, parsing layer 010) was a mix of sandy soil and small flinty stones. This was devoid of macro flora and fauna, save for some deep penetrating grass roots. Microscopic examination of soil and agar plate cultures showed similar microorganisms as in layer 000, though clearly from the agar plate studies these were at a lower organic density than in layer 000. The nature of this soil layer was consistent with what would be expected for former ploughed farmland.

Layer 030 was an undisturbed natural sandy/clay soil, the dividing line between it and layer 020 being clearly evident by the change in colour and fewer stones than in layer 020. It too was devoid of macro flora and fauna, with very few roots extending down into it. Microscopic examination and agar plate studies showed similar microorganisms as in layers 010 and 020, though again clearly at a lesser density than in layers 010 and 020.

A full pedagogical biology report of what was found during the dig has been prepared as a separate report (See Appendix 6) and sent to Wicor School. It includes action learning points for the dig team and teachers, and pupil learning points explaining the science the pupils learned from participating in the biology and science finds and study that was undertaken during the dig.

6.2 Lithics. Ivan Gray and Sam Griffiths

6.2.1 A point of possible Palaeolithic origin with oxidised orange, brown patina characteristic of a lithic from a gravel terrace. Probably deposited in the area by post glacial outwash.

6.2.2 A grey translucent flake that may be an arrow head blank of possible Mesolithic origin.

6.2.3 A white patinated microlith 'barb' showing retouch.

6.2.4 Debitage/detritus of semi translucent grey flint that suggests evidence of knapping activity in the locality period Mesolithic to Bronze age. Some of this debitage could possibly have been used as microliths but no evidence of retouch on any.

6.2.5 Two flint flakes initially identified as artifacts but on closer examination probably created by plough damage. One a flake with some evidence of retouch but with a substantial area of cortex the other a possible thumbnail scraper with what could be blunting retouch.

6.2.6 Fire Burnt Flint.

> 6.2.6.1 Nine small flint nodules with areas of crazing and ceramic-like glazing associated with heated flint being placed in water (Lawrence and Mudd, 2015). Characteristic of flint associated with prehistoric cooking and often described as pot boilers.
>
> 6.2.6.2 Fourteen small fragments of flint also showing areas of crazing and ceramic-like glazing associated with heated flint from deep within a fire being placed in water and possibly fragmented potboilers shattered by use (Lawrence and Mudd, 2015).

6.2.6.3 Fifteen pieces of burnt flint from deep within a fire some showing glazing, some 'rubified' some extruding a 1mm- 3mm thick red surface material some showing areas of unburnt flint core.

6.2.6.4 One piece of apparently solid red resinous or glass like extrusion.

6.2.6.5 Nine pieces of flint with a chalky white patina some showing orange oxidation circles. One perhaps a partially burnt Mesolithic core, two others possibly discarded flakes, two perhaps broken flakes. Possibly knapping detritus discarded in a fire or flint deliberately placed in a fire to facilitate knapping. (Coles, 2009).

Report section	**Artefact**	**Layer**	**Length (mm)**	**Breadth (mm)**	**Depth (mm)**	**Weight (g)**	**Photo catalogue ID**
6.2.1	0001	010	75.5	35.5	16.5	22	0039/40
6.2.2	0004	020	37	25	6	6	0041/42
6.2.3	0005	020*	23.5	12	5	<=1	0045/46
6.2.4	-	020*	12-39	8-31	2-7.5	32	0047/48
6.2.5a 6.2.5b	- -	020* 020*	53 36	31 26	10 10	17 8	0043/44 0043/4

Table 1. Physical characteristics of lithic artefacts (* = *recovered during sieving*)

6.3 Pedagogy and Curriculum Development. Alison Nash

Expert knowledge about the archaeology, geology and flora and fauna combined with primary teacher expertise led to a bespoke module of learning being written for sixty Year 4 children. Before the children were introduced to the dig, they needed a grounding in archaeology; to know the importance of physical evidence in helping to find out about the past. We also wanted the children to understand that some evidence survives a long time and other evidence does not, which means we never have a complete picture of the past.

The period of time the children needed to understand was the Mesolithic period; that it follows the Palaeolithic and precedes the Neolithic. They would learn that this period is characterised by hunter-gathering, that much of the evidence comes from small, finely worked flint tools known as microliths, and that people relied on seasonal produce moving around to get food. These key facts needed to be embedded to help the children understand the period, and the chronology of the period both in this country and around the world.

Once established, the children's learning moved to the local landscape and that the physical landscape and shape of coastline was different in 6000BC to how it looks today. They started to learn the flora and fauna included different species no longer present today and that the way people lived and survived in this area in 6000BC was very different to how we survive in the area today (see Appendix 4).

The National Curriculum requires that children gain '*A high-quality history education will help pupils gain a coherent knowledge and understanding of Britain's past and that of the wider world. It should inspire pupils' curiosity to know more about the past. Teaching should equip pupils to ask perceptive questions, think critically, weigh evidence, sift arguments, and develop perspective and judgement. History helps pupils to understand the complexity of people's lives, the process of change, the diversity of societies and relationships between different groups, as well as their own identity and the challenges of their time'* and this is exactly what working alongside experts did linked to bespoke sessions in the classroom designed by our teachers and Headteacher.

First, the children learnt about the nature of evidence. They examined rubbish bags and discussed the evidence. We did, of course, make sure that the rubbish bag had a genuine mix of items used regularly in today's world. From looking at these bags of rubbish, the children:

- Considered what evidence tells us and what it does not tell us
- Talked about 'tentative conclusions' and the limitations of evidence.
- Looked at the rubbish bag through the lens of 'survival' – what things are likely to survive and for how long. What is likely to be there in 1000 years?
- Thought about what archaeologists do

Having looked through the rubbish and made tentative conclusions from the last session, the children attempted to reconstruct the life or lives of the person or people who produced the rubbish. Some of the considerations were how many different people produced the rubbish, any clues to gender, age or culture, whether they were rich or poor and the reasons for coming to this conclusion.
A different lens was then given to the children to look through the rubbish again. A tally chart was produced on the different materials in the bag and the quantity. They thought about the rate of decay and what is likely to be left after 1000 years. The rubbish was predominantly plastic and this gave the children the idea of how to understand how 'ages' are named. After discussion, the children felt that the age we are currently living in should be looked back on as 'The Plastic Age'. This could be linked to the Middle Stone Age which is named after the distinctive stone tools and because it comes, in chronological terms, between the Palaeolithic and Neolithic.

Archaeologists, like all scientists, have to be thorough and accurate making careful records. This was an introduction to recording the rubbish precisely, thinking of the questions and considerations above, ready for the dig itself.

The focus on learning was then moved to our location and there was a shift to geography using Google Earth to study our part of the world. Maps of different scales were used to help children identify local topography, and maps were given to be labelled. Thus, they started to build a picture of our area both in geographical and historical terms.

These sessions were completed before the children moved outside to the dig where they worked alongside experts learning how to measure and layout the trench, how to excavate the soil and how to precisely catalogue soil, flora, fauna and any other items found. Tables were set up with microscopes to allow close observation and everything was labelled clearly.

As whole classes could not physically move around the trench at the same time, a carousel of activities was set up being involved in the dig itself, identifying and labelling or completing supportive classroom work. This mix of indoor and outdoor learning kept the children focused and allowed them opportunities to take the learning in a direction of their choosing when they found something of interest. Many of these activities were at the direction of the archaeologists and included identifying and sketching shells that would have been found in this area at the time, matching bones with animals, and close observation of hand axes and learning about how they were made and their uses.

One of the aims of the National Curriculum for primary history states:
‘Understand the methods of historical enquiry, including how evidence is used rigorously to make historical claims, and discern how and why contrasting arguments and interpretations of the past have been constructed History’

As you can see, this was realised admirably through this module of learning and the opportunity to work alongside experts in the field. Children were inspired to take their learning home, to talk to their households and to bring in items of interest showing a level of curiosity and deepening of their own understanding through intrinsic motivation inspired by the experts. This level of understanding would not have happened to this depth or breadth without this level of immersion.

7.0 CONCLUSION AND RECOMMENDATIONS

The purpose of this excavation transcended the goal of purely undertaking an investigation. Following a period of significant disruption to the educational experience of all school age pupils due to the SARS-Cov-2 pandemic, the objectives to achieve a positive outcome for curriculum development and an enriched learning experience and to conduct an excavation that offered the prospect of inspiring Year 4 pupils were, in retrospect, ambitious. That it has demonstrated a scalable and transferable model is considered to be a success and one that the community project is due to repeat at a second Primary School in close proximity to Rainbow Bar. It, and the planned beach survey activity with WPS on the Wicor foreshore in Spring 2020, leaves a legacy that WSP teaching teams can build upon for future cohorts. The extensive ecology report (Section 6.1) stands in its own right as further evidence of the engagement achieved through the RBCRP partner approach. The Teaching team's report (Section 6.3) concludes that the immersive nature of the approach, and hence the rich learning opportunity it afforded, was a valuable contribution to the Year 4 cohort's educational progression.

The archaeology per se was unremarkable with no features of archaeological significance being found; this is consistent with the findings reported in the HER ID: 69932 record. The nature of post-medieval artefacts found points strongly to soil improvement methods depositing organic matter and general detritus, which was then distributed and reduced by plough action. This plough action was shallow, down to the silty sandy clay natural. Based on the find characteristics, it is likely too that there was no post-medieval habitation in close proximity to the site. Whilst the HER record 30888 indicates medieval activity in the locality, none (excepting the possible differential interpretation of the glass bead) was identified by data from the WPS trench. The sole, potentially Roman artefact presence is perhaps explainable by the same process of material importation. The overarching conclusion is that the investigation strongly suggests that the post-medieval to modern land usage prior to WPS occupation of the site was arable, with soil improvement processes, and no habitation. The possible Roman artefact is insufficient on its own to push this specific inference further back in time, although it likely suggests more generally that there was no immediate nearby Roman habitation. The presence of lithics (Section 6.2) is perhaps partly best seen in the bigger context of glacial outwash processes – the Palaeolithic artefacts found may well have been washed down from the higher, raised river terrace with the proximity of the identified Holocene stream in support of this water transport process. Whilst it is unlikely that Palaeolithic manufacture was taking place at this location, the HER record 31022 indicates that Palaeolithic materials are not unlikely in this location. Differentially, the likely Mesolithic artefacts and associated flakes/debitage possibly suggest that transitory manufacture and usage may have been present at the location during that era; this would be consistent with the Wicor Shore Mesolithic finds held at Fareham Westbury Manor Museum. The finding of burnt flint fragments and possible ‘pot boilers’ is not explainable by the current excavation as to whether these are of modern or pre-historic origin, or whether they are of intentional or accidental production. Their presence does however pose a curious and intriguing question which may be worth future, further investigation.

Appendices

Appendix 1 Context List

Context	Description
000	Topsoil – dark brown sandy hummus
010	Mid-brown sandy clayey hummus containing post mediaeval pottery, glass, fragments of tile.
020	Mid-brown sandy clayey hummus containing post mediaeval pottery, glass, fragments of tile, brick and slate, coal, metal and lithics. Chalk pellet inclusion
030	Mid-yellow silty sandy clay – natural.

Appendix 2 Photograph List

ID	**Description** (with personnel id where relevant)	Direction from	Date
0001	Pre-ex location view	N	01/11/2001
0002	Pre-ex location view	E	01/11/2001
0003	Pre-ex location view	S	01/11/2001
0004	Pre-ex location view	W	01/11/2001
0005	Initial sod cut line	W	01/11/2001
0006	Work in progress (IG)	N	01/11/2001
0007	Work in progress IG, DR, LM)	N	01/11/2001
0008	Land drainage cut	E	01/11/2001
0009	Land surface (010)	E	01/11/2001
0010	Land surface (010)	S	01/11/2001
0011	Possible Palaeolithic point	Above	02/11/2021
0012	Possible Palaeolithic point	Above	02/11/2021
0013	Possible Palaeolithic scrapper	Above	02/11/2021
0014	Possible Palaeolithic scrapper	Above	02/11/2021
0015	N end of trench, surface 030	E	04/11/2021
0016	Discounted Flint core detail, interface 020/030	Above	04/11/2021
0017	N end of trench, surface 030	W	04/11/2021
0018	Work in progress	N	04/11/2021
0019	Sieving station	S	04/11/2021
0020	Sieving finds table (IG)	S	04/11/2021
0021	Biology tent with microscope setup (DR)	S	04/11/2021
0022	Main trench cleaned down to 030	S	04/11/2021
0023	Main trench cleaned down to 030	S	04/11/2021

0024	N end of trench	S	04/11/2021
0025	Trench	N	04/11/2021
0026	S end of trench	N	04/11/2021
0027	Trench	W	04/11/2021
0028	Trench	E	04/11/2021
0029	Detail of 030, surface at interface with 020	Above	04/11/2021
0030	010 – ceramic fragments	Above	19/12/2021
0031	010 - glass fragments	Above	19/12/2021
0032	010 - pipe stem	Above	19/12/2021
0033	020 - ceramic fragments	Above	19/12/2021
0034	020 – glass fragments	Above	19/12/2021
0035	020 – pipe stem	Above	19/12/2021
0036	020 – glass bead	Above	19/12/2021
0037	020 – metal objects	Above	19/12/2021
0038	Chalk pellet examples	Above	03/02/2022
0039	Possible Palaeolithic point	Above	07/02/2022
0040	Possible Palaeolithic point - reverse	Above	07/02/2022
0041	Possible Mesolithic arrow blank	Above	07/02/2022
0042	Possible Mesolithic arrow blank - reverse	Above	07/02/2022
0043	Two flint flakes of probable plough damage	Above	07/02/2022
0044	Two flint flakes of probable plough damage - reverse	Above	07/02/2022
0045	Microlith ‘barb’	Above	07/02/2022
0046	Microlith ‘barb’ - reverse	Above	07/02/2022
0047	Debitage	Above	07/02/2022
0048	Debitage - reverse	Above	07/02/2022
0049	Possible ‘Pot boilers’	Above	07/02/2022
0050	Fire crazed flint fragments	Above	07/02/2022
0051	Burnt flint	Above	07/02/2022
0052	Red resinous/glass-like extrusion	Above	07/02/2022
0053	Patinated flint	Above	07/02/2022

Appendix 3 Artefact List

Context	Description
000	1 white plastic-coated paper clip
010	9 ceramic fragments 1 glass fragments 1 pipe stem fragments 16 Brick and tile fragments Possible Palaeolithic point Possible Palaeolithic scrapper
020	Possible Roman/recycled medieval small oblate glass bead 20 ceramic fragments 7 glass fragments 2 pipe stem fragments 35 Brick, tile and slate fragments 5 metal artefacts Possible Mesolithic arrow blank + flakes Possible Microlith 'barb' Pot boilers and debitage 6 coal/charcoal fragments 6 chalk pellet-like fragments
030	Nil

Appendix 4 Wicor in the Mesolithic – Curriculum content materials

<u>Wicor 6,000 BC</u>

Imagining and recreating life at Wicor in the Mesolithic or middle stone age – The story of the Wicor Valley tribe.

In the last four thousand years the ice has retreated so the land has become habitable again and the trees and the plants and animals have gradually returned.
Our ancestors have been able to travel here up the Channel River and the Solent River and settled somewhere in what is now modern Wicor.
They lived by hunting and gathering and may have planted out small 'gardens' with the first domestic cereals.
Wicor as a place name is probably Anglo Saxon and means a dwelling or place where there was a lot of trade, industrial and artisan work activity. This has been the case right up to the present day. So what dwellings, trade and what work activity would there have been here in the Mesolithic?
We will build together the story of the 'Wicor Valley Tribe' and its village, based on the archaeology, geology, geography, and ecology.

<u>Links to the Curriculum.</u>
A local multidisciplinary study encompassing geography, environmental science, science, history, PE, art, and music.

<u>Questions.</u>

Where did the first people come from? How did they travel here?
What did the landscape look like then? How has it changed?
What was the climate like?
What was the flora and fauna? i.e., what were the plants and animals living here? Would a soil section then be different from the one we made?
How did people live? How did they feed and clothe themselves, protect themselves from the weather and keep warm?
How many of them were there? Where was their nearest neighbours?
What was their relationship like with their neighbours?
How did you find a partner and start a family?
How did they communicate?
How did they travel?
What if you were sick?
What did they believe in?
How did they make their tools for foraging and hunting?
What was it like being a child in the Mesolithic?
How did you learn the skills you needed to live?
Did they do PE and play games? How did they grow strong and healthy? What skills did they need to forage and hunt?
Did they have music and sing? What instruments did they play? Did they paint or draw?
What did they think when they looked up at the moon, the planets and the stars. Did they have stories about how the world was made, about heroes and heroines of the tribe? How did they relate to the wild creatures around them and the plants they ate? What did they think was under the ground? Where did they think springs and rivers came from?
What happened when they died?

How do we know all this, what are we certain of and what are we guessing at?
What modern native peoples can we learn from to understand how they lived?
Was it better to live in the Mesolithic compared with now?
Describe a family now and how we live and compare it with a family 8,000 years ago.

Why did the sea- level rise? How will this have affected the Wicor Tribe?

Possible Activities.
Model of the landscape.
Map of Wicor village then and now.
Make a model of Wicor Mesolithic village in its landscape.
Draw a picture of Wicor village and the people who lived here.
Lay out a timeline on the field. Work out how many generations since the Mesolithic.
Draw a map locating Wicor on the Solent River.
Draw a map showing how farming spread from the Near East to France and then up the Solent River to Wicor. How did the Wicor tribe start farming? Did they welcome it or prefer hunting and foraging?
Field walk and excavation on Wicor shore looking for flint nodules and Mesolithic stone tools.
Foraging nearby, what is there to eat now? What would there have been then?
Lighting a fire using pyrites and flint or a fire- drill.
Preparing food and cooking in the Mesolithic.
Belief and ritual in the Mesolithic – doing a hunting dance/ ceremony or shamanic ritual.
Building a Mesolithic hut and thatching it.

Finding flint and knapping.
Making tools and using them e.g., bow and arrow, sling shot, bull- roarer, sickle, digging stick, harpoon, knife, needle and thread, basket, fish trap.
Can you cut down a tree with a tranchet axe?
Draw a plan for making a canoe and a paddle.
Making a cloak and hat.
Making a pendant or necklace with stones and shells from the beach. What will you draw on the pendant and why?
Imagine you are living in the Mesolithic, write a story about a typical day for your family and what you might do and compare it with a day for your family now.

Buying in expertise and trips.
If we can find the money, we could get a knapper in to lead a workshop, buy a Mesolithic tool kit instead of making one, get help with building a hut and get in a basket weaver or cook. Trips out to visit technology centres and their huts would also be good options. Maybe the Butser Hill staff would help us with a hut or perhaps the staff at the Weald and Downland Museum?

These are good resources.

https://ancienttechnologycentre.com/
https://www.will-lord.co.uk/
https://www.primitive-technology.co.uk/shop/flintknapping-workshop-full-day/

Useful links

Historical Association. Good material you can access and use as a member and guidance on teaching the stone age.
https://www.history.org.uk/primary/resource/9539/rethinking-the-stone-age-to-bronze-age

Star Carr
We can build the entire Wicor project around this, relocating the Star Carr settlement on the Wicor stream and the Solent River and adjusting for landscape, climate, flora and fauna etc.

A good summary of the finds and the Star Carr site is here.
https://archaeology.co.uk/articles/return-to-star-carr-discovering-the-true-size-of-a-mesolithic-settlement.htm
Link below is the main site where there is loads of material for schools and a free Future Learn course which is well worth doing for an intro to the Mesolithic. There are short videos on the course on knapping and lighting fires in the Mesolithic and the questions they ask we can borrow and ask the children.
They even have a series of stories for children we can readily adapt.
http://www.starcarr.com/
Their red deer frontlets for use in ritual or hunting are great and the design of the hut they found there is the same as ‘Howick House’, the Mesolithic hut they found in Northumberland. They have also found a shale pendant with an enigmatic design etched on it.

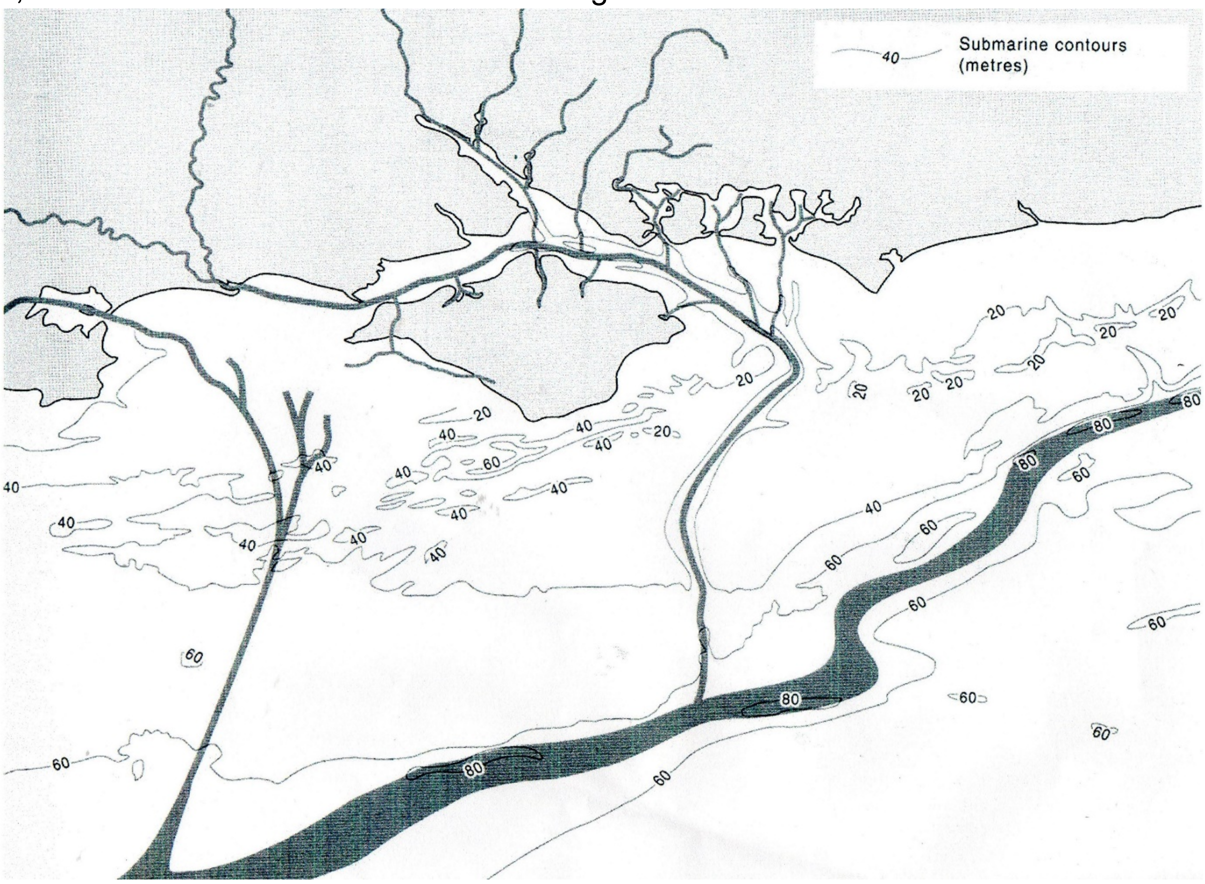
Bouldnor Cliff
This is an important site on the Solent we can also borrow from.
https://archaeology.co.uk/articles/news/mesolithic-maritime-discovery-at-bouldnor-cliff.htm
Crucially they have found seed corn here which makes a case for the first farmers and farming coming into Britain up the Solent River. People were making planks on the Bouldnor Cliff site for huts or boats, and they have found a wooden platform there that could have been for a hut or provided somewhere to tie up your canoe and is similar to the platform found at Star Carr.

Location and landscape

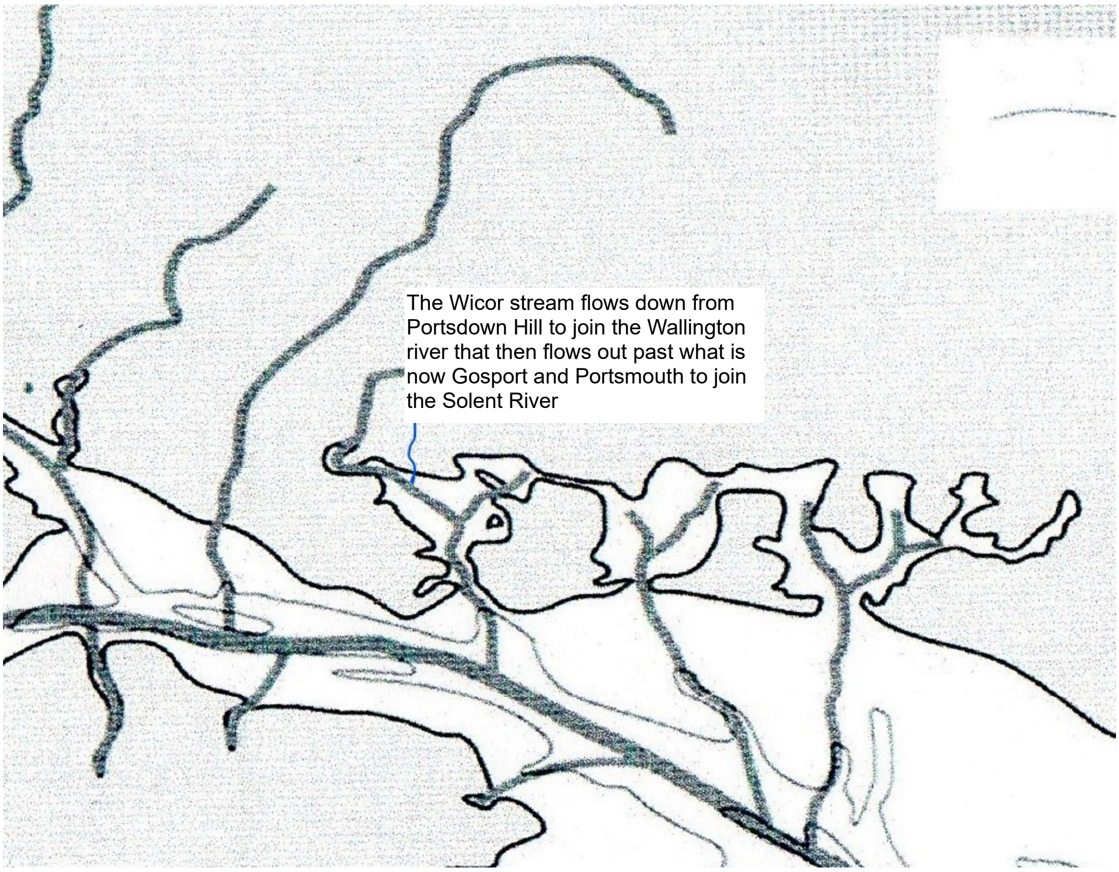
The Solent River when the last ice cap retreated 12,000 BC.

The sea level was much lower, possibly 11 metres, and all of the Solent and Portsmouth Harbour and the English Channel would have been dry land. The old river beds are preserved as the deep-water shipping channels, so we know where they were. The Isle of Wight will still have been joined to Dorset so the Solent River valley and its plain will have been sheltered from the South Westerly winds and provided a rich and fruitful habitat.

The sea level rose as the ice cap melted and the removal of the weight of the ice over Scotland meant the country pivoted and the land sank in the south. This lowering, combined with the rising sea -levels caused an inundation and flooding of the Solent circa 6, 500 BC/ BPE when the sea broke through near the Needles.



The Wicor stream in relation to the Solent and Channel rivers


The Wicor stream flows down from Portsdown Hill to join the Wallington river that then flows out past what is now Gosport and Portsmouth to join the Solent River

Appendix 5 Toolkit equipment recommendations

Equipment Item	Number	Comment
4”pointing/archaeology trowels	4	Drop-forged trowels for durability
Spades	3	(2x small blade spades suitable for Year 4 use)
Mattock	1	
Buckets	2	
Wheel barrow	1	
Sieves with 25mm/1” mesh	2	
Hand shovels	2	
Measuring tapes	3	2x20m tape measures 1x 5m metal tape measure
6” nails	12	
Polyethylene string	50m	Hi-visibility preferred to reduce trip hazard
Compass	1	
Large Plastic Sheet	1	(NB If spoil cannot be put directly onto surface)
Camera	1	
Range pole	1	
Clipboard	1	
Pens, pencils and erasers	-	
Recording paperwork	-	e.g https://leicsfieldworkers.files.wordpress.com/2021/03/test-pit-record-formv3.pdf (free) or https://pasthorizons.com/collections/drafting-film-notebooks-record-sheets/products/record-cards-starter-pack
Gardening gloves		
Hand cleanser		

Appendix 6

Wicor Primary School, Porchester, Hampshire

Biology
project report
of investigations in
support of the archaeological dig
1-4 November 2021

David Rodgers
Project biologist

Introduction

1.1 The Rainbow Bar is a shingle bar projecting from the Meon Shore, Hill Head, Fareham Hampshire that is exposed for about 350 metres at low spring tides which is an abundant source of lithics (stone tools, flint cores and flint flakes). This indicates that the Rainbow Bar was a stone tool making site, probably because of the abundance of flint as a raw flint material on the Rainbow Bar. The Rainbow Bar project team is a group of local volunteers interested in developing the understanding of, and interest in, human pre-history evidenced by the stone tool artifacts found on and in the vicinity of the Rainbow Bar.

1.2 The archaeological dig at Wicor Primary School was undertaken as an experimental extension of a Rainbow Bar Lithics Society funded project to support the study of the Stone Age by year 4 pupils at the school. Wicor school was chosen because it is an area where lithics are known to be present on the seashore in the vicinity of the school and is close to a stream that may have carried lithics from the stone axe factory site, Red Carr, on the chalk escarpment to the North of school. The assistant headteacher who is head of curriculum development for the school, Mrs Alison Nash, also lives in Hill Head and had previously shown interest in the Rainbow Bar project. Mrs Nash participated as an interviewee in a video made by the Rainbow Bar Project Team for the 2021 annual conference of the Lithic Society. She explained how information about human pre-history from the Rainbow Bar project could be used to help primary school children study the Stone Age.

1.3 The dig at Wicor School was undertaken over four days 1 – 4 November 2021. The dig team were:

- Ivan Gray, Rainbow Bar Project Leader,
- Paul Ramsay, archaeological dig , and
- David Rodgers, project support biologist.

1.4 The dig team records its thanks to all the pupils and staff at Wicor Primary School who worked with the project team on the dig, organised the participation of pupils and provided excellent support for our investigations, in particular:

- Mr Mark Wildman, headteacher who gave permission for the dig,
- Mrs Alison Nash, assistant headteacher for quality teaching and pedagogy, key project contact at the school,
- Ms Tamzin Napier, class teacher year 4N,
- Ms Phoebe Cole, class teacher year 4C,
- Ms Louise Moreton, environmental learning assistant.

1.5 The excavation was an action research project by the Rainbow Bar project team to develop learning resources and methods that will be useful to other primary school pupils in studying the Stone Age. This report is a report on the biological investigations that accompanied the Wicor School excavation. What we learned from these accompanying biological investigations that are relevant to how such investigations can help learning in schools are flagged ***in bold italics*** as Action Research learning points ***(ARPS).***

1.6 A biology study protocol was prepared prior to the excavation and study. It included a risk analysis. A copy of this pre-dig protocol and risk analysis for the biological investigations undertaken to support the excavation is attached as appendix 1.

1.7 The pupils came out to help with the dig and associated biological investigation in groups of six or seven for approximately thirty minutes on each of several occasions over the four days. This rotation of groups of pupils was organised by class 4 teachers to ensure that all pupils experienced all aspects of the process of the archaeological excavation and associated biology. As will be seen by comparing this report with the pre-dig biological protocol, some of the planned activities for the pupils set out in the pre-dig protocol were not undertaken because they proved impractical through want of time. For example, it was not possible for pupils to draw specimens found, though this could become a classroom activity if appropriate.

ARLP:

- ***Discuss and agree process of pupil engagement in advance with the teaching team and design activities accordingly. Design a variety of appropriate activities, but do not be too ambitious.***

1.8 Anticipated learning points for the pupils were set out in the pre-excavation protocol. Some of these were achieved, some were not and some additional learning points that were unexpected were also found. These are also reported ***in bold italics*** in the text of this report as Pupil Learning Points ***(PLPs).***

1.9 In discussing the biological investigations associated with the excavation a joint discovery rather than a direct didactic approach was taken to encourage maximum pupil participation. When a biological specimen was examined or an issue relating to it discussed, pupils were encouraged to think about the specimen or issue and to suggest what it might be or how it might be explained scientifically. All pupils who attempted to answer were praised for their attempt, even where not correct, and where necessary additional questions asked to lead them in the direction of an appropriate answer or suggestion.

ARLP:

- ***this joint discovery approach worked well and encouraged enthusiastic participation by pupils.***

2 Excavation site and pre excavation inspection

2.1 The excavation site was a three metre by two metre (six square metre) plot on the school playing field aligned North/South on the West side of the school playing field. A map showing the location an details of associated geology and topography is provided in the principle archaeological report of the dig.

2.2 A biological pre-inspection of the site before the start of the dig was undertaken to ensure that there was no evidence of endangered or rare species such as slowworms that are known to inhabit the school grounds or ground nesting bumble bees that would be harmed by the excavation. The site was open grassland that was occasionally mowed during the growing season. No evidence of any endangered or rare species was found at the pre-inspection and none were discovered during the dig. The surface flora was rough grass with some clover. No other plant species were found. The grass species could not be easily identified because it had been mowed and there were no seed heads. The clover was not in flower, but had distinct trefoil leaves with white markings which identifies it as common white clover. Being autumn, the turf surface was covered with fallen leaves from trees on and around the boundary of the site.

2.3 The following sections explain the biological investigations and results that helped in the understanding of the archaeological human history of the site and its current ecology.

3. Study number 1: leaf density and type on the turf surface.

3.1 This study of leaf density and type on the surface of the excavation site was not planned as part of the pre-project protocol. It was undertaken because it was clear that the first two groups of pupils to come to participate would otherwise have little to do.
ARLP3:

- ***Be flexible and prepared to change plans and add additional activities where needed and appropriate.***

3.2 After the excavation site was marked out (see process in the archaeological report) the first group of pupils were tasked with collecting all the leaves present on the turf surface of the site (layer 000) prior to the start of turf removal. The leaves collected were placed in a seed tray. The pupils were then tasked with counting the leaves collected. This was done by each pupil counting ten leaves and placing them in a second tray while I logged the number of groups of ten leaves counted. In total 570 leaves and 1 winged seed (specimen 2) were counted.

3.3 The pupils were shown the winged seed and asked what they thought it was. The round seedballs on the end of the winged seed was pointed out (see photograph below)

3.4 The seed was a seed from a Lime tree. This led to a discussion with pupils about the production of seeds and nuts by trees and the mechanisms trees have evolved for their dispersal; wind (e.g. Limes and Sycamores) animals and birds–(acorns from oaks, hazels and other nut bearing trees) and sheer volumes of smaller seeds that increases the chance of seeds landing on suitable site and producing the next generation of trees (e.g. Pines and Beech trees).

PLP:

- ***Trees produce seeds, nuts are tree seeds, and different tree seed dispersal mechanisms.***

3.5 Pupils were asked about the function of leaves on trees and their role in capturing energy from the Sun. When the Sun was shining, as it was during the discussion with some groups of pupils, getting the children to hold up their hands towards the Sun and feel the Sun's warmth was a practical way of feeling the energy emitted by the Sun which, through photosynthesis in the green chlorophyll in the leaf, the leaves could capture to enable the tree to bond carbon dioxide (taken in through the stomata) with water and nutrients from the soil to create complex sugars to enable the tree to grow and produce wood. One pupil was able to explain photosynthesis and clearly understood the nature of the carbon dioxide+water+nutrients+energy from the Sun = complex sugars+oxygen, the photosynthesis chemical pathway, an unusual level of knowledge and understanding for a child in year.

PLP:

- ***the function of leaves and the process of sunlight capture by the leaves and production of sugars through photosynthesis.***

3.6 Why the leaves of some trees – the broadleaved trees -turn golden, red or brown and fall from the trees in autumn before winter was also discussed. Pupils make insightful suggestions; colder weather in winter and less sunlight and shorter days for photosynthesis. The function of leaves in enabling trees to get rid of waste products was also discussed (the idea of trees not be able to walk to a lavatory stimulated some interest and amusement in this aspect of autumn leaf fall).

3.7 The collection of leaves from the excavation site surface was explained to the next group of seven pupils. They were asked what the most significant distinguishing feature of the leaves were and agreed that it was their shape. This led to a discussion of how shape could help identify which type of tree the leaves came from. The children were then each asked to select 10 leaves each and sort them according to their shape and sort them into piles. Nine piles of leaves were sorted by their shape as shown in the photograph below:

PLP:

- ***Leaf shape is a key characteristic to use in identifying trees.***

3.8 Because of lack of time and the fact that the leaves had fallen from trees and were not pristine examples of leaf type, it was not possible to identify all the tree types from which the trees had come. It was, however, possible to see that the most common leaf type had come from a stand of grey poplar trees and a new planation of hornbeams close to the excavation site.

3.9 Whilst examining the turf samples, a black beetle was also found (specimen 4 photo below). It led to a discussion with the children of what it was and what its distinct features were, enabling them to come to the conclusion that it was an insect because it had distinct segments (head, thorax and abdomen) and six legs. It was clearly agitated at being discovered and therefore kept for a short time in a petri dish, photographed and then released. This helped to reinforce the principle of respect for other forms of life.

PLPs:

- ***The taxonomic key characteristics of insects and how to identify them.***
- ***Respect for other living creatures by recognising that the beetle was trying to escape and releasing it.***

4. Study no. 2: counting earthworms and other invertebrates in the turf layer

4.1 As can be seen from the pre-dig protocol in appendix 1, the original intention was simply to investigate the turf layer for evidence of earthworms and other invertebrates to see what animals could be identified as living in the turf layer. Two factors on site altered this plan. Firstly, the removal of the turf took longer than anticipated which meant that groups of pupils would have had nothing to do during their half hour visit to the site during the turf layer removal that to watch the turf being removed. Secondly, as the turf began to be removed it became clear that there was a significant population of earthworms in the turf and it would be a useful exercise to count their numbers. From the perspective of the archaeological dig the earthworm population in the turf layer would help to understand the origin of this top 10cm level of the excavation site, which visual inspection showed to be darker and therefore to have more organic matter in it than the lighter coloured layers immediately below it (layers 010, 020) which appeared to be the surface and subsoil of the land when it was farmed, was much sandier with less humus and where no earthworms were found.

4.2 The important role of earthworms in eating leaves and taking leaves and other plant matter on the surface down into in their burrows and how this helped fertilise the soil was discussed with each group of pupils. How the earthworms then came to the surface and deposited soil and their excrement (worm poo) on the surface in worm cast was also discussed and explained and how this helped to build-up the soil level. Paul, the archaeological dig director used worm activity to explain one of the principal mechanisms by which the surface level of the site would have been built-up over time and why any Stone Age or Roman remains might well be up to a metre or more below the current surface level. He explained that was why archaeologists were always digging up sites like ours to find evidence of past human activity.

PLPs:

- ***The role of earthworms in consuming leaves and other vegetable matter falling on the turf and adding humus to the soil to improve soil health and fertility.***
- ***How earthworm casts (earthworm poo) is one of the mechanisms that builds up the level of the land surface.***
- ***Why archaeologists are always to be found excavating sites to discover human history and look for stone age tools and other evidence of past human history.***

4.3 Seven groups of pupils selected a turf sample in which to look for and count the number of earthworms in the turf. The turf samples (layer 000) varied in length and width, but all were approximately 10cm thick. Interestingly, as the dig progressed down through layers 020 and 030, no further earthworms were found inhabiting layers 010, 020 and 030, the only earthworms found were two large worms that had crawled onto layer 020 from the grass surrounding the dig site. The last three turf samples selected were of a smaller size because of insufficient time to example larger samples. The sizes of the samples examined are shown in the table of results on page x.

Turf sample for earthworm count.

4.4 Before examining the turf samples and extracting earthworms, the pupils were asked if any had cuts or skin problems that might become infected by soil bacteria and fungi. Some pupils had minor skin scratches but no open cuts or rashes that could become infected. The importance of washing hands well with soap and water after this earthworm investigation because of bacteria and other microorganisms living in the soil was explained.

ARP:

- ***The pre-project biology protocol identified cuts and other skin problems as a key risk in examining samples. This needs constantly to be borne in mind when working with children.***

PLPs:

- ***That micro-organisms that cannot be seen with the naked eye live in soil, some of which may be harmful.***
- ***The importance of washing hands with soap and water after handling soil or invertebrates found in soil.***

4.5 After turning the turf samples over so that the grass was underneath, the pupils were shown how to break-up the turf soil and gently extract the earthworms. The need to do this carefully in order not to injure the earthworms was demonstrated. The earthworms extracted were placed in a plastic container for later counting. No earthworms were harmed during this process.

PLPs:

- ***Respect for other living creatures and how to handle them carefully and not harm them.***
- ***How to carry out a scientific study methodically and carefully to gather statistical data.***

4.5 Initially some pupils were nervous about getting their hands dirty breaking up the turf and handling live earthworms, which some had never touched before. After seeing others participate, all the pupils who were nervous overcame their hesitancy and, after counting, there was not a single pupil who did not take a handful of worms to release into the vegetable garden. All earthworms were released unharmed onto the soil in the school’s vegetable garden.

PLPs:

- ***What earthworms feel like, cold blooded and wriggly, but not slimy.***
- ***That handling earthworms will not harm the handler.***
- ***Science and scientific investigation can be fun!***

4.6 The earthworms found varied in size from approximately 30mm long to 80mm. Some were evidently young juvenile worms and this led to a discussion of how worms reproduce. I explained that, like many animals, earthworms reproduce by laying tiny eggs that could not be seen other than with a microscope. I did not explain that earthworms are hermaphrodites because I considered that would not be an appropriate detail of the different ways living organisms reproduce for year 4 pupils. It might, however, be appropriate for older children in the context of teaching the biology of sexual reproduction.

ARP:

- ***Questions about how living organisms reproduce will almost inevitably arise when children are curious and ask questions. It would be helpful to discuss and agree with teaching staff the level of knowledge and detail about sexual reproduction that is appropriate for the age of children engaged with a project.***

4.7 There are in the order of thirty earthworm species in the UK, species that are difficult or identify because of the need to consider the detail of their taxonomic characteristics, which is too complex an exercise for year 4 pupils. Because of this and the desire not to retain any specimens but release them unharmed, the species of earthworm found were not identified. There appeared to be two dominant species, one of reddish brown colour shown in the photograph below and a second that had a lighter pink colouration shown in the subsequent photograph.

4.7 Time did not permit most of the turf samples to be fully broken up and all earthworms extracted. At the end of each session, the worms were counted and with guidance the pupils asked to estimate the percentage of the turf sample they had succeeded in breaking and extracting the earthworms from. This ranged from 65% of the sample to 100% for two samples.

4.8 The table on the following page shows the measurements of each turf sample, the percentage examined, the turf area, the number of earthworms found in each sample and the number of earthworms per square metre of turf that can be calculated from the data. The data is remarkably consistent showing an average of 364 earthworms per square metre. If the two outlier samples are excluded from the calculation the average becomes 365 per square metre.

4.9 However the fact that an estimate needed to be made of the percentage of the turf sample examined introduces a possible error into the calculation of earthworm numbers per square metre. The two samples where 100% of the turf was examined produced the two outlier samples with the highest and lowest earthworm count produces a density figure of 338 worms per square metre, This gives a maximum margin of error of 7.6% in comparison with the overall average of all seven samples. The result is therefore valid and reasonably reliable given the limitations of the exercise.

4.10 These results are at the upper end of results in the Natural History Museum's citizen science earthworm count which found an average of 222 earthworms per square metre, with higher numbers on grassland rich in humus from falling leaves and other sources. (see Earthworm Watch | Natural History Museum (nhm.ac.uk) . The absence of earthworms in the sandy layers 010, 020 and 030 is consistent with these Earthworm Watch results and enabled the archaeology dig director to conclude that the top 10cm humus rich layer was soil built-up since the construction of the school sixty years previously.

PLP:

- ***The use of data obtained to make calculations of averages (in this case, the number of earthworms per square metre).***

- ***Biological study of archaeological sites can help to understand the history of the site.***

4.11 Having calculated these earthworm densities the school was set the task of calculating the size of the school's playing field and working out how many earthworms were living in the turf layer of the field. Sample pits showed that other parts of the playing field had similar geology and history as the excavation site. The result will be a staggering number!

ARLP:

- ***Most of the PLPs identified as a result of this investigation were not anticipated prior to the excavation and are being explained in this report post project. In future project excavations it would be useful to agree a simple immediate reporting process to enable PLPs identified during the excavation and associated biology investigation to be immediately reported to teaching staff. This would enable whole class follow-up of interesting findings, if teachers consider it appropriate.***

Wicor Primary School Archaeological excavation 1-3 Novem				
Earthworm number analysis in surface turf layer				
Specimen ref. number	Turf sample measurement length in cm	Turf sample measurement width in cm	Turf sample area square cm	Tr %
5	60	20	1200	
9	60	20	1200	
10	70	27	1890	
11	55	25	1375	
13	34	27	918	
14	29	26.5	769	

5. Other invertebrates found in the turf layer

5.1 During the excavation three other invertebrates were found living in the turf layer.

5.2. A nest of common red ants (sp. Myrmica ruba) was found. When disturbed by the excavation work the ants were seen immediately to begin picking up the eggs in their nest and to carry their eggs to safety.

PLP:

- ***The social behaviour of ants and their immediate actions to protect their colony and eggs.***
- ***Like bees, ants have a queen that is the only fertile female egg layer in the colony and the workers collecting the eggs are all sterile females like worker honey bees in the school's beehives.***
- ***Red ants can give a surprisingly painful sting when a nest is disturbed, so care needs to be taken when they are found.***

5.3 Three insect larvae approximately 1.5mm long were also found in the turf layer 010 (see photograph below). Insect species are notoriously difficult to identify in the larval stage of their life cycle, so their species could not be identified. They were released back into the soil.

PLP:

- ***Insect larvae also can live in the soil until they change into adult insects when they emerge.***

5.4 A nest of common black garden ants was also disturbed by the excavation.

PLPs:

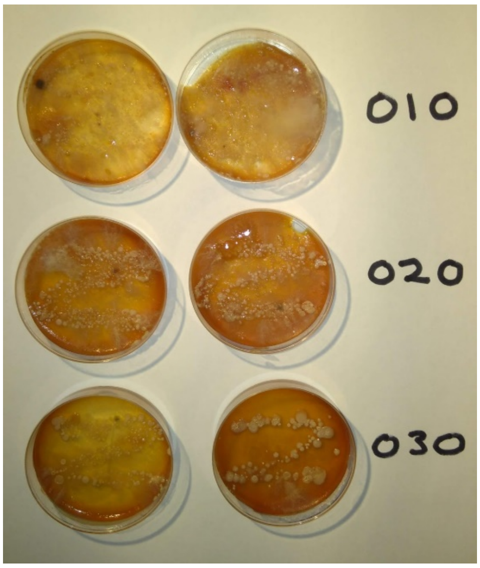
- ***Black ants (sp.Lasius niger) is the most common black ant found in gardens.***
- ***Unlike red ants they do not sting and do not bite.***
- ***Like all ants, there is one fertile egg laying Queen ant and the workers are all sterile females (like red ants and honey bees).***

- ***Flying ants, seen leaving their nests and flying away on warm summer days when it is likely to rain, are new queens flying to try to form a new colony. (The Queens are on their nuptial flight and their wings fall off when they eventually land on the ground – this latter detail was not explained through lack of time, but could be explained in a follow-up lesson).***
- ***(Another detail not explained but which could be explained in a follow-up lesson is that black ants are 'farmers'. They farm aphids by collecting aphid eggs, store them over winter and after they pupate and become adults next Spring, carry them up suitable succulent plants like beans and roses. The aphids attach to the plants with their sharp proboscis to suck sap. The ants then stimulate them with their antennae to excrete the sugary sap which forms honeydew which the ants collect. This provides the ants with an energy rich food. This is an example of the evolution of mutually beneficial adaptive behaviour between species: the aphids benefit by having their eggs protected and young adults placed on suitable food source plant, and the ants benefit by obtaining sugar, a calorie rich carbohydrate that they would not otherwise obtain. If you see black ants climbing up the young runner bean or broad bean plants in the school's vegetable garden in Spring beware, the beans will soon be infested with blackfly! For more information about ants, the original evolutionary farmers see:*** Ants Farming Aphids & What to do About It - Real Self-Sufficiency (realselfsufficiency.com).

6. Post excavation investigation

6.1 As stated in the pre-excavation protocol, it had originally been planned to study soil micro-organisms by inoculating sterile agar gel in petri dishes with soil samples for the different soil layers uncovered during the dig. This proved impractical for three reasons: lack of time, lack of facilities for sterile bio-secure transfer of samples, and the such investigation being clearly inappropriate for year 4 pupils. The investigation was therefore carried out after the dig was completed using soil samples taken from the excavation site.

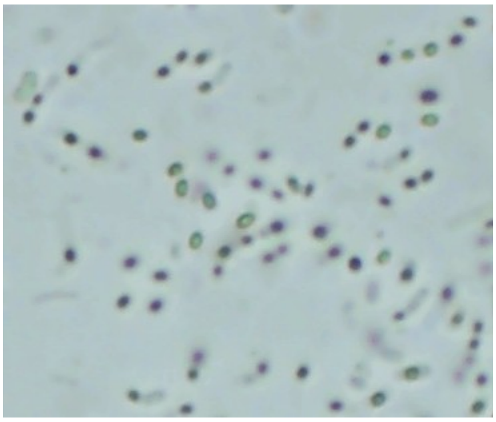
6.2 Six sterile petri dishes with a nutrient agar gel (agar plates) were inoculated with soil samples; two samples from each of the layers 010, 020 and 030. A sterile cotton bud was used to inoculate the agar gel in a 'Z' pattern on the agar plates to help distinguish micro-organisms grown from the soil samples from any stray contamination. The agar plates were then left for seven days to give time for colonies of micro-organisms to grow. Micro-organisms grew on all six agar plates with the Z inoculation pattern clearly visible. This confirms that the colonies of micro-organisms were from the three soil layers. The following photograph shows the agar plates and colonies grown from the three soil layers:



6.3 Fungal hyphae and colonies of micro-organisms grew more densely in the turf layer 000 than in either 010/020 or 030, with less fungal hyphae growth in layer 020 than in 010, with fungal hyphae being significantly less in layer 030. This is consistent with their being more humus and organic matter as a food source for micro-organisms in layer 000 that either of the other two layers and humus being virtually non-existent in layer 030. These findings help to confirm the stratification layers seen at the excavation site.

6.4 The micro-organisms were examined under a microscope using 2,500x magnification. Fungi hyphal strands from 000 were clearly visible, as shown in the following photographs:

6.5 The other micro-organisms from layer 000 were colonies of single celled organisms, some of which could be observed moving. These were probably motile ciliates (that move using hair like cilia on the outer surface of the their single cell membranes). As can be seen from the photograph below, some also had green colouration. The most likely explanation for this is that they are archaebacteria that photosynthesise, the green colouration being from chlorophyl. However, it is possible that these organisms multiplied when exposed to light during their cultivation on the agar plates and further detailed study would be necessary to confirm what they are.



ARP: ***Study of soil micro-organisms is too advanced for primary school children but could be part of an expended study for secondary school pupils.***

David Rodgers
December 2021

Appendix 1: pre-dig protocol for Biological and geological specimen sampling

Wicor Primary School: archaeological site excavation 1-5 Nov 2021 biology and geology specimen sampling protocol

1. This protocol sets put the process by which biological and geological specimens and samples obtained during the excavation of the Lithic exploratory trench at Wicor Primary School during the week of 1-5 Nov 2021 will be examined, recorded, photographed and processed.

2. **Pre-excavation site examination:** before marking-up for the excavation site it will be examined for evidence of any endangered or protected species such as slow worms, bumblebee nests, and rare plants such as orchids. A pre-visit examination of the site indicated that finding protected species is unlikely, but this pre-excavation examination will take place to seek to confirm this. If a protected species is found it will be moved to a new suitable habitat and/or protected from disturbance. If necessary, consideration will be given to changing the planned excavation site.

3. **General:** All animals such as earthworms, insects, insect larva, slugs etc that are macroscopic will be handled with care and every attempt made to ensure that they are not harmed and are released after examination. All specimens will be examined in a petri dish, photographed and recorded on a specimen record form (copy attached) and sequentially numbered. If the specimen is to be retained for further examination, pupils will be given the opportunity to examine them with a hand-held magnifying lens. Handling of specimens will not be permitted to minimise the risk of harm to the specimen. Earthworms, if any, which are particularly sensitive to light and dehydration when removed from their soil habitat will be recorded, examined and photographed as speedily as reasonably possible and released onto the excavation spoil heap and lightly covered with soil. Other specimens will be released as soon as practical after examination by pupil groups and discussion of their habitat, mode of life and place in the ecology of the site.

   Learning points:
   1. **Respect for animal life and biodiversity.**
   2. **Scientific method of examination and record keeping using standard consistent methodology.**
   3. **That some animals, like earthworms, live in holes in the ground.**
   4. **The importance of earthworms for healthy aerated soil.**
   5. **That earthworms and other invertebrates are food for birds and other animals.**
   6. **If insect larvae are found, an introduction to the stages of insect life cycles.**

4. **Plants and animals in the topsoil layer**: The first step of specimen recording during the excavations will be to record the plants and other organisms that exist within the top ‘turf’ layer of the excavation site soil. The sampling of this top turf layer will aim to identify the surface grasses, other plants, insects and other organisms in this turf layer. Samples will be inspected using hand lenses to look at samples in seed trays and

petri dishes. The inspection will also seek to identify grass and other plant seeds in the turf layer. Each species will be recorded and photographed on a specimen record form and sequentially numbered as in 2 above for later identification (if possible). Pupils will also be given the opportunity to draw their own visual record of specimens found.

Learning points:

1. **'Grass' is not just grass; there is a diversity of plant life in this site's turf layer and generally in grassy places.**
2. **Specimens, if found, will show that the turf layer is home to insects and other invertebrates.**
3. **Plant roots extend down into the soil, creating their own holes through the soil, are different from stems and leaves and have a different function than the green stems and leaves exposed to the light and air.**
4. **Improved observation and drawing skills.**
5. **Plants grow from seeds. (I may be possible to retain some grass seeds for later germination in a classroom experiment).**

5. **Taking samples for bacterial and fungal analysis:** As each layer of soil is removed from the excavation site a sample for bacterial and fungal analysis will be taken. The sampling process using a cotton bud will be explained to pupils and one pupil will be chosen from each group to take the sample and transfer it to the agar gel on the petri dish. The sample will be spread from the cotton bud tip onto a sterile agar gel medium in a petri dish using the standard letter 'Z' marking process (which helps to identify and differentiate any bacterial and fungal colonies that grow on the agar gel from any airborne spores which may contaminate the gel during the short period the sample is spread on the agar gel – the airborne contaminants growing colonies outside the 'Z' mark on the agar gel). The petri dish will be sealed and labelled and the source and nature of the sample recorded on the standard sample record form. The agar plates will be kept by me for seven days and the growth of any bacterial or fungal colonies photographed and recorded for a report-back to be given to the pupils during a later class lesson.

   A hand print bacterial sample will also be taken on an agar gel plate by getting a pupil to place the palm of their hand on a sterile agar gel plate.

   Learning points:

   1. **That microorganisms also live and grow in soil.**
   2. **The importance of hand washing and hand hygiene.**
   3. **Sampling method for taking bacterial and fungal spore samples.**

6. **Taking samples of soil type and particle size in each stratified layer of the excavation site:** Assuming the sub-soil is stratified and has not previously been disturbed by human activity, as each level of the site is excavated, including the surface turf layer, samples will be taken of the excavated material to be analysed later for relative particle size under the microscope. If there is clear stratification at the excavation site it may be possible, using a clear plastic bottle and water, to do a simple experiment to show how stratification deposits occur in water, the larger particles settling first with smaller ones on top.

   Learning points:

1. **How stratification occurs in sedimentary soil deposits**

7. **Looking for moving micro-organisms and microfossils in soil samples:** all soil samples will be washed with clean water and samples of the washed solution examined using hand magnifying lenses to see if any moving micro-organisms or non-motile microfossils can be seen. The washed samples will also be recorded, labelled and retained for later microscopic viewing and investigation by me.

8. Any bones and other biological specimens found during the excavation will also be photographed, labelled and recorded.

Equipment required (all will be supplied by me -DAR, except the hand-held lenses and microscopes for the pupils to use which the school has agreed to supply):

- Seed trays
- Specimen sample bottles
- Petri dishes – empty
- Petri dishes with sterile agar gel
- Tweezers for specimen sampling
- Microscope slides and cover slips
- Microscope slides with concave depression and cover slips
- Sampling pipette
- Water bottle for washing samples
- Magnifying hand lenses
- Microscopes
- Cotton buds for taking bacterial and fungal samples
- Cocktail sticks for placing microscope cover slides
- Disposable latex gloves
- Prepared specimen forms with numbered labels attached for recording and later identification of specimens and samples
- Ruler and micrometre measure for measuring specimens
- Sterilising hand gel

9. **Risk analysis:**

   There are no dangerous sharp implements or chemicals in the equipment required for investigating the biological and geological specimens obtained during the excavation. Glass microscope slides and cover slips present a risk of cuts if not handled correctly, but these will only by handled by DAR.

   A preliminary inspection of the site indicates that it is unlikely that any hazardous or dangerous plant, fungus or animal species will be found. It is possible that a nest of wasps or bees may be found. Whilst this is unlikely, if such a nest is found pupils will be moved a safe distance from it in case any child is allergic to bee or wasp stings.

Some common ant species secrete formic acid, which is a skin irritant but not seriously hazardous. All insects, including ants, and other invertebrates will be handled first by me and pupils will inspect and study them once they are identified and safe to inspect.

The is a risk will be of bacterial infection and fungal infection from soil bacteria and fungal spores. Hand hygiene after working with specimens will be stressed and teachers asked to ensure hands are washed or sterilised with hand gel after activities with specimens. Special care should be taken to avoid infection for any child with skin disorders or with cuts or skin abrasions, particularly on their hands.

Covid 19 transmission is a risk, so I will take a lateral flow test at the start of the week and at any other time the school requires. I will also wear a mask during any close work with pupils.

David Rodgers
29 October 2021

Appendix 2

Table of specimens taken during archaeological excavation at Wicor Primary School 1-4 November 2021

Wicor Primary Scool archaological dig 1-4 Nov			
Table of biological and geological samples tak			
Date	Specimen number	Length	Specimen s
01-Nov	1		
01-Nov	2		
01-Nov	3	40 ml po	
01-Nov	4	9-10 mm	
01-Nov	5	60cm	
01-Nov	6		

Annexes

Annexe 1.

LITHIC STUDIES SOCIETY
ALAN SAVILLE GRANT 2021

Please complete the form and return to Dr Rob Davis (rdavis@britishmuseum.org) no later than 31st March.

Personal details

Title: Dr **Name:** Ivan Lincoln Gray
Address: 51 Hill Head Road, Hill Head near Fareham, Hants, PO14 3JL
Tel: 01329 662734 **E-mail:** Gray51@BTinternet.com
Lithic Studies Society Member: Yes
Date Joined LSS: 2012
Affiliation*: Universities of Bournemouth and Southampton
Position: Retired Senior Lecturer in Public Services Management and Organisational Development
Dated started: 02 Jan 2021
* If applicable, please give the name of associated community group, employer, or academic institution

Background and experience (in less than **100** words outline your archaeological background and experience)
Ivan Gray co-ordinates the community-based educational research project and this application is made on behalf of the team of local residents that support it. Ivan is an amateur archaeologist researching the prehistoric archaeology of the Solent River basin and he has been walking the foreshore collecting lithics for fifteen years.
Paul Ramsay leads the Rainbow Bar Archaeology project, a key part of the wider initiative, with past experience in field archaeology, particularly site photographic recording and surveying. He has walked the foreshore and its hinterland for 25 years. He is a retired Principal Lecturer in learning and teaching practices.

Project title (in less than **15** words provide a succinct title for the project)

The Rainbow Bar Community Archaeology project – a study of lithics, hominin activity and landscape.

Project summary (in less than **250** words briefly outline and describe nature of the work for which the grant would contribute)

The project is part of a community education and research initiative supported by residents, local associations, and the Hampshire Cultural Trust. The initiative's primary outcome is the gathering together and development of learning and educational materials for the use of local schools, colleges, and the general public. There are several interrelated projects, including ecological and geomorphological, that will support the archaeological work. The intention is that the community and students will be closely involved in the research and the generation of learning materials.
The archaeological desk-based research component will model the landscape of Hill Head Beach and Rainbow Bar across the prehistoric periods corresponding to lithic assemblages from the area. The landscape models will be correlated with the finds data to attempt an analysis of hominin activity in

making and using flint tools in the area. The initial stage of the project will consist of gathering together the existing research on Rainbow Bar and making it available to schools, colleges, and the general public through a website.
This will be complemented by small-scale field work activities that will engage local residents and schools to participate in appropriately conducted amateur excavation. The further intention is to work with schools to develop cross-discipline curriculum electives that bring the experience of practical archaeological processes to students. The aim is to inspire a new generation of potential archaeologists through means such as trial trenching on school/college grounds with surveying, planning and recording activities to demonstrate the creative and technical facets of modern archaeology.

Project justification (using up to **250** words, give a breakdown of the project costing (including details of funding from other sources) and justification for the requested grant)

Rainbow Bar is a recognised palaeolithic site of national importance that has received little attention (see Palaeolithic Archaeology of the Solent River (Wenban-Smith and Hosfield, 2001, LSS Occasional Paper No7, p.4).
This project is a community-led response to Wenban-Smith's challenge to help '...put the Solent Basin more firmly on the map' (op.cit, p.5). The Hampshire Cultural Trust and One Community are advising on local sources of further funding, and the provisional project steering group will match fund the Saville grant to cover the costs of establishing equipment and tool facilities to further the archaeological capability of the project.
The project is starting from scratch thus has a need to purchase basic kit (such as trowels and shovels), basic wellbeing and welfare items (such as safety glasses and Hi Viz vests), recording and surveying items (such as a planning frame, range rod, reel tapes, marker flags, photographic scales), drawing and recording supplies (such as drafting film, record cards, waterproof markers) and finds and storage items (such as finds trays and artefact storage bags). The objective is to have sufficient capacity to support a team of up to six people - this is considered a viable number both for local residents involved in small-scale excavation, and for school-based educational activities.
A comparative costing from a variety of equipment suppliers for the above items has been undertaken and the grant contribution breaks down as below.

Wellbeing and Welfare £50
Recording & Surveying (Items & Materials) £245
Basic kit £150
Total £ 445

Referee
Name: Emma Banks
Community Manager - Hampshire Cultural Trust **Address:** Chilcomb House, Chilcomb Lane, Winchester, Hampshire S023 8RB.

Tel: 07840 128770 **E-mail:** emma.banks@hampshireculturaltrust.org.uk

I confirm that all of the above information is correct and that, if I am in receipt of the Alan Saville Grant, I will (1) provide a financial summary of expenditure (including receipts) to the Treasurer of the Lithic StudiesSociety, (2) submit to the editor by email a short report for the society's journal *Lithics* on the activity supported by the grant and (3) consent to details of the award being posted on the Lithic Studies Society website and social media accounts.

Signed: Ivan Gray **Date: 23 March 2021**

Thumbnails of digital photographs

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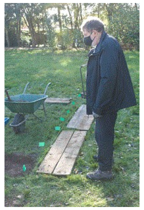
5	 6	 7	 8
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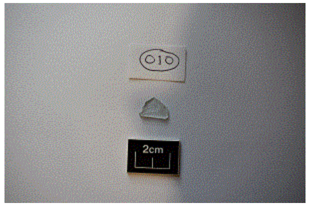

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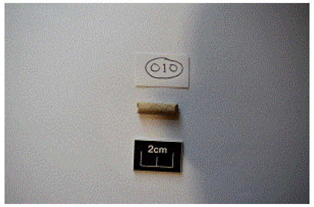

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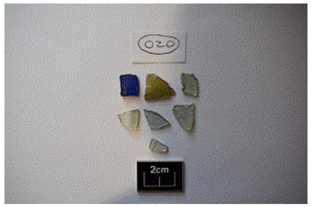

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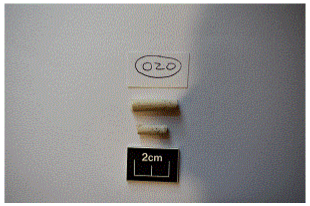

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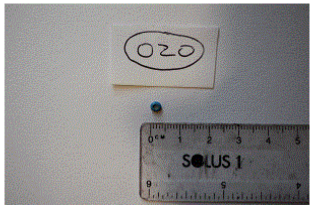

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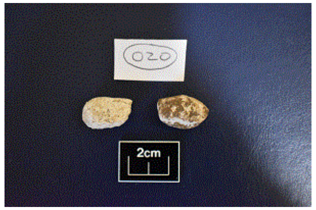

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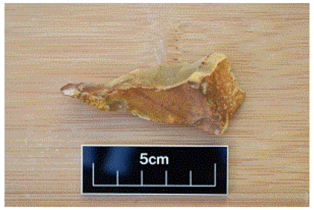

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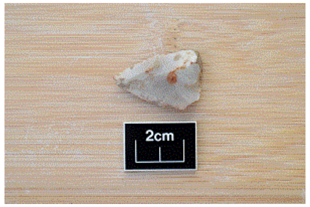

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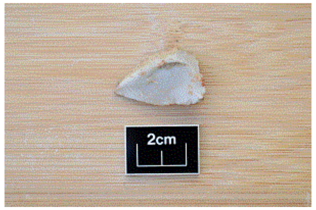

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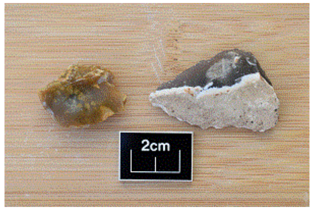

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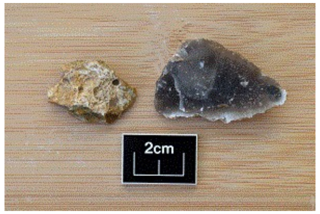

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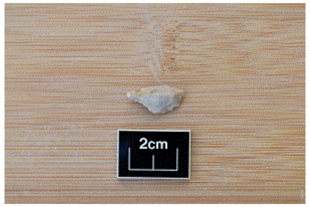

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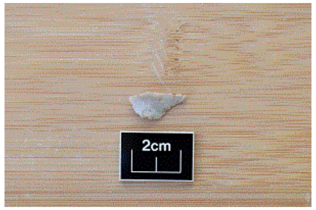

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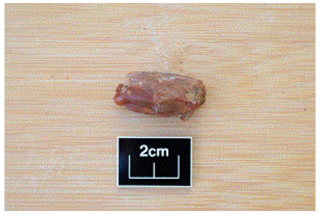

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