Stanton Drew Stone Circles: observations and notes regarding the sourcing of the various rock-types used in the construction of the monuments.

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Introduction

Conneller (2008) when discussing lithic technology argues that the locations of raw material sources are a vital piece of the archaeological record because of the information it may provide about mobility, trade, and exchange in prehistoric studies. In can also be inferred to embody place, and it appears many places where the material was sourced might have been of importance to the peoples of that time (Conneller 2008: 169).

While Conneller was discussing lithic technology I believe that some of his inferences are a valid point when considering the Stanton Drew Stone Circle Monument and where the stones there might have originated from. There are at least four distinct rock types to be found within the monument site and the origins of the rock types appear to be from geographically as well as geologically diverse areas. There seems to be several different questions to be considered why the particular rock types were chosen:

Was the River Chew of particular significance? What was the mode of transportation of the stones? How does the site at Stanton Drew relate to other sites in the area, such as those at Fairy Toot or the Priddy Circles?

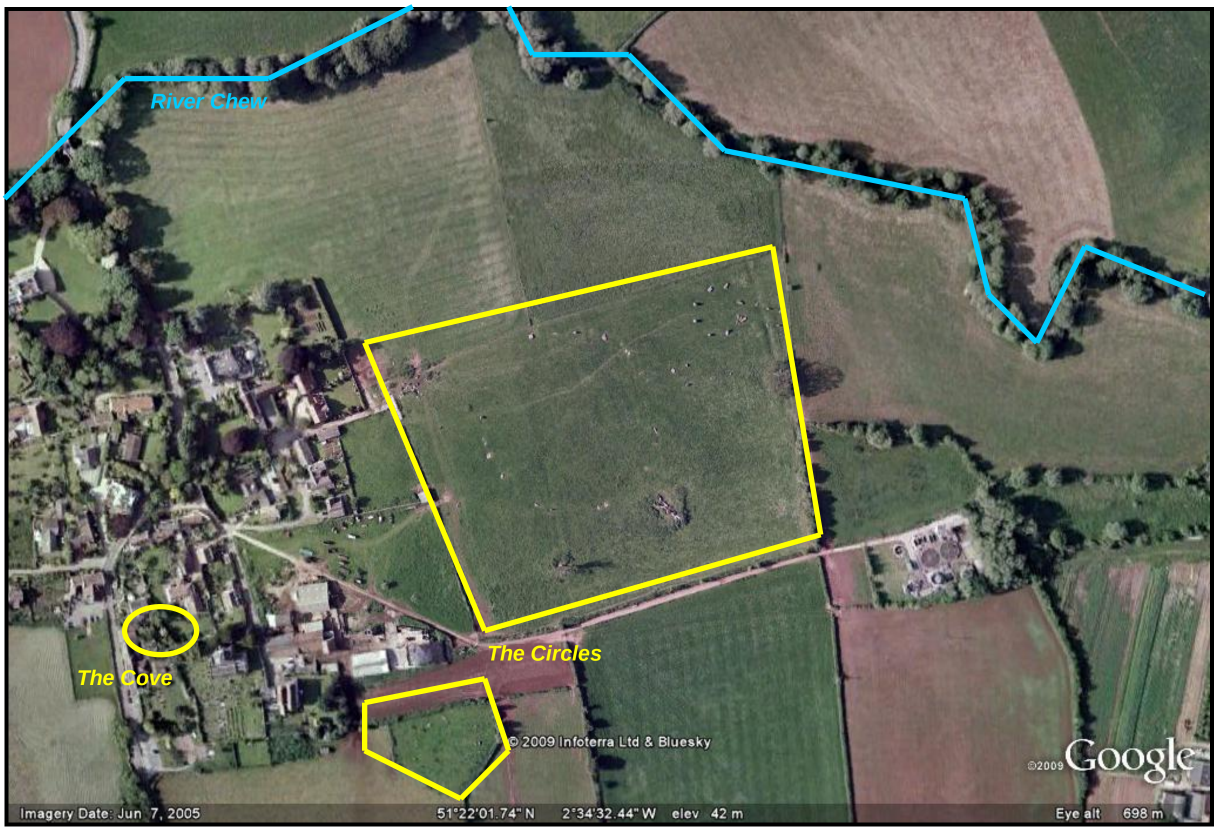


Figure 1. An aerial photograph of the Stanton Drew Stone Circles outlining the main features of the site and the course of the River Chew.

The complex at Stanton Drew comprises of three distinct stone circles, the Great Circle is the second largest stone circle in Britain, and the other two circles to the south-west and the north-east are considerably smaller. The Great Circle and the north-east circle both appear to have been approached, or left, to the north-east by short avenues of stones and in the garden of the local hostelry, the Druid's Arms, is a group of three stones known as 'The Cove'. To the north of the complex on the other side of the River Chew lies a solitary stone known as Hautville's Quoit, Lloyd Morgan (1887: 42) places two other small stones to the west at Middle Ham or Lower Tyning that are not located on the modern Ordnance Survey maps of the area.

Megalithic sites such as this have been broadly dated late Neolithic and early Bronze Age ca. 3000 – 2000 BC and this site has been interpreted as being an important centre for ritual and ceremonial activities (Lewis: online accessed 2010). From about 4000 BC humankind began to radically alter the landscape with the construction of large ceremonial, religious and burial monuments in clearings created in the wildwood. These monuments belonged to and were used by specific groups of people who were also using the local countryside, partly to grow crops and for animal husbandry while also still hunting, fishing and gathering (Aston, 1985: 23). Recent geophysical surveys at the site indicate that the Great Circle was contained within an outer ditch and that inside the circle were concentric rings of pits, interpreted to have held timber uprights (English Heritage, online accessed 2009) and more recently the possibility of the Cove being the remnants of a substantial long barrow (Oswin, Richards, and Sermon, 2009). It should be noted that Tratman remarks that a very large elm tree at the centre of the Great Circle was felled and removed in 1963 and that its removal caused a major disturbance in the central area where its presence had possibly destroyed any archaeological features that may have been there (Tratman, 1966: 42).

The Stanton Drew Stone Circles are located at NGR ST 600 633 on the outskirts of the village of Stanton Drew, within the Chew Valley and to the north of the Mendip Hills. It is about 8 miles to the south of Bristol and is in the Bath and Northeast Somerset unitary authority region. The course of the River Chew flows to the east of the Harptree area and flows north before turning to an easterly direction and passes to the north and very close to the stone circles at Stanton Drew (figure 2). Rivers or fresh water seems to have been key elements at Neolithic sites, such as henges, causewayed enclosures, and cursus monuments (Fowler and Cummings, 2003: 10).

The name 'Stanton' possibly derives from the Old English 'stān' which means 'stone and from 'tūn' meaning 'enclosure, farmstead, village, manor, 'Stanton' possibly refers to 'stone farmstead'. This might be an archaeological reference to the megalithic monuments nearby (Cameron, 1961: 116).

To the north of the Stanton Drew Stone Circles the summit of Dundry Hill is capped by an outcrop of Inferior Oolitic limestone of Jurassic age while to the east and to the south of the stone circles are sandstones from the Coal Measures, these rocks are of Carboniferous age. Lying to the southwest is the locally silicified Dolomitic Conglomerate from the Harptree and Compton Martin areas, these rocks are of Triassic age and occur as inter-digitations on the northern flank of the Mendip Hills. The more silicified Dolomitic Conglomerate rock types constitute the most common of the rock types found at Stanton Drew, while the rocks that form 'The Cove' are of a Dolomitic Conglomerate that has a lesser degree of silicification and good examples of this rock type can be seen to outcrop throughout the length of Harptree combe which lies between the villages of West and East Harptree, the more silicified rocks can be seen to outcrop higher up the combe at Garrow and at Ridge.

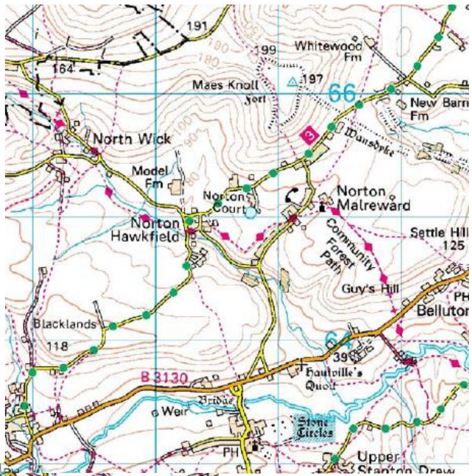


Figure 2. A series of maps showing the general area around the Stanton Drew Stone Circles complex, the modern course of the River Chew and the locations of the suggested sources of the stones.

A brief description of the four rock types that have been identified at Stanton Drew:

- Oolitic Limestone – Jurassic 205 – 142 Ma (figure 3). These rocks are a pale grey-yellow colour, although this is difficult to fully distinguish due to a substantial lichen cover. The surface of the blocks resembles a limestone pavement and has numerous cup-like depressions and pits that partly fill with water. Many rock art sites have flat slabs of stone open to the elements and, when it rains, the cup-and-ring marks fill with water, rocks with natural cup marks are often utilised for the same effect. It could be that places where rocks ran with water or held water were culturally significant in many ways (Fowler and Cummings, 2003: 10). It is possible that some of these limestone slabs at Stanton Drew were not intended to stand or were used as capstones.

Figure 3. Oolitic Limestone, Great Circle.

- Silicified Dolomitic Conglomerate - Triassic 248 – 205 Ma (figure 4). These rocks have a wide range of colours from pale pink to orangey pink with some bright, sometimes ochreous orange, through to dark rust, and purple-red blotches, the red and orange colour is indicative of the mineral iron content of these Triassic rock types. The rocks have a glassy, metallic appearance and feel and the surface can be described as pitted, pock-marked, frothy, knobbly, and gnarly. There are abundant quartz geodes that make many of the stones sparkle, William Stukeley (cited in Lloyd Morgan, 1887: 39) remarks that “it shines eminently and reflects the sunbeams with great lustre”. Quartz was a highly significant and regarded material in prehistory as indicated through its use in various monuments (Lewis: online accessed 2010). There are some silicified fossil fragments from the remains of limestone clasts within the conglomerate. The varying clasts range from sub-rounded to sub-angular, fine to coarse gravel to pebble and cobble size. The majority of the stones have a substantial cover of lichen with some moss and grass.

- Dolomitic Conglomerate – Triassic (figure 5). This is a weathered pale grey-pink and has a lesser degree of silicification. The varying clasts range from rounded to sub-angular fine to coarse gravel, pebbles and cobbles of limestone and sandstone. There are also some silicified fossil fragments from the remains of limestone clasts within the conglomerate and the stones again have a substantial cover of lichen.

Pennant Sandstone – Carboniferous 354 – 290 Ma (figure 6). These rocks are of a pink to fawn colour and distinct bedding layers are clearly visible in particular cross-stratification which is typical of material that has been laid down in deltas. There is a layer of rounded to sub-rounded fine to medium gravel of quartz.

Figure 4. Silicified Dolomitic Conglomerate, North East Circle.

Figure 5. Dolomitic Conglomerate, The Cove.

The Great Circle, Northeast Circle, and the Avenues

The majority of the stones within the Great and Northeast Circle complex comprise of a silicified Dolomitic Conglomerate similar to that found around the Harptree area in particular at Garrow and at Ridge. In the Great Circle 61.5% of the visible stones comprise the more silicified Dolomitic Conglomerate, 23.1% comprise Oolitic Limestone that is likely to have originated from the Dundry Plateau, 11.5% comprise Sandstone that appears to be of a more local origin and 3.8% are Dolomitic Conglomerate of a rock type has a lesser degree of silicification and, again is similar to types found within the Harptree area. The stones that form the Northeast Circle and the Avenues comprise 90.9% silicified Dolomitic Conglomerate and 9.1% Oolitic Limestone and the probable origins of these stones are as detailed above. The orange to rust-red colours of the silicified Dolomitic Conglomerate does not look out of place at Stanton Drew matching well with the local red sandy soils and the Triassic Mercia Mudstone that underlies the monument site.

Figure 6. Pennant Sandstone, Great Circle.

The Southwest Circle

When standing in the Southwest Circle the almost circular appearance of the site gives a feeling of an almost manufactured situation. It has a levelled surface where the stones are placed with a significant drop-off or falling away of the ground, in particular to the east, west, and south sides, although this could just as easily be the consequence of later agricultural practices. A solitary stone just off centre in the circle is possibly the cornerstone of a field boundary marked on Dymond’s 1890’s site plan, although a slightly earlier 1884 – 1887 map depicts this as a solitary central stone at the corner of a field boundary. This stone and another stone in the Southwest Circle comprise a Dolomitic Conglomerate, of a type similar to that of the stones located in the Cove. The majority of the stones in the Southwest Circle comprise a silicified Dolomitic Conglomerate, although at least one stone is of the local sandstone, possibly from the sandstone bands that are found within the Mercia Mudstones of this area and are visible in the local environment.

The geology and landscape of Stanton Drew and the surrounding area

Archaeologists are becoming increasingly aware that monuments help to shape the perception of landscape, possibly altering both the form and content of a landscape, helping to promote and create senses of time, place and notions of identity and belonging (Goldhahn in Jones 2008: 57). It is feasible that monuments were constructed to occupy a permanent place in the landscape and were intended to exert an influence on future occupants of that landscape.

The visibility of the monuments at Stanton Drew from the surrounding countryside might have been an important factor in the location of the site. High ground surrounds the lower ground of the River Chew basin where the monuments are situated and an approach from this low level would have meant that the site could not be seen, the seclusion giving a sense of privacy. The Great Circle and Northeast Circle and the Avenues occupy a place on a slightly elevated terrace above the river where the basin widens between the 40-metre contour line before narrowing considerably to the northeast of the site. It might be that this widening of the basin was a significant factor in the placement of these particular monuments; consider the approach from an upstream direction following a narrow channel then a widening of the basin, perhaps flooded, and the monument situated on a raised terrace above the water. Streams enter the main river here, from Dundry and Norton Marleward to the north and from the Stanton Wick area to the south. During the Neolithic many sites are placed close to rivers, water sheds and water sources as can be seen at Stanton Drew and at Avebury. The Southwest Circle occupies a rather different place in the landscape when seen in comparison to the Great Circle and Northeast Circle complex. The Southwest Circle is situated in a prominent position on a brow and commands a wide panoramic view of the surrounding countryside particularly when looking to the west along the valley towards the Severn Estuary. The high ground of Blackdown on the Mendips is clearly visible. The different positioning of the Southwest Circle might suggest a differing thought process or even a different period of construction. This prominent position has been later utilised as the site of the circa 13th century church and the circa 15th century Church Farmhouse.

As the perception and cognition of landscape is altered by the construction of a monument, then the actual physical landscape is also altered. The monument materializes in the landscape while the landscape then becomes materialized in the monument. The materials used to construct the monument, such as earth, wood and stones have been selected and gathered from specific sources within the landscape and are then incorporated into a new form as part of the monument. The social and ritual performance of monument construction can alter entire landscapes (Goldhahn in Jones 2008: 59). Stone circle monuments are not usually regarded as creating places specifically designed for burials, although some sites have received burials most usually as secondary deposits. It has been suggested by Parker Pearson and others that wooden henges and circles may have been designed for use by the living while stone-built monuments were constructed for the dead or ancestors (Cummings in Pollard 2008: 139 – 141). An interesting consideration at the Stanton Drew site where recent geophysical surveys have suggested a wooden structure within the stones (English Heritage, online accessed 2009) and a possible long barrow (Oswin, Richards, and Sermon, 2009) which perhaps indicates the site was developed through different stages with time. It might be that the long barrow was constructed first, followed by the wooden henge and finally the stone circles.

The architecture of the monument may have been designed to reflect the social position of people in life or death, this could suggest simple differences between male and female and the young and old in Neolithic society (Cummings in Pollard, 2008: 139). Alexander Keiller, who was largely responsible for the re-construction of the stone circle at Avebury during the 1930's, suggested that the shapes of the stones placed at that site might have represented gender, columnar are male shapes and triangular or lozenge are female shapes (Malone, 1994: 21) and the same interpretation might be applied to the stones at Stanton Drew.

When considering the monuments at Stanton Drew their place within the landscape of which they have become a part, is a major factor, as it is for the individual stones that remain a part of that landscape. When describing the geology and landscape of the stones and surrounding areas it is with these considerations in mind.

The Stanton Drew Stone Circles complex is situated on the south side of the River Chew where the underlying rocks are mainly of the Mercia Mudstone Group of Triassic Age. These beds occupy most of the upper basin of the River Chew and it is a gently rolling landscape of a modest elevation. To the east of the site are the more sharply contoured Coal Measures, through which the river cuts its valley through the villages of Pensford, Woollard, Compton Dando and beyond (Lloyd Morgan 1887: 44).

During the Lower Carboniferous sedimentation and uplift resulted in land creation where the coal-forming swamps and forests became established. The climate during this period would most likely have been warm with a relatively high rainfall resulting in a high-water table these were ideal conditions for coal to be formed. The sedimentation of the Coal Measures was cyclical – periods of organic deposition, followed by flood events, mud and sands were then deposited until the swamp conditions were re-established and vegetation grew. Eventually during the Upper Carboniferous there was general uplifting with folding and erosion of the surrounding areas followed by a widespread change in sedimentation patterns. Marine flood events ended and a deltaic sediment, comprising coarse-grained grey, current-bedded, felspathic, sub-greywacke type sandstone, known as the Pennant Formation, was laid down in a belt across the district (Green, 1992: 52). The main Coal Measure deposits including the Pennant Formation lie to the east of Stanton Drew, there is also a thin tongue of Pennant Formation to the south around Stanton Wick. It is noteworthy that during their excavations at Chew Valley Lake Rahtz and Greenfield found several examples of pennant sandstones being utilized (Rahtz and Greenfield, 1977)

To the west of Stanton Drew are Broadfield Down comprising limestone and fringed to the east by Dolomitic Conglomerate and Leigh Down comprising Dolomitic Conglomerate where there is evidence of some silicification in the curiously altered Lias or Rhaetic Harptree Beds. To the south and southwest lie the Mendip Hills comprising mainly of limestone and Old Red Sandstone but fringed near East and West Harptree by beds of Dolomitic Conglomerate of both silicified and un-silicified types and the Rhaetic Harptree Beds (Lloyd Morgan 1887: 44 - 45).

At the end of the Carboniferous and into the Permian there came the cataclysmic earth movements of the Variscan Oregeny, also known as the Amorican (Green, 1992: 67) when the Mendip and surrounding area was uplifted, folded and eroded. During the Permian and Triassic, the climate was dry for long periods and weathering quickly removed the cover of Upper Carboniferous sediments from the summits exposing the limestone beneath, the rainwater run-off that resulted from the lack of vegetative cover, caused flooding and rapid erosion transporting pebbles and boulders of limestone and sandstone down the slopes, this debris became deposited at the base of the major gorges. These pebble bed and scree deposits formed the Dolomitic Conglomerate, so called because of the dolomite content (calcium/magnesium carbonate) (Hardy, 1999: 73). Within the conglomerate the degree of roundness of the clasts and their size gives some indication to the amount of transportation that has occurred, and the energy required for transport prior to deposition. It is noted that at the time of writing there is a substantial piece of Dolomitic Conglomerate currently being used as a gatepost at the entrance to the farmyard of Church Farm in Stanton Drew, this is also the rock type that comprises the stones in The Cove. The Dolomitic Conglomerate has in many cases undergone considerable secondary changes (Green, 1965: 64-65), this is particularly noticeable in the Harptree area where the rock has been silicified probably by metasomatism, this is a metamorphic process whereby rocks are affected by a combination of heat, pressure, and fluids in which the chemical composition of the rock is altered significantly most usually as a result of fluid flow. Lloyd Morgan (1887: 45) suggests that heated waters have seemingly dissolved any limestone clasts and the spaces left have been partially or completely filled with crystallised quartz (figure 8).

Figure 8. Quartz geodes in silicified Dolomitic Conglomerate, Northeast Circle.

If water had a significant influence on Neolithic people, then it might have been that the sparkling and reflective qualities of quartz possibly emphasized the link between stone and water (Fowler and Cummings, 2003: 14). Lloyd Morgan goes on to remark that great weathered blocks of this nature are to be found in the Harptree area (Lloyd Morgan 1887: 46). Referring to the geological maps of these areas (BGS: Sheets 264 and 280) only in the Compton Martin and Harptree areas has the Dolomitic Conglomerate been subjected to silicification, in the Broadfield and Leigh Down areas the siliceous material is from the later Rhaetic Harptree beds. Examples of silicified Dolomitic Conglomerate can be seen in several locations around the Harptree villages much of it present in older walls and field boundaries (figure 9).

Figure 9. Silicified Dolomitic Conglomerate in a West Harptree wall.

The stones that have been used to construct 'The Cove' monument comprise a Dolomitic Conglomerate that also has been silicified but to a lesser degree. Within some of the limestone clasts are the silicified fossil remains of the corallite *Siphonodendron* of Carboniferous age. Examples of this coral type can be found in limestone cobbles in the bed of the stream that flows through Harptree Combe. In the light some of the silicified clasts within the Dolomitic Conglomerate can be seen to sparkle due to the quartz crystallisation. The stones of the cove lack the vivid oranges and 'rusty' reds of the more silicified rocks found in the Circles and Avenues and are greyer in colour.

There is evidence of siliceous rocks having been used in the remnant walls of the circa 12th century Richmont Castle in Harptree combe, the walls have since been almost completely robbed out and/or re-worked for its mineral content and in the construction of various local manor houses and cottages.

The strata of Triassic age found around Stanton Drew is mainly of the Mercia Mudstone Group (formerly called Red or Keuper Marl) consisting largely of red dolomitic siltstone and mudstone with a starchy texture and a feebly conchoidal fracture (Green 1992: 80) this in turn overlies, unconformably Supra-Pennant Measures from the Upper Coal Measures of Carboniferous age below at an unspecified depth. The red mudstones commonly have small patches, streaks and occasional bands of grey and grey green, the colour differences are inferred to be the result of the oxidation state of the constituent minerals (Green 1992: 81). Where there are extensive outcrops of Coal Measures, such as those found at Pensford, there is a marginal facies comprising soft red and fawn calcareous sandstones that have resulted from the erosion of the older rocks (Green 1992: 81). The Mercia Mudstone Group was deposited in a mudflat environment in three main ways; the settling-out of mud and silt in temporary lakes, rapid deposition of silt and fine sand by flash floods, and the accumulation of wind-blown dust on the wet mudflat surface (Chandler and Forster 2001: 16).

Figure 10. Inferior Oolite as seen at Maes Knoll, Dundry Hill (east).

To the north of the Stone Circles is the elevated hill-outlier of Dundry the upper part of which comprises Inferior Oolite of Jurassic Age overlying Lias beds (Lloyd Morgan 1887: 44). Marine conditions during the Jurassic period were marked by a gradual deepening of the sea leading to the formation of the Inferior Oolite in a shallow shelf sea. There are numerous gaps in the succession indicating there were interruptions and/or modifications by frequent earth movements. On the eastern part of Dundry Hill the Upper Inferior Oolite rests directly on Upper Lias, in which sandy ferruginous beds and hard limestones with limonitic ooliths typify the Dundry rock type (figure 10) (Green 1992: 117).

An oolith is a spherical granule of which Oolite is composed; they are formed by concentric accretions of thin layers of mineral around a core. The ooliths that comprise the Dundry Inferior Oolite are sometimes referred to as 'ironshoots' due to their iron content (Green, 1992: 117). There is a significant area of landslip around the slopes of Dundry Hill just below the summit which may have produced blocks of the Inferior Oolite material.

Immediately to the north of the Stanton Drew Stone Circles is a narrow band of alluvium of Pleistocene and Recent age. This alluvium represents the course of the River Chew which seems to have been restricted by the topography to a relatively narrow channel. During prehistory rivers were probably used as connections and communication routes to the outer world, as highways for navigation and travel, for the transportation of goods and remained as fixed points within the landscape. It may be that a variety of watercourses, such as springs, rivers and swallets (caves) represented links with the spirit world and were important places for disposing of the remains of the dead. In lowland Britain some enclosures and henges were bisected by rivers or were subject to flooding and it has been suggested that flowing or standing water may have been a vital element in the decay of bodies left at these sites. It seems that places of stone and water might have been key locations for the transformation, fragmentation, and disposal of the human body in the Neolithic (Fowler and Cummings, 2003: 8). Is it possible that at the point where the River Chew narrows to the northeast of the stone circle near to Byemills Farm that temporary dams were constructed and the river basin artificially flooded during certain ceremonies, celebrations and/or rituals. There was certainly the logistical and technical knowledge to move large, heavy stones a considerable distance and place them according to a design and dam construction would not have presented too much of a problem to the engineers of the time. Prior to the construction of Chew Valley Lake there was anecdotal evidence of commonplace extensive flooding of the area in particular at Stanton Drew and further down river at Woollard (Rahtz and Greenfield, 1977: 6).

To the southwest of Stanton Drew on the Mendip Plateau are the Priddy Circles interpreted as probable ceremonial henge monuments bearing some similarity to the early form of Stonehenge (Adkins, 1992: 97). The Circles are surrounded by sinkholes and swallets that may have been instrumental in the abandonment of the site (Stanton, 1986). All across the Mendip Plateau there are numerous sinkholes and swallets (caves) where water enters and

Figure 11. Garrowpipe Spring.

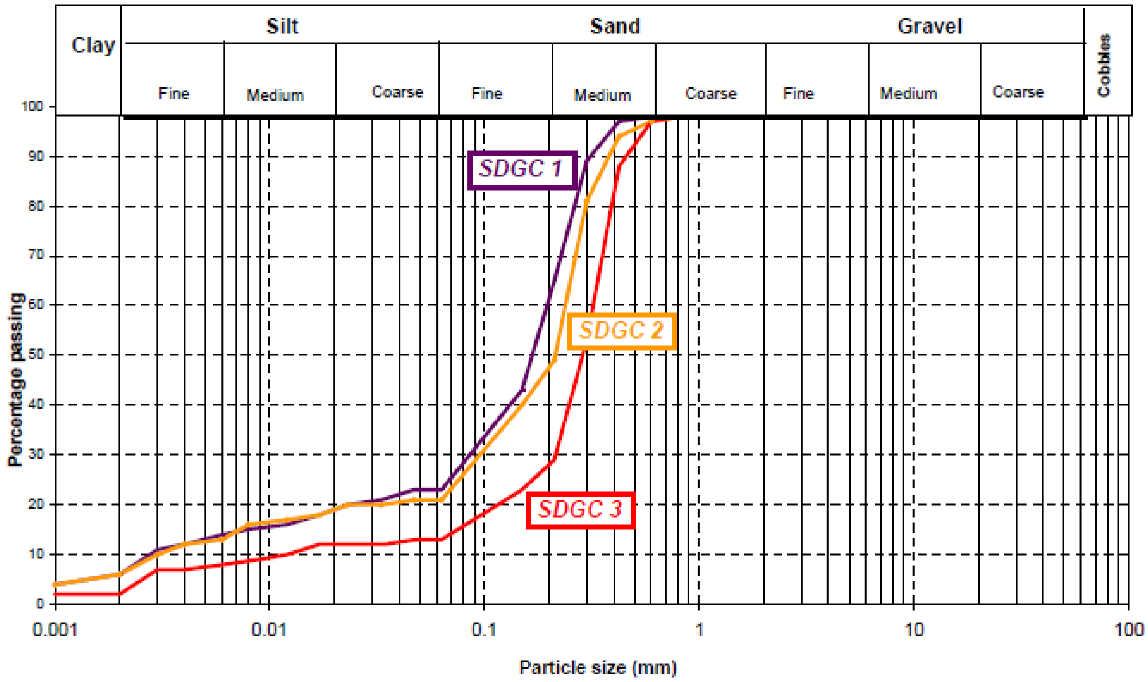
disappears from view and these were possibly regarded as places of transition from a world of the living to a world of the dead or of the ancestors. Many of these sites have been used as burial sites, such as at Charterhouse Warren Farm Swallet and Brimble Pit Swallet where artefacts from the Neolithic period found included flints, Grooved Ware and a polished greenstone hand axe. About 2 km to the north-north east of the circles, and coincidentally in an alignment with the group of the three southernmost complete circles, Garrowpipe Spring is located where the water issues from beneath large blocks of silicified Dolomitic Conglomerate (figure 11), which is very similar to the rock type found at Stanton Drew, this emergence of water may have represented a new beginning, a new life giving unpolluted 'fresh' water, it might have signified the start of a journey as the spring water flows to join the river further down the valley. During their investigation and subsequent excavation at Stonehenge Darvill and Wainwright (2008) alluded to the significance of the relationship between natural springs and stone when they traced the origin of the bluestones found at the centre of the monument to a location in the Preseli Hills in West Wales. There the source of the stones was surrounded by springs with reputed healing powers and where inscribed bluestones were also found nearby. It was these healing and magical powers that, Darvill and Wainwright suggest, were the reason the bluestones were transported the considerable distance to Stonehenge. The area around the spring at Garrowpipe has, unfortunately, suffered a great deal from overuse by off-road vehicles and has been significantly eroded. The water from Garrowpipe flows down through Harptree combe, passing by large blocks of Dolomitic Conglomerate at Garrow (figure 12) and throughout the length of the combe are good exposures of in-situ Dolomitic Conglomerate rock type. The stream then flows out onto the floodplain to join the River Chew near to the place that is now occupied by Chew Valley Lake. During excavations at Chew Park in the early to mid-1950's prior to the creation of the lake structural evidence of Neolithic settlement comprising a building and pit was uncovered (Rahtz and Greenfield, 1977).

Figure 12. Blocks of Dolomitic Conglomerate at Garrow.

There is a spring line just beneath the summit of Dundry Hill where several springs rise, and these streams are later joined by water issuing from springs at Norton Malreward. The water flows down to enter to the north side of the River Chew just to the east of the present location of Hautville's Quoit. To the east of the stone circle spring fed streams from the Upper Stanton Drew and Stanton Wick areas enter on the south side of the river close to where the river basin narrows. With the levels of present-day water extractions and usage it is entirely possible that water levels and flows were significantly different in prehistoric times when the monuments were constructed and in use.

Analysis of soil samples.

Three disturbed soil samples were taken from molehills in a spread across the Great Circle and Northeast Circle complex and these were analyzed for particle size distribution to give an indication of the underlying geology. There are many different methods for particle size analysis, but these split into three main groups. Sieving which involves the physical separation of grain sizes through a stack of sieves of reducing mesh size down to a minimum of 63 microns. Whilst smaller mesh sizes can be used to quantify the silt fraction down to 5 microns the time investment required means that one of the other techniques is normally used for the fine fraction. Sedimentation is usually carried out on the passing 63-micron fraction (silt and clay) after the sand has been quantified by sieving. It uses the principle that coarse particles separate out of a suspension quicker than fine particles. The clay and silt content is measured by either drawing off samples by pipette (pipette method) or using a hydrometer to measure suspension density (hydrometer method) over set periods of time (SASSA, 2010). For the samples analyzed from Stanton Drew, the hydrometer method was used to determine the fine fraction. A summary of the test results presented in Graph 1 and Table 1 below.



Graph 1. The particle size distribution curves of the samples taken at three locations from the Great Circle and Northeast Circle, Stanton Drew.

The reddish-brown to red colour and with a sand content ranging from 77.3% to 86.5% that comprises of a mainly fine and medium grain size suggests that the origin of the soil is a result of the weathering and erosion of the underlying Triassic strata of Mercia Mudstone, where there is found locally a marginal facies that comprises soft red and fawn calcareous sandstone bands. There appears, from the samples tested, to be a general coarsening of the material across the site from the southwest to the northeast and down slope; SDGC 1 has a medium sand content of 33.0%, SDGC 2 has 48.4% and SDGC 3 has 67.8% while the fine sand content reduces SDGC 1: 42.8%, SDGC 2: 27.4% and SDGC 3: 16.0%. The iron content of sample SDGC 3 determined as 15920 mg/kg is almost twice that of SDGC1 determined as 8283 mg/kg and this may be a reason for the much redder colour of SDGC 3. It is possible that the variability of the iron content and the sand content may have some effect on any geophysical survey results undertaken at the site. There is a slight reduction in pH across the sample line from pH7 (SDGC 1) to pH6.7 (SDGC 3), the soil organic matter might have been influenced by grass roots present in the sample. These sandstones can be seen in a road cutting 500 metres to the south of the Stone Circle complex (figure 7) also heading from the village hall and going westwards along the same outcrop as the Stone Circle complex runs the aptly named Sandy Lane.

Figure 7. Sandstone exposed in a roadside cutting at NGR ST 5960 6056. Weathering and erosion of the material is apparent.

Sample	***Location (NGR)***	***Cobbles (%)***	***Gravel (%)***	***Sand (%)***		***Silt (%)***	***Clay (%)***
SDCC 1	ST59947/63223	0	0.1	Coarse:	1.5	15.3	7.4
		-	-	Medium:	33.0	-	-
		-	-	Fine:	42.8	-	-
SDGC 2	ST60024/63271	0	0.2	Coarse:	2.9	13.7	7.4
		-	-	Medium:	48.4	-	-
		-	-	Fine:	27.4	-	-
SDGC 3	ST60080/63360	0	0.2	Coarse:	2.7	9.9	3.3
		-	-	Medium:	67.8	-	-
		-	-	Fine:	16.0	-	-

Table 1. Summary table of particle size proportions for the samples taken at three locations from the Great Circle and Northeast Circle, Stanton Drew.

Samples SDGC 1 and 3 were also analysed for iron content, pH and soil organic matter. The results are presented in Table 2 below.

Sample	Field description	Iron (mg/kg)	pH (unit)	Soil organic matter (%)
SDGC 1	Pale reddish-brown, slightly silty, slightly clayey, mainly fine and medium SAND with some organic content (grass roots, etc.)	8283	7.0	0.3
SDGC 3	Red brown, slightly silty, slightly clayey, mainly fine, and medium SAND with some organic content (grass roots, etc.)	15920	6.7	0.6

Table 2. Summary of chemical analyses results of samples SDGC 1 and 3 from the Great Circle and Northeast Circle.

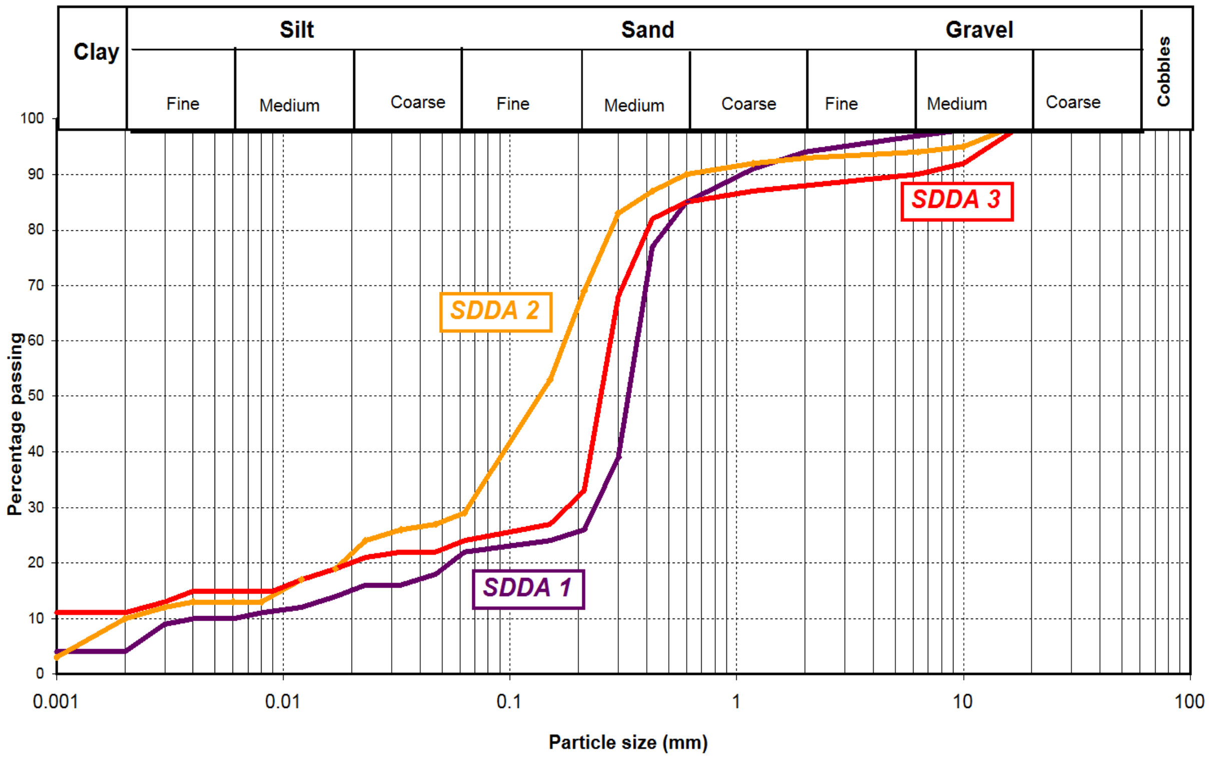


Figure 1. Particle size distribution summary of three samples taken from locations in the rear garden of the Druids Arms, Stanton Drew.

Sample	***Location (NGR)***	***Cobbles (%)***	***Gravel (%)***	***Sand (%)***		***Silt (%)***	***Clay (%)***
SDDA 1	ST59744/63128	0	6	Coarse:	9	16	6
0.25m		-	-	Medium:	59	-	-
		-	-	Fine:	4	-	-
SDDA 2	ST59743/63131	0	7	Coarse:	3	18	11
0.35m		-	-	Medium:	21	-	-
		-	-	Fine:	40	-	-
SDDA 3	ST59744/63120	0	12	Coarse:	3	13	12
0.30m		-	-	Medium:	52	-	-
		-	-	Fine:	9	-	-

Table 1. Summary table of particle size proportions for the samples taken at three locations from the Druids Arms rear garden, Stanton Drew (as a consequence of rounding totals may not equal 100). Location was determined using hand held Garmin etrex GPS (accuracy ±5 metres).

Samples SDDA 1, 2 and 3 were also analysed for iron content, pH, soil organic matter and water-soluble phosphate. The results are presented in Table 2 with field descriptions of each sample tested.

Sample	**Field description**	**iron (mg/kg)**	**pH (unit)**	**soil organic matter (%)**	**water soluble phosphate (mg/l)**
SDDA 1 0.25m	Brown very slightly gravelly, slightly silty, very slightly clayey SAND. Sand is mostly medium with slight coarse and fine grain size. With fragments of burnt material (charcoal) and brick,	23950	7.2	1.6	<10
SDDA 2 0.35m	Red brown very slightly gravelly, slightly silty, slightly clayey SAND. Sand is mostly fine and medium with some very slight coarse grain size. Gravel is sub-angular to sub-rounded, fine to coarse of red sandstone (weathered).	16470	7.9	1.1	<10

SDDA 3 0.30m	Red brown slightly gravelly, slightly silty, slightly clayey SAND. Sand is mostly medium with slight fine and very slight coarse grain size. Gravel is sub-angular to sub-rounded, fine, and medium of red sandstone (weathered/soft). With some organic content (charcoal).	13580	7.9	0.9	<10

Table 2. Summary of chemical analyses results and field descriptions of samples SDDA 1, 2 and 3 from the Druids Arms rear garden, Stanton Drew.

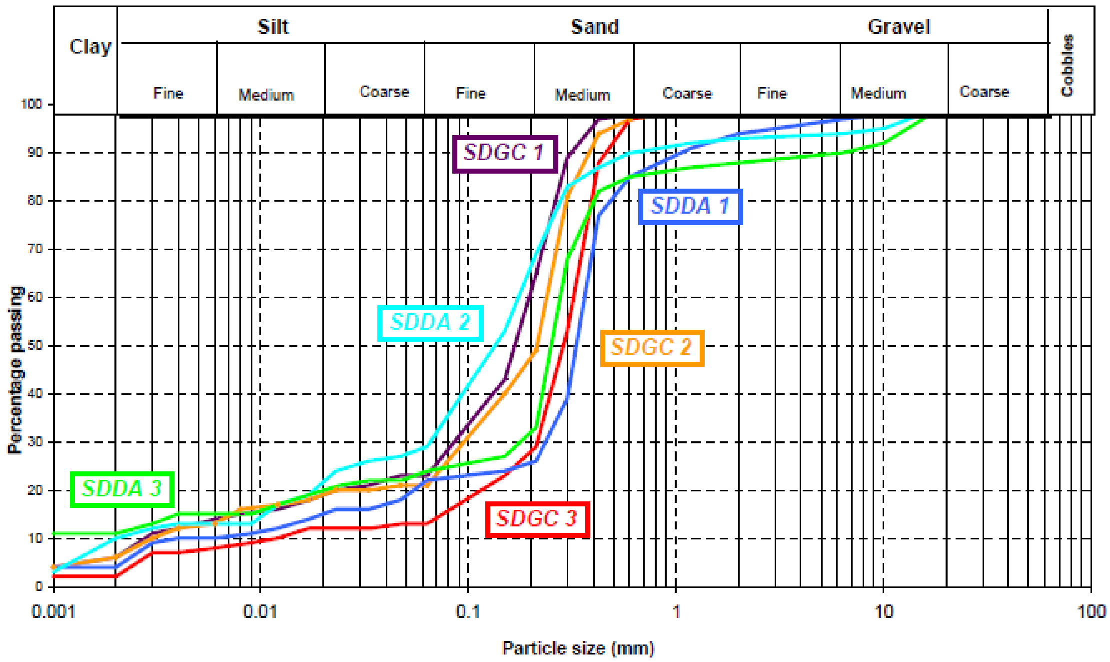


Figure 1. Particle size distribution summary of the samples analysed from the Great Circle complex (SDGC 1, 2 and 3) and the rear garden of the Druids Arms (SDDA 1, 2 and 3) at Stanton Drew.

The particle size distribution summary in figure 1 shows that the 3no. SDGC samples fit broadly into a particular envelope as do the 3no. SDDA samples. There is a correlation between the two sets of data from the medium sand grain size down to the clay fraction, however the samples SDDA from the Druids Arms generally have slightly more coarse sand and gravel and this may be as a consequence of an outcrop of sandstone that is relatively close to the surface, although this has not been confirmed. The Druids Arms is located by the roadside and sandstone exposures are visible at several locations along the road that runs through the village. The soil descriptions for the SDDA samples indicate that the gravel fraction contains some [weathered] red sandstone material possibly remaining relatively close to its source whereas the generally finer SDGC samples might suggest colluvial deposition. The existing ground surface of the garden area was strewn with a variety of building debris and several bonfire sites; generally, there was ≈100mm of grass and topsoil over the survey area and it is likely that the material tested had been previously disturbed as the samples contained brick fragments and charcoal, without further testing the depth of any disturbance cannot be established. It might be that material excavated during construction of buildings, etc. has been levelled across the garden area leading to the possibility of an older ground surface below, careful hand-augering around the garden area might prove beneficial in establishing depths of any disturbance, etc. Without further testing it is difficult to draw too many conclusions from the test results although they do provide some useful indicators.

Although the above results may give some indications as to the local geology it should also be noted that the sample size is very small and as a consequence the results should be seen as inconclusive. In order to fully understand the soil composition a comprehensive sampling strategy would need to be undertaken across the full extent of the site and probably into the surrounding area and for a representative range of samples to be collected and analysed for a wider range of particle size distributions and trace elements.

Fieldwork Report: Hautville's Quoit, Stanton Drew.

Hautville's Quoit (*Figure 1*) is located at Quoit Farm, near Stanton Drew, NGR ST 60173/63811, and plotted using hand-held Garmin etrex GPS accuracy +/- 5 metres.

Figure 1. Hautville's Quoit after some clearing of debris from the surface of the stone.

Geology:

According to the BGS 1:50 000 Map (Sheet 264) the underlying geology comprises Mercia Mudstone strata of Triassic age, this in turn overlies, unconformably, strata of Supra - Pennant Measures which form part of the Upper Coal Measures of Carboniferous age, below at an unspecified depth. To the east and south of the site is alluvium of Pleistocene and Recent age; also, to the east of the site and below at unspecified depth is the Pensford No.2 Coal Seam.

The soil found at Quoit Farm is likely to be derived from the erosion and subsequent transport of material from the Lias strata of Jurassic age that forms the high ground to the north of the site. In particular, from a layer consisting of mainly clay and shale, there is a substantial area of landslip on the slopes of Maes Knoll (East Dundry) and around the village of Norton Malreward. The strata that comprise the landslip are described as mainly clay with White and Blue Lias, mainly limestone, also of Jurassic age. The clay content of these soils is likely to retain higher moisture content than the sandy soils of the stone circle site on the south side of the River Chew.

Hautville's Quoit consists of a pale brown to grey sandstone. The sandstone can be described as comprising subrounded to rounded (high sphericity), fine to medium (250 - 375 microns), well to medium sorted, shiny, polished, mostly translucent grains of quartz, that appear matrix supported in a siliceous cement. There are noted numerous small clam-like (bivalve) fossil shells measuring up to 10mm x 6mm in an area of exposed bedding

Figure 2. The pock-marked surface of the stone is clearly visible.

surfaces, these fossils are possibly a marker bed and might be useful in determining the origin of the rock type; these fossils have not yet been identified. A white scaly appearance on some parts of the stone is likely to be due to lichen growth or as a result of weathering. The pock-marked surface (*Figure 2*) might be the consequence of a number of factors, including the effect of roots or solution. There are a number of lines of cleavage and other surface features visible on the stone (*Figure 3*); these factors are the subject of on-going research. The quoit was examined using an illuminated field microscope with x30 magnification and hand lens with x8/x15 magnification, natural light conditions were good at times; the stone had been cleared of debris.

Figure 3. Surface features visible on the stone

Discussion and follow-up fieldwork:

On a purely personal note, the rock type that comprises Hautville's Quoit is not one that is recognised either locally, or in the broader surrounding area. There are a number of features of the stone that require further consideration. Some subsequent fieldwork in the Mendip area has been carried out in the Ebbor Gorge area to look at exposures of the Quartzitic Sandstone Group (QSG) associated with the Ebbor Thrust. However, it is thought unlikely that this particular exposure provided the source for Hautville’s Quoit.

Lloyd-Morgan (1887) described the rock type that comprises the quoit as fine-grained sandstone. Lloyd-Morgan hesitates to offer any opinion as to the source of sandstones found at Stanton Drew, either that of the quoit or the stones found in the stone circle close by and states *"of the source, geological and local I am doubtful"*, he does, however go on to ask the question *"Is it possible that one or more of the sandstone monoliths may be sarsen - but whence?"*

Mercer carried out an excavation at the site in 1969 and also attributes the stone as of 'Wiltshire sarsen stone' origin.

Hardy (1999, p. 176, 181) in his book 'The Geology of Somerset' describes a 'tough silica-cemented sandstone found as loose masses in the surface of softer rocks'. A number of these 'sarsen' stones were uncovered during the construction of the M5 motorway in the Blackdown Hills area close to Taunton but many of these appear to have been 'lost'.

The references of Lloyd-Morgan and Mercer prompted a field trip to Fyfield Down in Wiltshire, an area that is renowned for the sarsen stones, also called 'grey wethers', that are found there, and many have been used in monument sites such as Avebury and Stonehenge.

There are a number of similar features (*figures 4 and 5*) in the stones at Fyfield Down and Hautville's Quoit.

Figure 4. Pock-marked surface of a 'sarsen' stone seen on Fyfield Down.

The 'grey wethers' can generally be described as sandstone that comprises of grey, fine to medium (250 - 375 microns), sub-rounded to rounded (high sphericity), well sorted, shiny, polished, mostly translucent grains of quartz, the clasts are contained in a matrix comprising siliceous cement. Occasional stones were also noted to have variable colour from a pale grey-brown to more orange, possibly a result of iron content. Some of the stones contained rare flint nodules and very occasional fine to medium, sub-rounded to rounded gravel of quartz. The shape of the 'grey wethers' was also variable from rounded and spherical to more sub-angular blocks, with sizes ranging from <1m^3 to several m^3. It should be noted that no occurrences of fossils were noted in any of the stones observed at Fyfield Down.

The chert from the Upper Greensand that occurs in the Blackdown Hills near Taunton was formed as silica solution in the ground water filled the voids within the sandstone to convert it to quartzite or chert; this rock-type is of Cretaceous age. Fossils found in these sandy sediments are preserved in a similar process as silica replaced the calcium carbonate content of the shells (Hardy, 1999, pp. 176, 181). A field trip to this area to examine any outcrops or older buildings might provide further evidence.

Figure 5. More of the various surface features that were noted on stones found at Fyfield Down.

Some further rock-types to be considered:

Ganister is hard, fine-grained quartzose sandstone cemented with secondary silica and typically has a characteristic splintery fracture. Cornish miners originally coined this term for hard, chemically, and physically inert silica-cemented quartzose sandstones, commonly, but not always found as seatearths within English Carboniferous coal measures. Where a ganister underlies coal as a seatearth, it typically is penetrated by numerous root traces. These root traces typically consist of carbonaceous material. Ganisters that contain an abundance of fossil roots, which appear as fine carbonaceous, pencil-like streaks or markings, are called “pencil ganisters”. In other cases, the root traces consist of fine, branching nodules, called “rhizoliths”, which formed around the roots before they decayed (Wikipedia, online, accessed 30th April 2012). It is feasible that this rock-type was found within the Coal Measures in the Pensford area but no reference to it has, so far, been found in publications accessed.

Fieldwork Report: An assessment of the soils and sediments of the Big Mound field and the nearby River Chew floodplain.

An assessment of the sediments that comprise the floodplain of the River Chew and a tributary, Norton Brook, was undertaken as part of the overall survey of the field known as Big Ground and the surrounding area. The River Chew forms the present southern boundary of Big Ground [and West Mead] generally passing through the floodplain flowing in a west to east direction. Norton Brook forms the present eastern boundary of Big Ground and flows in a northwest to southeast direction from its source at ~150 metres AOD on East Dundry to where it joins the River Chew at ~40 metres AOD.

The sediments observed along the banks of the River Chew and in the sections recorded comprise an agricultural topsoil/ploughsoil of stiff brown silt/clay with abundant organic content comprising mainly grass and roots, overlying soft pale brownish red very sandy silt, which in turn overlies firm pale grey-brown sandy silt with some organic content comprising decayed wood to an undetermined depth. The sands and silts are likely to be derived from sandstone bands within the Mercia Mudstone and a local outcrop of sandstone upstream of the area being investigated, these formations are all of Triassic age.

The sediments that were observed in the banks of the tributary, Norton Brook and in the section recorded shows a multi-layered stratigraphy comprising agricultural topsoil, silt/clay, clay and gravels, these layers are of varying thickness and mostly of a pale grey-brown colour. These sediments are likely to be mainly derived from the erosion and subsequent transport of material from the Lias strata of Jurassic age that forms the high ground to the north of Big Ground. In particular, from a layer consisting of mainly clay and shale, there is a substantial area of landslip on the slopes of East Dundry around the source of the brook and also around the village of Norton Malreward. The strata that comprise the landslip are described as mainly clay with White and Blue Lias, mainly limestone, also of Jurassic age.

To assess the soils underlying the immediate area of the ‘Big Mound’ an examination of the sediments exposed in a number of molehills revealed soil comprising variably brown to red brown, slightly gravelly, silty sand. The sand is fine to medium, and the gravel is medium to coarse, sub-angular of weathered sandstone. The soil appears to be mostly derived from the erosion of sandstone bands or from a local outcrop of more competent sandstone; it is probable that the underlying geology of the Big Mound is comprised of sandstone. These formations are part of the Mercia Mudstone Group of Triassic age.

A subsequent field trip to investigate the floodplain and riverbank sediments downstream in the Bye Mills area revealed that the sediments there comprise an agricultural topsoil/ploughsoil of brown sandy silt/clay with abundant organic content comprising mainly grass and roots, overlying red silty sand to an undetermined depth. There was stratigraphical evidence of a flood event in the boundary between the topsoil and sand deposits comprising a ~50mm layer of grey-black sandy silt/clay with abundant organic content overlain in places by a thin layer of red silty sand.

Further investigation of the riverbank and floodplain from the bridge over the River Chew at Stanton Drew down to the narrowing of the river valley at Bye Mills provides evidence that there is a significant depth of sediments. The river valley becomes constricted at Bye Mills and this narrowing continues to the village of Pensford, anecdotal evidence for regular flooding of the area is known. The erodible nature of the strata to the north and south of the river and the depth of sediments within the narrow floodplain suggests that the valley has always been congested, whether this has been accelerated due to the effects of ploughing and agricultural land usage is unclear. There is some evidence that the river course has changed over time both naturally and manufactured by human intervention.

Figure 1. *A possible ancient river course on the southern side of the River Chew at Bye Mills, flood water can be seen to lie within the depression.*

Along the south side of the River Chew is an elongate depression, ~1 metre depth, running parallel to the river course suggesting this is possibly an ancient river course (see figure 1). The river has been diverted from its original course at Bye Mills where there are a number of constructed features including weirs, sluices, and channels. It is possible that the river once ran much closer to the Stanton Drew Stone Circle coming up to the raised terrace at the end of the Avenues to the northeast of the site. To further determine the depth of sediments within the floodplain area an augering strategy would be required. This might involve hand auger methods along the lower river bank preferably when water levels are low, alternatively mechanical borehole could be progressed, but this has obvious cost implications.

<table>
<tr><td colspan="3">Location: East facing bank section of the River Chew at Stanton Drew</td><td>NGR: ST 60305/63359</td><td>Date: 03/03/2013</td></tr>
<tr><td colspan="5">Site description:

The River Chew forms the present southern boundary of the field known as ‘Big Ground’ generally it passes the site flowing in a W → E direction. The description below is of an east facing section to investigate sediment deposition in the river floodplain (see figures 2, 3 and 4).</td></tr>
<tr><td>Depth (m):</td><td>Thickness (m):</td><td colspan="3">Soil description:</td></tr>
<tr><td>0.00</td><td>0.40</td><td colspan="3">Agricultural topsoil/ploughsoil: stiff brown SILT/CLAY with abundant organic content comprising mainly grass and roots.</td></tr>
<tr><td>0.40</td><td>2.60</td><td colspan="3">Soft pale brownish red very sandy SILT, sand is fine to medium.</td></tr>
</table>

3.00	0.20 (depth excavated - full depth unknown)	Firm pale grey-brown sandy SILT with some organic content comprising decayed wood, sand is fine to medium.

NOTE: at the time of investigation the present river level was approximately 3.00 metres below ground level (mbgl).

Figure 2. *Agricultural soil (0.00-0.40mbgl) exposed in the east facing bank of the River Chew*

Figure 3. *Sandy silt (0.40-3.00mbgl) as exposed in east facing section in bank of the River Chew.*

Figure 4. *Varying sandy silts and decayed organic material (~2.00-3.20mbgl) as exposed in east facing section in bank of the River Chew.*

<table>
<tr><td colspan="3">Location: East facing bank section of Norton Brook, near Stanton Drew</td><td>NGR: ST 60477/63531</td><td>Date: 24/02/2013</td></tr>
<tr><td colspan="5">Site description:

Norton Brook is a tributary of the River Chew and forms the present eastern boundary of the field known as ‘Big Ground’. It flows in a NW → SE direction from its source at ~150m AOD on East Dundry to where it joins the River Chew. The description below is of an east facing section to investigate sediment deposition in the river floodplain (see figure 5).</td></tr>
<tr><td>Depth (m):</td><td>Thickness (m):</td><td colspan="3">Soil description:</td></tr>
<tr><td>0.00</td><td>0.40</td><td colspan="3">Agricultural topsoil/ploughsoil: stiff brown SILT/CLAY with abundant organic content comprising mainly grass and roots.</td></tr>
<tr><td>0.40</td><td>0.55</td><td colspan="3">Stiff brown slightly sandy SILT/CLAY with abundant orange-brown flecks, some organic content – roots and rootlets.</td></tr>
</table>

0.95	0.70	Very stiff pale brown very slightly sandy SILT/CLAY with frequent orange-brown flecks, some organic content – roots and rootlets.
1.65	0.20	Soft to firm pale brown sandy CLAY with orange- brown flecks, occasional organic content comprising black decayed wood.
1.85	0.10	Soft pale grey-brown sandy CLAY with abundant organic content comprising black and brown decayed wood.
1.95	0.10	Dense sandy clayey GRAVEL, gravel is fine to medium sub-angular to round of mudstone and siltstone with frequent iron staining.
2.05	0.10	Soft to firm gravelly CLAY with abundant organic content comprising black and brown decayed wood, gravel is fine to medium sub-angular to round of mudstone and siltstone with frequent iron staining.
2.15	0.05	Soft blue-grey CLAY with abundant organic content comprising black and brown decayed wood.
2.20	0.05	Dense sandy clayey GRAVEL, gravel is fine sub-angular to rounded of mudstone and siltstone with frequent iron staining.
2.25	0.10	Stiff pale grey-brown CLAY.
2.35	0.20	Dense sandy clayey GRAVEL, gravel is fine to coarse sub-angular to rounded of mudstone and siltstone with frequent iron staining.
2.45	0.25	Decayed tree root/stump with lenses of blue-grey clay and gravel as described above.
2.70	unknown	Active stream bed comprising medium to coarse gravel overlying sandy silts and clay to an unknown depth, also organic content and waste material – potsherds, clay pipe, metal objects, etc.

Figure 5. *East facing section of sediments exposed in the bank of Norton Brook as described above (the 2.0 metre range pole appears shortened due to the sloping nature of the bank)*

Location: Big Mound			**NGR**: ST 60333/63443	**Date:** 24/02/2013
Site description: Description of soil exposed in a number of molehills on the western slope of the 'big mound' in the field known as Big Ground (see figure 6).				
Depth (m):	**Thickness (m):**	**Soil description:**		
surface	unknown	Loose variably brown to red brown, slightly gravelly, silty SAND. Sand is fine to medium; gravel is medium to coarse, sub-angular of weathered sandstone. The soil is likely to be derived from the Sandstone Bands or a local outcrop of more competent sandstone; both formations are part of the Mercia Mudstone Group of Triassic age.		

Figure 6. *Soil exposed in molehill on western slope of Big Mound (the rock specimen seen in the top left of the picture was found elsewhere).*

<table>
<tr><td colspan="2">Location: Bye Mills</td><td>NGR: ST 60900/63705</td><td>Date: 07/04/2013</td></tr>
<tr><td colspan="4">Site description:

Description of sediments exposed in scoured north facing riverbank (see figures 7 and 8).</td></tr>
<tr><td>Depth (m):</td><td>Thickness (m):</td><td colspan="2">Soil description:</td></tr>
<tr><td>0.00</td><td>0.3</td><td colspan="2">Agricultural topsoil/ploughsoil: stiff brown SILT/CLAY with abundant organic content comprising mainly grass and roots.</td></tr>
<tr><td>0.30</td><td>0.05</td><td colspan="2">Grey-black sandy SILT/CLAY with abundant organic content, overlain in places by red silty sand (possible flood event).</td></tr>
<tr><td>0.35</td><td>unknown</td><td colspan="2">Medium dense red silty SAND, sand is fine to medium.

River level at ~2.0mbg.l</td></tr>
</table>

Figure 7. *Agricultural soil (0.00-0.30mbgl) exposed in the north facing bank of the River Chew overlying red silty sand, between can be seen a darker grey-black organic sediment representing a possible flood event.*

Figure 8. *Sediments exposed in the scoured north facing bank of the River Chew at Bye Mills.*

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