AHKRpt 2844

By P. Murphy

Spong Hill, Norfolk : Interim report on Environmental Studies 1977-78

A. Peri-glacial and post-glacial 'natural' features

The gravel subsoil exposed during excavation at Spong Hill shows a confusing variety of natural and artificial features of varying dates. In these circumstances the isolation and definition of archaeological features, particularly those of early date which have suffered from erosion, presents considerable difficulties. Similar problems were apparently encountered during the excavation of the Broome Heath Neolithic settlement (Evans, 1972a, 77) though the situation at Spong Hill is made more difficult by the fact that the surviving fossil periglacial features do not form a regular well-defined pattern, as at Broome Heath. The purpose of this note is to outline the geological processes which may have led to the formation of the natural features, and to summarise their characteristics, in the hope that this will be of some assistance in the interpretation of such features during future excavation seasons.

The Pleistocene geology of this area of Norfolk has been described by Phillips (1976). The plateau gravels between East Dereham and North Elmham, of which Spong Hill forms a part, are known as the Hungry Hill Gravels, currently interpreted as glacial outwash gravels deposited during the Wolstonian (penultimate) glaciation. This spread of gravel was subsequently dissected during the development of the drainage system of the Wensum. The Hungry Hill gravels characteristically consist of an upper layer of coarse rounded flint gravel in an orange sand matrix over a greater depth of coarse orange sand. In several sections exposed in gravel pits, Phillips reports the presence of features indicating frost disturbance of the surface of this gravel, including vertical stones, involutions and ice-wedge casts, and she suggests that the concentration of stones at the top of the deposit may have resulted from repeated frost action.

The gravels at Spong Hill also show clear signs of frost action in a periglacial environment. Several categories of surviving fossil features and structures have been distinguished.

1. Sorted upper layer

Sections through the natural gravel show a concentration of larger flints at the top of the deposit, and the lower parts of the main enclosure ditches are cut through a coarse orange sand. Although this may represent varying conditions of deposition, such sorting can also result from freeze-thaw processes (West 1977, 85). A section in grid squares 675 and 685 illustrates this phenomenon (Fig 1). The significance of features 1768 and 1769 is not clear.

2. Linear features

Although a well-developed polygonal pattern of fissures is not distinguishable at Spong Hill, isolated linear features are present. Context 1787 is a good example unfortunately not completely sectioned. This was exposed over a length of some 7.5 m., though it was obscured at either end (Fig. 2). West (idem, 93) describes the processes, including the development of ice-wedges, by which such fissures may form.

3. Small penannular features

Examples of these features occur in grid squares 1064 and 1065. In section they resemble the linear features: an upper U-shaped portion, with a lower tapering wedge-shaped part. In plan they form small incomplete circles up to about 2.5 m. in diameter.

4. Larger features

These are interpreted as fossil periglacial features since their fills include vertically-oriented stones and layers, though their precise mode of formation is not understood by the writer. Examples are 1642 and the complex of features in grid square 1042 (Figs. 3 + 4).

In addition to these periglacial features natural features probably of post-glacial origin are also present. These are termed 'subsoil hollows' by Evans (1972, b,219). An example is 846 (Fig. 5), a shallow feature very roughly circular and about 2.5 m. in diameter with near-horizontally stratified fill including flints most of which have their long axes orientated horizontally. Evans suggests that such features may be the casts of tree-root systems.

Frequently these natural periglacial and postglacial features include Neolithic material in their upper parts. This suggests that they survived as surface undulations in the Neolithic, before soil erosion following presumed deforestation had led to the 'planing off' of the surface of the hill. In many cases the accumulation of Neolithic refuse in such hollows need not have involved artifical excavation, which would provide an explanation for the amorphous character of some Neolithic 'features'. Other examples, however, are well-defined with sharp margins, undoubtedly purposefully dug.

The sequence of events thought to have led to the formation of the features described is summarised in Table 1.

Evans, J.G. (1972) a. Ice Wedge Casts, in Wainwright, G.J. 'The Excavation of a Neolithic settlement on Brooms Heath, Ditchingham, Norfolk PPS 38, 31.

Evans, J.G. (1972) b. Land Snails in Archaeology London

Phillips, L. (1976) 'Pleistocene vegetational history and geology in Norfolk' Phil.Trans. Royal Soc. Lond. Series B 275, 175-286.

West, R.G. (1977) Pleistocene Geology and Biology (2nd ed.) London

Phase	Processes	Surviving deposits and features.
Flandrian (postglacial)	Later occupation and farming	Pits, ditches etc.
	Soil erosion - loss of upper part of Neolithic features. Neolithic occupation.	Pits etc. Accumulation of refuse in tops of natural features.
	Forest clearance (presumed)	Post-glacial features - tree root casts etc.
	Forest development (presumed)	
	Soil formation	
Devensian glaciation	Frost disturbance of the gravel surface	Peri-glacial features
Ipswichian interglacial		
Wolstonian glaciation	Deposition of the Hungry Hill Gravel outwash sheet, and its subsequent dissection during development of the Wensum drainage system	Main mass of gravel and sand forming Spong Hill

Table : Summary of geological and archaeological sequence at Spong Hill.

(Adapted, with additions, from Phillips (1976, 231)

B. Alkali-soluble humus and pH estimates

In general the fills of most archaeological features at Spong Hill consist of little more than re-deposited gravel. However, the upper deposits of the main ditches frequently include areas of dark soil (10YR3/2), darker than the modern Ap horizon (10YR4/3). These deposits are unusual in that they produce relatively large amounts of bone, though in a poor state of preservation. Samples of these layers (context nos. 1257, 1280, 1318, 1818) have been examined in order to determine the reason for this dark colouration and for the relative abundance of bone in them.

Samples of the 'turf' revetment of the Iron Age ditch (1906), a brown (10YR 3.5/3) sandy loam have also been examined.

Methods

Estimates of alkali-soluble humus were made, using samples of the modern Ap horizon and undisturbed gravel for comparison. In each case 1g. of soil was added to 5 ml. of 3N. NaOH in a test-tube, shaken and allowed to settle. The intensity of brown colouration was estimated visually.

pH estimates were made using indicator paper with a 1:2.5 suspension of soil in distilled water.

Results

The organic content of samples from the upper ditch fills is similar to that of the modern ploughsoil. The samples contain quantities of finely-divided charcoal. pH values are around 6, compared with values around 5 for the Ap horizon and natural gravel.

The material from the 'turf' revetment contains slightly less organic material than the modern ploughsoil.

Interpretation

The relatively high organic content of the upper ditch fill, and its higher pH suggest that it is a refuse deposit. The dark colouration is thought to result from the combined effects of the organic component and the presence of finely-divided charcoal through the possibility of post-depositional incorporation of mineral salts (eg. of Mn or Fe) has not been excluded. The pH has been affected by the deposition of wood ash, bone and other organic refuse containing bases. This provides conditions adequate for some bone survival, though it is still a slightly acid deposit and the samples of faunal remains are probably biased in favour of species with large robust bones.

The interpretation of layer 1906 as a turf revetment, placed on the side of the ditch to stabilise the gravel slope seems reasonable. It is certainly hard to see how a deposit with the characteristics of a 'topsoil' could have formed in this way by natural processes.

C. Carbonised fruits and seeds

Recovery : Seeds and charcoal were recovered from soil samples in the laboratory by water flotation, collecting the flot in a 250 micron mesh sieve.

Contamination : All samples contained intrusive material : insects, shells of Cecilioides acicula and occasional specimens of Vallonia spp., roots and modern seeds. Only definitely carbonised plant material is listed in Table 1.

Botanical descriptions : In general the plant remains recovered are in extremely poor condition, but the barley from the Roman pit 1777 (Sample 60) is well-preserved and worth describing.

The caryopses have the angular cross-sections typical of hulled barley, though few retain their lemmas and paleas. Lemma bases, where they survive, have deep horse-shoe bevels. Grains from lateral spikelets are common. The dimensions of 30 grains are as follows:

	Length (mm)	Breadth (mm)	Thickness (mm)	L/Bx100	T/Bx100
min	4.0	1.5	1.3	161	66
mean	5.38	2.76	2.28	198	83
max.	6.1	3.2	2.9	267	94

The rachis internodes are generally slender, though a few broad internodes from the bases of ears are present. Most specimens have curled up during carbonisation or have subsequently fractured. Marginal pubescence is seen on many specimens.

This sample is of six-row hulled barley, with a lax-eared spike.

Discussion

During the 1977 season early prehistoric features were extensively sampled in an attempt to recover further evidence for arable farming in the Neolithic. Approximately 60 litres of soil from a range of features were examined in the laboratory. The results did not justify this effort; only a few wheat grains (species indeterminate) and hazel-nut shells were recovered. This adds little to the information already gained from grain impressions on pottery from the site.

Hulled barley and spelt wheat were the main cereals recovered from Iron Age and Roman features. Oats were present, but in the absence of floret bases it is impossible to say whether these were a cultivated or wild species. The large cereal deposit, mainly of hulled six-row barley, from pit 1777 is unusual in a Roman context. Such large deposits are much more commonly of spelt wheat. It seems probable that this deposit, and also that from context 558 (described in the last interim report) are the result of accidents occurring during the bulk drying of grain. One suspects that future excavation may well produce the remains of a Roman grain dryer on the site. The Saxon features examined produced no identifiable cereals.

No new cultivars have been identified in the 1977-8 seasons, though the seeds recovered do provide a larger sample of material, thus giving a firmer base for the discussion of cereal farming in the area. Extensive sampling in future seasons is unlikely to produce significant amounts of new information, though a thorough inspection of all the Neolithic pottery from the site for further grain impressions will probably be worthwhile.

Context No.		730	799	1484	1489	941	728	821	973
Sample No.		9	13	61	62	24	4	14	28
Provisional date#phase			Neolithic			Beaker		Iron-Age	
Feature-type			Pits			Pit	Pit	Ditches	
Cereal fragments (< ½ grain)		-	-	-	-	-	-	-	-
Cereal indet.	ca	1	1	-	-	1	1	2	1
Hordeum vulgare L.	ca	-	-	-	-	-	-	-	-
Hordeum sp.	ca	-	-	-	-	-	-	-	-
Triticum sp.	ca	-	1	-	1	-	-	-	-
Avena sp.	ca	-	-	-	-	-	-	-	-
Hordeum sp.	ri	-	-	-	-	-	-	-	-
Triticum sp.	gb	-	-	-	-	-	-	-	-
Triticum spelta L.	gb	-	-	-	-	-	-	-	-
c.f. Thalictrum sp.	a	-	-	-	-	-	-	-	-
c.f. Agrostemma githago L.	s	-	-	-	-	-	-	-	-
Chenopodium album L.	s	-	-	-	-	-	-	-	-
c.f. Atriplex sp.	s	-	-	-	-	-	-	-	-
Chenopodiaceae indet.	s	-	-	-	-	-	-	-	-
Leguminosae indet.	co	-	-	-	-	-	-	-	-
Rumex sp.	nu	-	-	-	-	-	-	-	-
Polygonum aviculare agg.	nu	-	-	-	-	-	-	-	-
Polygonum persicaria L.	nu	-	-	-	-	-	-	-	-
Polygonum convolvulus L.	nu	-	-	-	-	-	-	-	-
Polygonaceae indet.	nu	-	-	-	-	-	-	-	-
Corylus avellana L.	n.fr	-	+	+	-	+(e)	-	+	-
Hyoscyamus niger L.	s	-	-	-	-	-	-	-	-
Compositae indet.	cy	-	-	-	-	-	-	-	-
Carex sp.	nu	-	-	-	-	-	-	-	-
Bromus mollis/secalinus	ca	-	-	-	-	-	-	-	•1
Gramineae indet.	a	-	-	-	-	-	-	-	-
Indet.	bu	-	-	-	-	-	-	-	-
Indet.		-	-	-	-	-	-	-	-
Sample volume (litres)		2.5	2.5	5	5	2.5	2.5	2.5	2.5

Table : Fruits, seeds etc. recovered in 1977-8

Notes : (a) A column sample was taken through this ditch; seeds from different levels are not separated in this table.
(b) Naked embryos. Many testa fragments present but not counted.
(c) Not counted.
(d) Lacks testa.
(e) Collected by hand during excavation.

1239	1905	1906	726	1256	1874	1777	1621	56	776	1704
56	67	68	2	52	66	60	59	-	-	70
IA/Roman	IA/Roman			Roman		Roman	Saxon	Saxon	Undated	
Ditch(a)	Turf revetment +charcoal layer			Ditches		Pit	Pit	inhumation		
-	+	+	-	+	-	+	-	-	-	-
5	10	7	1	8	1	+(c)	5	-	-	-
-	-	-	-	-	-	507	-	-	-	-
1	6	3	-	-	-	-	-	-	-	-
1	2	1	-	1	-	6	-	-	-	-
1	-	1	-	-	-	9	-	-	-	-
-	2	-	-	-	-	88	-	-	-	-
1	8	1	-	-	-	-	-	-	-	1
3	6	2	-	1	1	-	-	-	-	2
-	-	-	-	-	-	1	-	-	-	-
-	-	-	-	-	-	1(d)	-	-	-	-
-	-	-	-	-	-	26	-	-	-	-
-	-	-	-	-	-	4	-	-	-	-
-	-	-	-	-	-	85(b)	-	-	-	-
-	-	1	-	-	-	-	-	1(e)	-	-
-	-	-	-	-	-	83	2	-	-	1
-	-	-	-	-	-	6	-	-	-	1
-	-	-	-	-	-	30	-	-	-	-
-	-	-	-	-	-	4	-	-	-	-
-	-	-	-	-	-	7	-	-	-	-
-	-	-	-	-	-	-	-	-	+(e)	-
-	-	-	-	-	-	-	1	-	-	-
-	-	-	-	-	-	1	-	-	-	-
-	-	-	-	-	-	1	-	-	-	1
2	19	4	-	1	-	3	-	-	-	1
-	+	-	-	1	-	6	-	-	-	1
-	-	-	-	-	-	1	-	-	-	-
-	-	-	-	1	-	7	-	-	-	2
50	2.5	2.5	2.5	2.5	2.5	2.5	10	-	-	2.5

Abbreviations :

a	achene
bu	bulbil
ca	caryopsis
co	cotyledon
cy	cypsela
gb	glume base
fr	fragments
indet	indeterminate
n	nutshell
nu	nutlet
ri	rachis internode
s	seed

SEE ORIGINAL PENCIL DRAWING FOR FULL DETAIL)

G.S. 1012

XED YELLOW AND ORANGE -

N SAND TO SANDY GRAVEL

ttSand, scattered small + a few med. pebbles
BROWN FINE GRAVEL, SCATTERED
PEBBLES.
BROWN FINE GRAVEL + PATCHES OF DARK BROWN SILT
MODERATE SMALL PEBBLES.
YELLOW FINE GRAVEL, FEW SMALL PEBBLES.
BROWN FINE GRAVEL, OCCASIONAL SMALL PEBBLES.

1886].

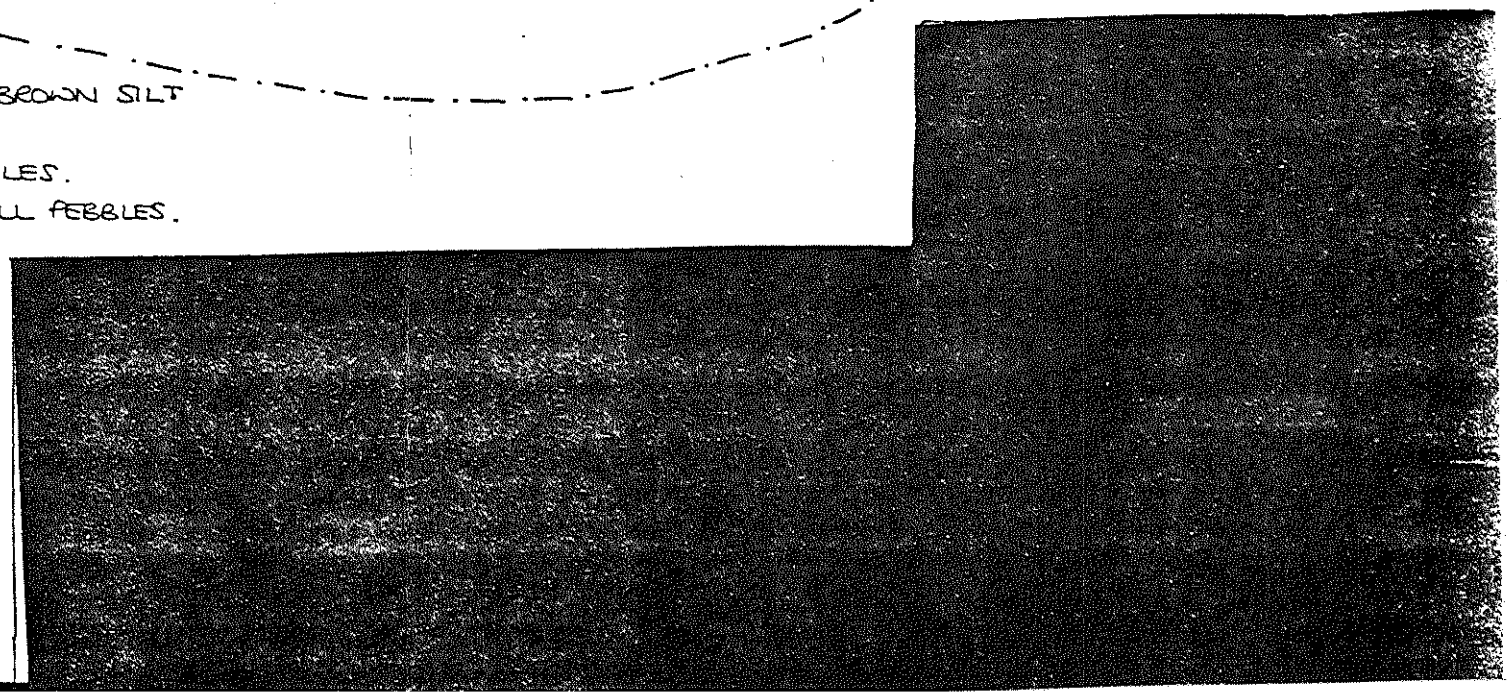
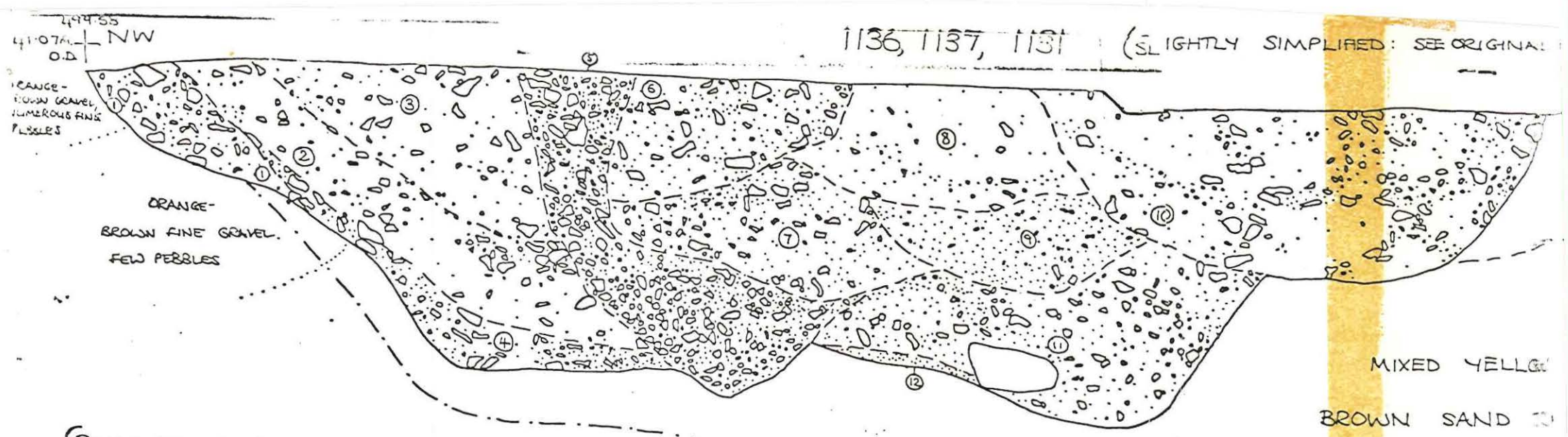


Fig 4



1136, 1137, 1131 (SLIGHTLY SIMPLIFIED: SEE ORIGINAL)

31
- (1): MID BROWN GRAVEL, MODERATE MEDIUM + SMALL PEBBLES.
- (2): DARK BROWN SILT SAND, SCATTERED SMALL + FEW MED. PEBBLES.
- (3): DARK BROWN, SLIGHTLY ORANGE, SILT SAND, SCATTERED SMALL + MEDIUM PEBBLES.
- (4): DARK BROWN SILT SAND, NUMEROUS SMALL, MODERATE MEDIUM, PEBBLES.
- (5): ORANGE - BROWN SAND GRAVEL, EXTREMELY NUMEROUS SMALL, + MODERATE MEDIUM, PEBBLES.
- (6): MID BROWN GRAVEL, MODERATE SMALL + FEW MEDIUM PEBBLES.
- (7): ORANGE BROWN COMPACT GRAVEL, MODERATE SMALL PEBBLES.
- (8): BROWN ORANGE GRAVEL, SCATTERED SMALL PEBBLES.
- (9): ORANGE BROWN COMPACT FINE GRAVEL, MODERATE SMALL PEBBLES.
- (10): MIXED MID BROWN + ORANGE BROWN FINE GRAVEL, MODERATE SMALL + FE MED. PEBBLES.
- (11): MIXED MID BROWN + ORANGE BROWN GRAVEL, MODERATE SMALL + FEW MEDIUM PEBBLES.
- (12): ORANGE BROWN VERY COMPACT GRAVEL

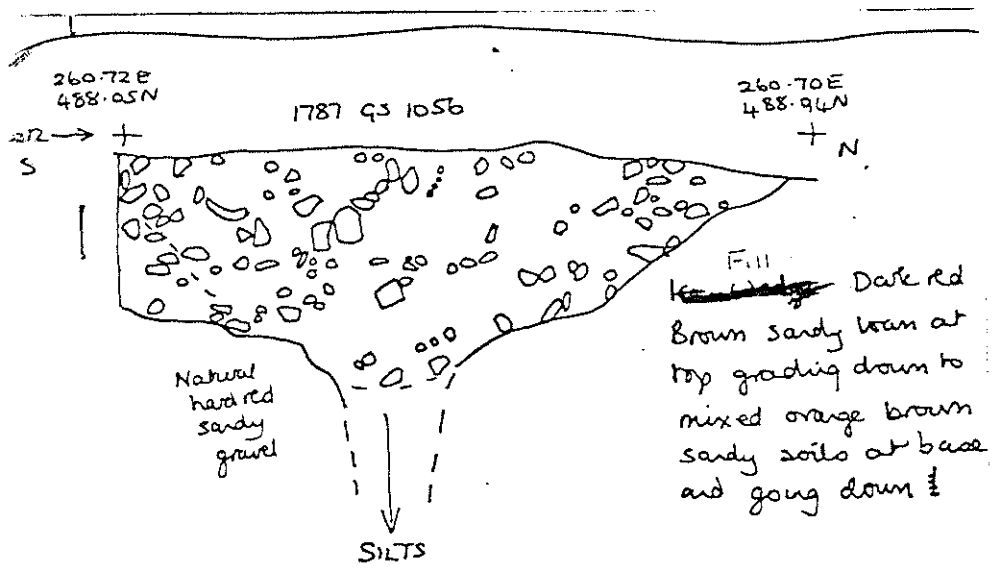
1136
- (25) Dark Brown Silt Sand, scatter
- (26): ORANGE BROWN FINE SMALL PEBBLES.
- (27): ORANGE BROWN FINE SAND, MODERATE SM
- (28): BROWN / YELLOW FINE
- (29): ORANGE BROWN FIN

1137 = (30): [PART OF 1136].

5
- (13): ORANGE BROWN GRAVEL, NUMEROUS SMALL + FEW MED. PEBBLES.
- (14): ORANGE BROWN SANDY GRAVEL, FEW SMALL PEBBLES.
- (15): BROWN ORANGE GRAVEL, SCATTERED SMALL PEBBLES.
- (16): BROWN ORANGE GRAVEL, NUMEROUS SMALL + MED. PEBBLES.
- (17): DARK BROWN SLIGHTLY SANDY SILT, MODERATE SMALL + MED. PEBBLES.
- (18): DARK BROWN SILT SAND, PATCHES OF MID. BROWN SAND, MODERATE SMALL PEBBLES.
- (19): BROWN ORANGE COMPACT GRAVEL, OCCASIONAL SMALL PEBBLES.
- (20): ORANGE BROWN GRAVEL, SCATTERED SMALL PEBBLES.
- (21): DARK BROWN SILT SAND, SCATTERED SMALL PEBBLES.
- (22): DARK BROWN SILT SAND, MODERATE SMALL + MED. PEBBLES.

Fig

Fig 2.


260·72 E
488·05 N
1787 GS 1056
260·70 E
488·94 N
N
S
Fill
Dark red
Brown sandy loam at top grading down to mixed orange brown sandy soils at base and going down
Natural hard red sandy gravel
SILTS

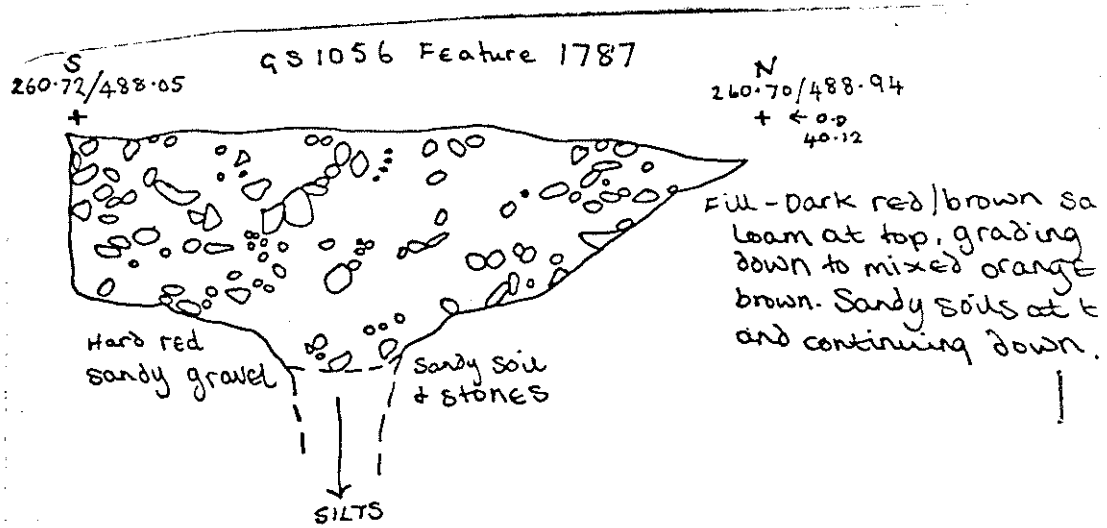
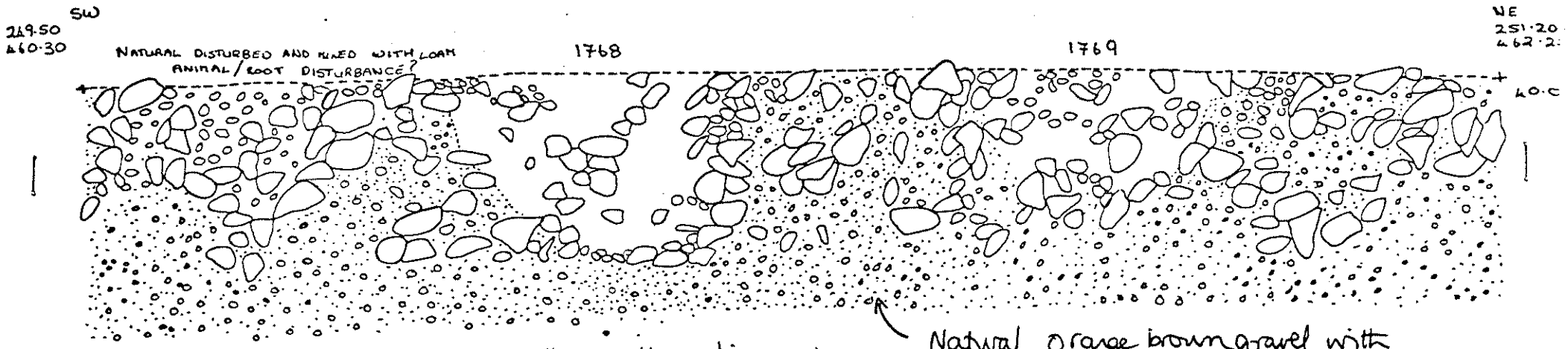
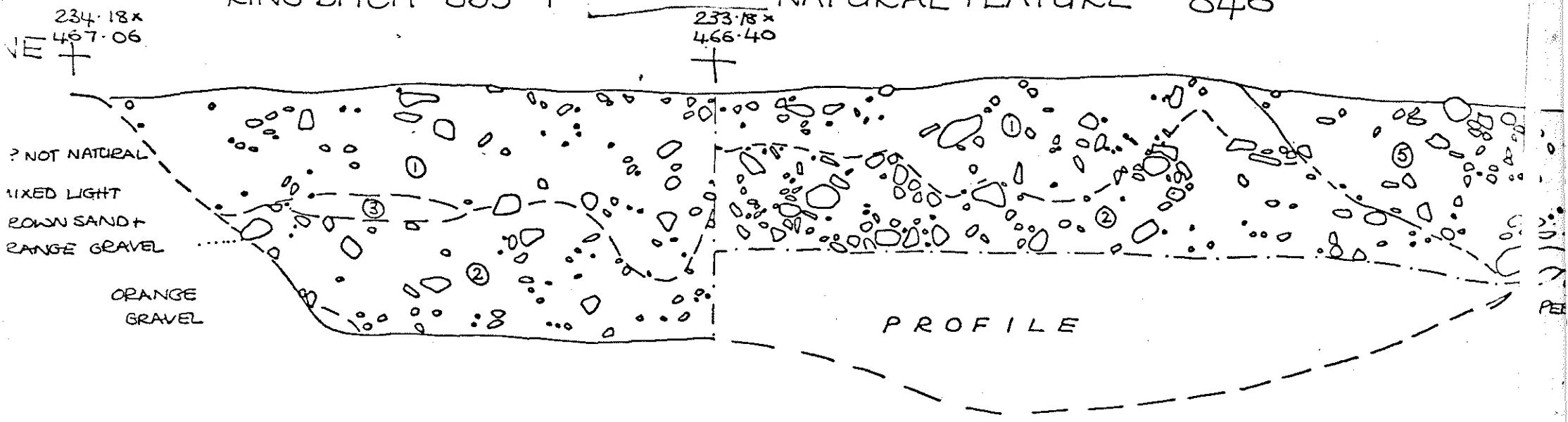

GS 1056 Feature 1787
S
260·72/488·05
N
260·70/488·94
0·0
40·12
Fill - Dark red/brown sa loam at top, grading down to mixed orange brown. Sandy soils at b and continuing down.
Hard red sandy gravel
Sandy soil & stones
SILTS

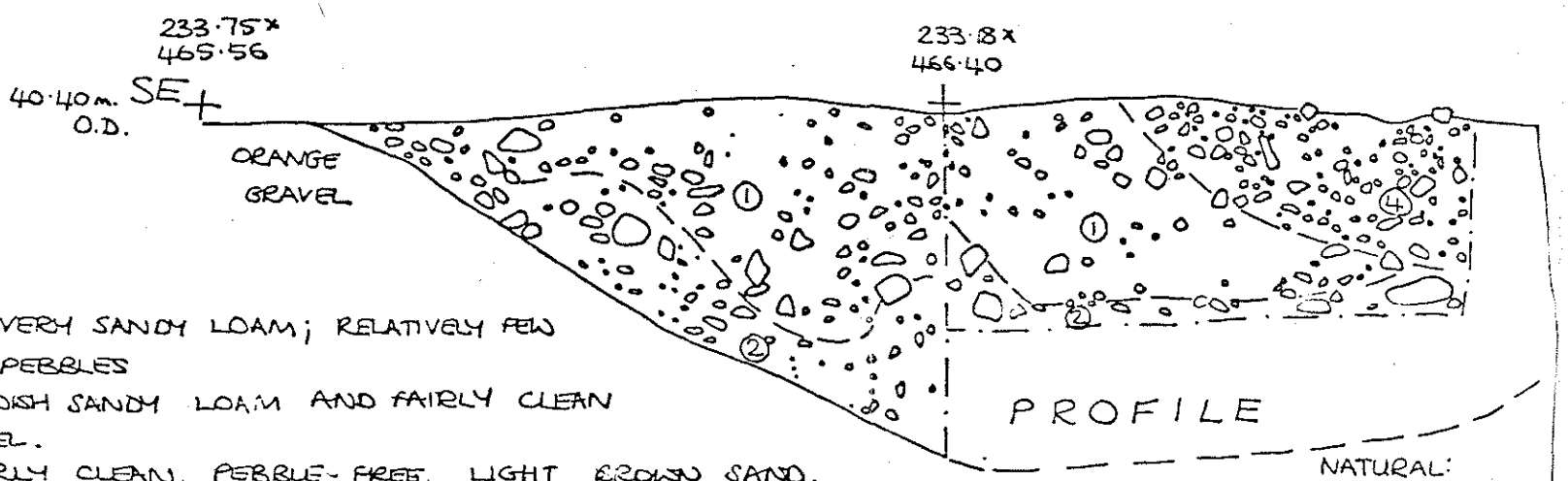
Fig. 1.

PERIGLACIAL FEATURE GS 685 + 675



RING DITCH 835 + NATURAL FEATURE 846





FILLS

846 = ①: MED. BROWN, VERY SANDY LOAM; RELATIVELY FEW SMALL → MED. PEBBLES

880 = ②: MIXED BROWNISH SANDY LOAM AND FAIRLY CLEAN ORANGE GRAVEL.

PART OF 846 { ③: LENS OF FAIRLY CLEAN, PEBBLE-FREE, LIGHT BROWN SAND.
④: SIMILAR TO ① BUT VERY PEBBLY.

835 = ⑤: MED. BROWN SANDY, PEBBLY LOAM; DARKER THAN ①. [= OBLIQUE SECTION THROUGH RING DITCH.]