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SCHIPLUIDEN

A NEOLITHIC SETTLEMENT ON THE DUTCH NORTH SEA COAST *c.* 3500 CAL BC

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AND PETER F.B. JONGSTE

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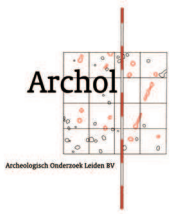

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3 Features

Tom Hamburg
Leendert Louwe Kooijmans

Many thousands of features reflect the long-term, intensive use of the entire dune and its immediate surroundings. Clusters of postholes represent the sites of former huts or yards. A large number of temporary wells testify to the occupants' struggle to secure fresh water supplies after floods. Hearth pits show that a Mesolithic tradition lived on for a long time in this area. Fences, which will have enclosed the entire dune, are seen to represent a collective effort intended to keep cattle out, but also to give structure to the site and to isolate the domestic domain from its surroundings. Remains of a small hut probably postdate the permanent settlement.

3.1 Introduction

All over the dune and in part of the adjacent clay deposits (Units 19/18) a large number of features came to light – more than ten times the expected number. The initial expectations were based on the evidence of the Wateringen 4 site, which appears to have been a single-house site that was occupied for only a short time. The difference in the distribution and density of the features implies that the dune at Schipluiden was used for much longer and far more intensively. The numbers of postholes and pit fills seem large, but viewed in relation to the assumed length of occupation (around 2.5 centuries) they are not that excessive: on average 15 postholes and one pit per year.

The features came to light at the base of the various find-containing layers: beneath Unit 20 in the dune sand (Unit 25), further northwest beneath Unit 19N, in Unit 26, and to the southeast beneath clay Unit 18, in clay Unit 19.

In comparison with evidence in the Pleistocene sandy areas, the features have survived extremely well, thanks to the fact that they were covered with aquatic deposits relatively soon after the site was abandoned. Only the top 30 cm of the features had been destroyed by bioturbation, trampling and colluviation. The measured depths consequently had to be increased by around 30 cm to obtain the original depths. Shallow features with depths of <30 cm have disappeared. So the posts of postholes with recorded depths of 5-60 cm will originally have been dug 35-90 cm into the soil. The exceptionally good wetland conditions, which had preserved even the ends of several wooden posts, were to be found only in the peripheral zone of the dune.

Not only the depths, but also the other dimensions of the features as specified in the drawn and digital records relate to the first cleaned level (C, fig. 3.1). This means that many features, in particular pits, are smaller in diameter than they originally were at the former surface.

Although the top of the dune, including the find layer, had disappeared due to erosion at the base of the Gantel system (Unit 0), this level C lay precisely at the base of the eroded stratum at the highest points. Comparison of the excavation plan with the erosion zones shows that the patterns of features were not affected by the erosion: for example, dense clusters of postholes are observable in the erosion zones, too. So the map may be regarded as homogeneous and representative.

3.2 Recording the evidence (figs. 3.2-3, after p. 54)

Levels A and B

After the find layers had been excavated, height measurements were taken at the base of those layers in every excavation trench in a 2 × 2 m grid. So on the dune this level (B) lay at the base of Unit 20, at the top of the dune sand (25). To the northwest it lay beneath the -4.70 m contour line at the top of Unit 26, beneath the humic sandy clay of 19N or the trampling horizon 30, to the southeast it lay at the top of Unit 19S, at the base of the clay Unit 18. The shape of the

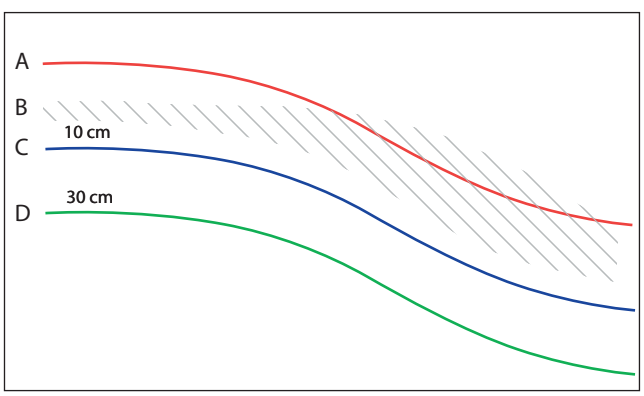

Figure 3.1 Position of excavation levels A-D in relation to the stratigraphy. Hatched: sediments containing artefacts.

dune and of the former ground surface above the -4.50 m contour line in phase 2 (level A) was accurately reconstructed by raising this level by 20 cm, the average thickness of the excavated layer. To the southeast, this is the surface of the adjacent gulley deposits that was later deformed by subsidence (18 plus 19S). The features that came to light already during the shovelling of the culture layers, in particular postholes of the fences were recorded and the small features were sectioned. At this depth the level (B) was however still badly disturbed by bioturbation and only few features could be made out.

Levels C and D [1]

In order to make the features (better) visible, a second level – level C – was exposed about 10 cm deeper down (fig. 3.4). Height measurements were recorded in this area in a 2 × 2 m grid, too. The features observed at this level were recorded in area plans in a scale of 1:50 and were subsequently sectioned – first the small features, then the pits and wells. Some of the large pit features were excavated not by hand, but under close scrutiny with the aid of a digging machine. This was necessitated by time pressure, and was justifiable on the basis of the small numbers of finds they contained. All sections were drawn and some were also photographed. A database was created in which the following data were recorded per feature: centre coordinate, height of the level, diameter, depth, fill. This information proved very useful in the later analyses, especially those of the postholes.

After all evidence at the first level had been recorded, excavation was according to the research design continued, again with the aid of the digging machine, down to a third level (D), 30 cm below the previous one, *i.e.* at a depth of 60 cm beneath the original ground surface. This was done because the research at Wateringen 4 (Raemaekers *et al.* 1997) had shown that some features were not visible at higher levels. This procedure led to the discovery of a number of hearth pits and assured us that we had not missed any important features (house plans, burials).

Finally, Unit 19S was in every excavation pit excavated by mechanical scraping to collect the finds embedded in it (phase 1). No features were observed at the base of this deposit.

The excavation trenches all extended far beyond the distribution of the features, but the find scatter was found to extend beyond the excavation pits in a southeasterly direction.

The field drawings of large features that crossed the boundaries of excavation trenches did inevitably not join up in the site map. The limits were adjusted as accurately as possible in the final map. The fills of large depressions that covered more than a single pit were not included in the excavation plan.

		N=	sum
small features			
stake holes		475	
stakes and stake holes of fences		293	
post moulds		3086	
postholes		180	
postholes with postmoulds		82	
post holes with posts		4	
	total		*4120*
large features			
pits		275	
wells		148	
deposition pit		1	
hearth pits		56	
graves		6	
ditches, foundation trench		3	
	total		*489*
	total anthropogenic features		*4609*

Table 3.1 Quantitative survey of all features.

Figure 3.4 Excavation level C in trench 16 showing postholes and other features.

3.3 Classification And phasing

3.3.1 Classification (table 3.1)

In total, 7584 features were recorded. They were classified in the field on the basis of their shape (in horizontal and vertical section), their dimensions (diameter, depth) and characteristics of the fill (colour, stratigraphy). Classifications were generally based on a combination of characteristics rather than on distinguishing criteria. The employed criteria can however be described.

A large number of features (N=2975) were interpreted as natural disturbances caused by root action and burrowing.

These were mainly small features, with diameters of 5-15 cm, which were at this level often indistinguishable from stake holes and postholes. Their main characteristics are irregular outlines and a heterogeneous fill. Many large features were likewise attributed to natural causes, notably the fills of natural depressions in the dune. Those features are characterised by a shallow depth combined with irregular outlines in cross-section.

The remaining features (N=4609) were interpreted as man-made on the basis of their regular cross-sections and outlines in the exposed area, sharp limits and homogeneous fills. They vary tremendously in dimensions, from a few centimetres to more than three metres in diameter and from almost zero to two metres below level C. In spite of these widely varying dimensions, no classes could be distinguished exclusively on the basis of diameter-depth ratios. From the smallest and shallowest to the largest, the features represented a continuous range. For the benefit of the later analysis, the individual features were in the field grouped into a number of categories on the basis of their dimensions, shape and characteristics of the fill:

– large features: 'ordinary' pits and wells,
– large features with a special function: burials, hearth pits and a deposition pit,
– ditches and trenches, including a wall-foundation trench,
– small features: postholes.

Classifying the features rarely involved problems: all features with diameters >50 cm were assigned to the first categories and all features <20 cm were classified in the last group. Only the distinctions between pits and postholes later proved to have been somewhat arbitrary. These categories were found to overlap at diameters of 20-50 cm (*cf.* fig. 3.5).

3.3.2 Phasing

Only a very small number of the individual features could be assigned to the stratigraphically distinguished phases. This was due primarily to the small number of finds encountered in the fills and the absence of undisputed typochronological markers, and secondarily to the small number of intersections and their positions within the body of the dune, outside the stratigraphy. There were three variables allowing some degree of phasing, coupled to depth zones:

– the development of the dark occupation layer and the incorporation of soil from this layer in the fills of features,
– stratigraphic positions beneath covering layers,
– altitudes on the dune slope.

It should moreover be borne in mind that the stratigraphically distinguished phases vary substantially in length, and

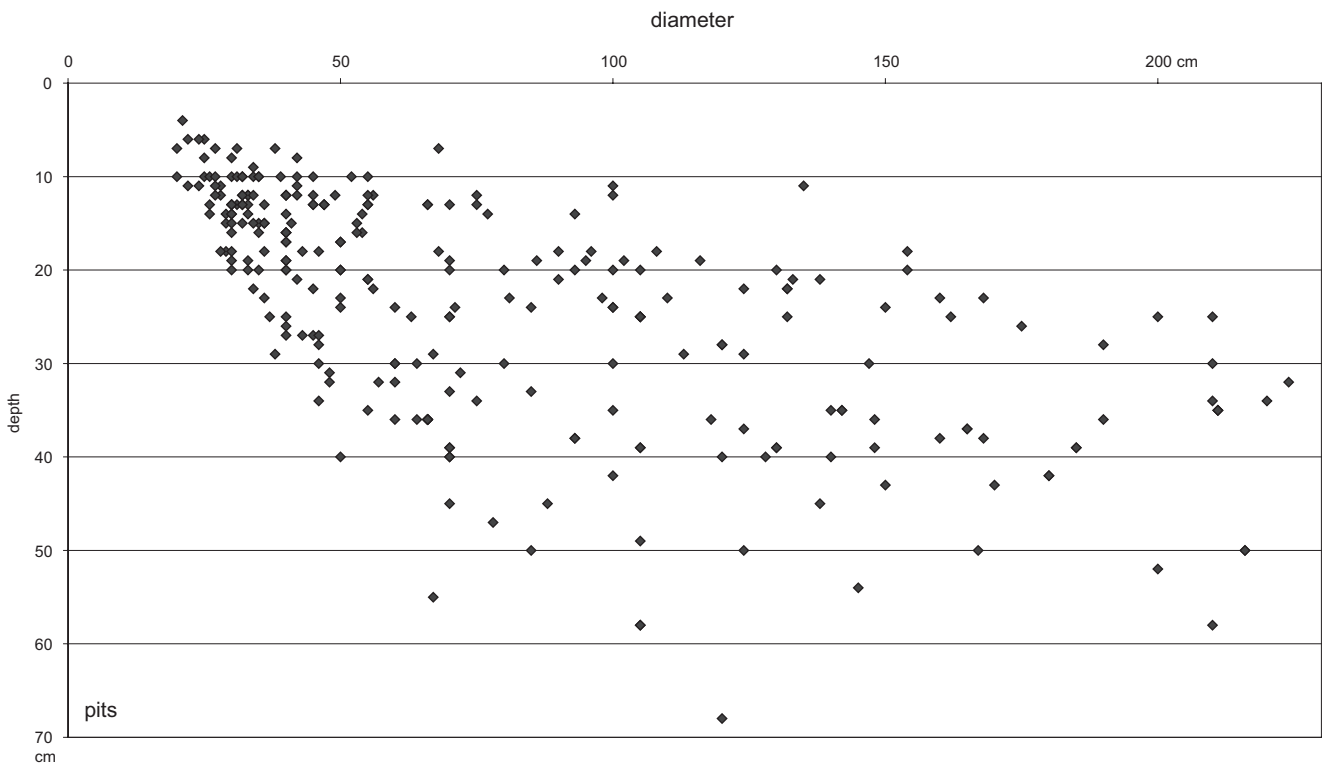

Figure 3.5 Pits, diameter versus depth.

that environmental conditions also varied considerably, in particular between phases 1-2b on the one hand and phase 3 on the other (see chapter 2). These differences may well have led to a different use of the site.

3.4 Large features: pits

The 423 large features can be divided into two groups on the basis of the nature of their fills:
– 'ordinary' pits
– wells

With the odd exception, the pits of both categories yielded exceptionally few finds. This could imply that they became filled fairly quickly and that their surroundings were kept relatively clean.

3.4.1 'Ordinary' pits

Classed as 'ordinary pits' (N=275) were in the first place all features with diameters of more than 50 cm and an unstratified, homogeneous light to dark grey sandy fill. The largest diameter measured is 230 cm. These pits were dug down into the top part of the dune sand (Unit 25), were not deeper than 70 cm and their diameters were always greater than their depths (fig. 3.5).

Relatively shallow features (with diameters >1.5 × their depths) with cross-sections of 20-50 cm, which were in the field, classified as 'ordinary' pits, show some overlap in their ranges with the postholes and post moulds. The pits in question were on the basis of non-metric indicators somewhat arbitrarily classified as either a pit or a posthole. From an analytical viewpoint these features are however to be regarded as a single group, and indeterminate in functional terms. In the post configuration research (section 3.8) the features of the entire group were regarded as (probable) postholes/post moulds.

The pits were regularly distributed across the crown and the northwestern slope of the dune and very little can be said about them. They contained very few finds, neither primary finds at the base nor secondary finds in the fill. This implies that the settlement site was fairly clean. Why these pits were dug is not clear.

3.4.2 Wells

Characteristics

'Watering places' or 'wells' (N=148)[2] were dug down to the top of the tidal deposits (Unit 26) underlying the dune, and some even down into Unit 40. Most of the wells were found to contain a bipartite fill: a primary fill with a microstratification of clean sand mixed with washed-in anthropogenic soil in varying degrees. The secondary fill was an extension of the surrounding occupation layer (Unit 20 or Unit 19N) and bore a close resemblance to that of the ordinary pit fills. The primary fill seems to have been formed within a short space of time (a few months or perhaps even weeks) due to the caving in of the edges of the pits, which originally had steep sides. On the whole, the wells do not seem to have been stabilised or maintained. Once the primary fill had formed, a wide, fairly shallow depression remained, which became filled at a much slower rate. In some cases the remnants of wells lying side by side were found to have merged into large shallow depressions. This was for example observed in trench 16, feature 15, and trench 2, feature 12.

Functional interpretation

Similar pits have been encountered at other contemporary settlements in this region, notably at Rijswijk, Wateringen 4 and Ypenburg (Koot 1994; Raemakers *et al*. 1997; Koot, H./B. van der Have 2001). At these sites the pits were interpreted as the features of temporary sources of freshwater in the then prevailing brackish to saline tidal environment. These interpretations were based on the assumption that in the case of such an isolated dune, precipitation will within a short time have led to the formation of a bubble of freshwater floating on the saline groundwater in the subsoil. The 'wells' in question were all dug down to beneath the former groundwater level, and in such positions relative to the body of the dune as to suggest that such underground supplies of freshwater – assuming they indeed existed – would have been tapped (fig. 3.6). Quite recently, some interesting observations on such freshwater seepage have been published. Small pits dug 'at the foot of the dunes were found to yield pleasantly cool potable water'. True streams have risen in the large Velsen Dunes (Van Deursen 2001). And digging operations on the seaward side of of the dunes of the provinces of Noord- and Zuid-Holland have also yielded evidence of seepage. It is assumed that the water in question derives from a 50-cm-thick layer of freshwater that

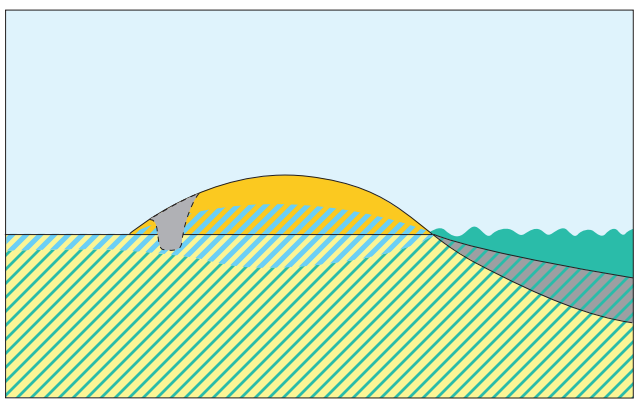

Figure 3.6 Schematic representation of an unlined well that tapped fresh water from the natural reservoir in a dune. Green: salt water, blue: fresh water.

slowly flows to the sea beneath the beach (Knip 2004). This is a matter demanding further research.

The pits were not maintained, they contained hardly any refuse and they were largely filled up in a natural manner fairly shortly after they had been dug. In only one case (feature 2-12, one of the pits of the complex to be discussed below) had an effort been made to stabilise a well by placing three approximately 1-m-long planks vertically against the walls. But these efforts were in vain: at least one of the planks (a tangentially split part of an alder *(Alnus)* collapsed inwards (fig. 3.7). Another possibility is that there was usually a sufficient supply of freshwater, but that that supply was incidentally threatened, notably when the sea forced its way inland during storms and/or spring tides. After a flood, such pits will have constituted a quick solution for bridging the time to the recovery of the former situation.

Description

The features that were identified as wells are pits with diameters of 40 to 370 cm at level C. Their depths relative to this level vary from 30 cm to 2 m, so their original depths will have been 60-230 cm (fig. 3.8). The majority of the recorded diameters relate to the collapsed structures, and are consequently systematically too large. In 65 cases the original diameter could be determined at the base of the well, where the deepest part had been dug into the stable, clayey sediment (Unit 40). These parts were cylindrically shaped and had diameters of between 30 and 240 cm. That stability may well have been the very reason why these wells were dug down so deep into this layer:

Figure 3.7 Section of feature 2-12, a well reinforced with vertically inserted split wood; measuring staff with 20-cm divisions.

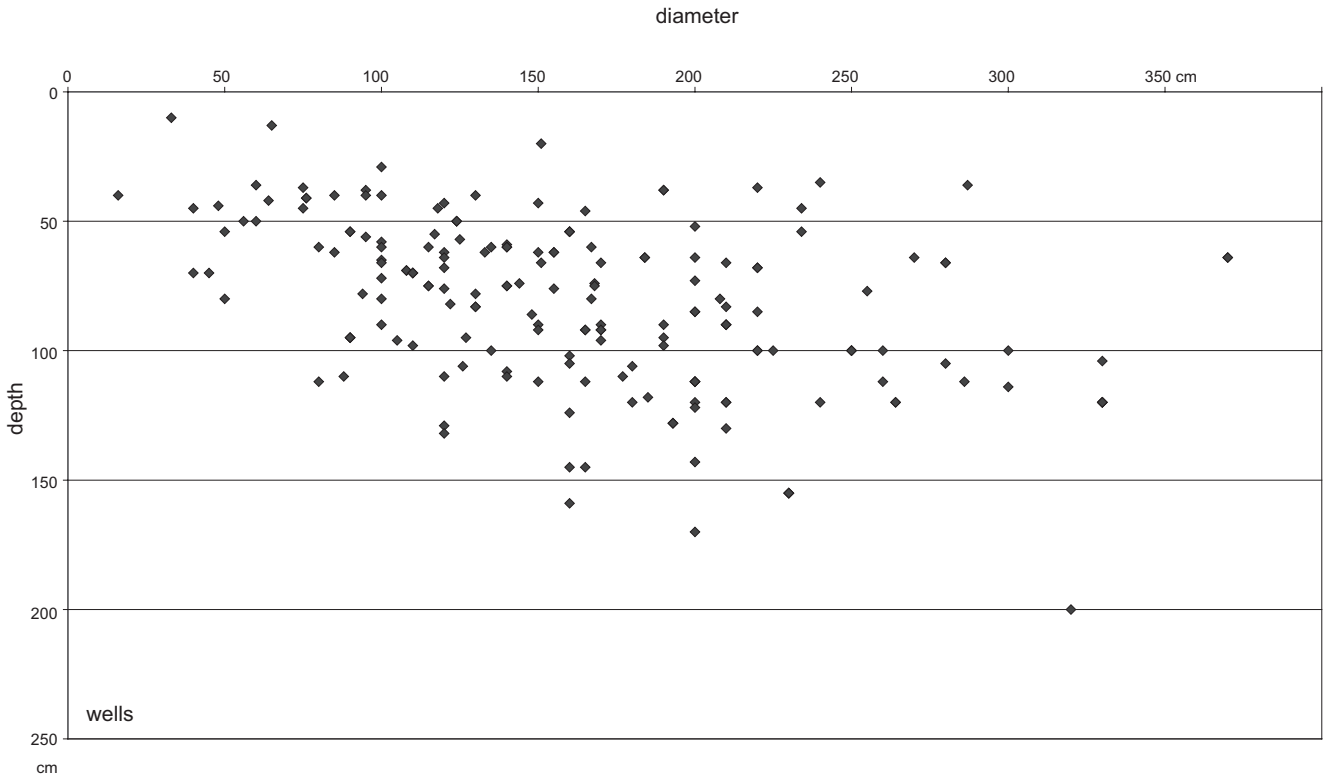

Figure 3.8 Wells, diameter versus depth.

this part did not collapse, allowing a supply of freshwater to seep from Unit 25 and optionally Unit 26.

Remarkable is the great variation in dimensions. Some of the wells have an exceptionally small diameter, of less than 80 cm in ten cases. They are not relics of larger pits, but primary steep, deep pits with small diameters. They were found randomly distributed between the wells on the northwest side. From time to time there were evidently situations when a small supply of freshwater sufficed. Does this reflect a measure that was occasionally taken exclusively for human use or does it mean that the group of people who lived at this site varied in size? This intriguing observation is hard to explain.

At the other end of the spectrum are complexes of large pits whose fills were found to merge to such an extent that we assume that the wells succeeded one another. One of the complexes in question comprised the aforementioned well that was reinforced with planks. Otherwise very few intersections were observed. We may assume that the depressions marking the sites of former wells remained visible for quite some time, and that people avoided digging in their unstable fills. Only one of the features (14-19) is assumed to represent a wide well, in which the water could be reached via a specially dug entrance.

Most of the 'wells' were found lying close together in a large group at the foot of the northwestern side of the dune. Viewed from the former waterfront on the southeastern side, that will have been the sheltered side and, certainly in the earlier occupation phases, the most obvious location for a well. A much smaller number were dug in other parts of the dune and on its southeastern slope.

Besides the pits themselves, the heaps of sand dug from them will have remained visible for quite some time. On the northwestern side of the dune they will have hampered drainage and will – along with the water seeping from the dune – have led to marshy conditions in those parts, enabling the formation of Unit 19N (see also chapter 2). Higher up the dune the excavated sand will have acted as a source of colluvial deposits.

Dates

The wells can be generally dated to a particular phase on the basis of the nature of their fills and/or the presence of a dated overlying stratum.

All the wells of the large group found on the northwestern side had a very clean primary fill. Beneath the -4.0 m contour line they were covered by Unit 19N. Only two pits contained

no secondary fill. This was taken to indicate an early date (phase 1), prior to the formation of this stratum. In all the other cases 19N constituted a secondary fill, implying a broader time span, comprising phases 1 and 2a.

The wells found higher up the dune slope could be differentiated exclusively on the basis of their fills. We assume that the darker 'occupation layer' (Unit 20) was formed in the course of the period of occupation. This assumption implies that wells from the beginning of the occupation period will have a relatively clean fill whereas late wells will contain large amounts of soil washed into the pit or subsided from the surrounding occupation layer (figs. 3.9-10). We also assumed that the youngest pits would contain evidence of a higher groundwater level and expanding peat growth (Units 10 and 11). This led to the following classification criteria:

phases 1/2a:	light primary fill and no secondary fill	N = 60
phase 2a:	light primary fill and dark secondary fill	N = 43
phase 2b:	slightly contaminated primary fill and darker secondary fill	N = 22
phase 3:	primary fill occasionally, and secondary fill always dark and peaty	N = 5
phase 2/3:	intermediary between phases 2 and 3	N = 5
not phased:		N = 13

So the great majority of the wells were dug in phases 1 and 2a, and in that time almost exclusively on the north-western side of the dune (fig. 3.2). It is not clear how intensive this activity was in phase 1 because the beginning of the formation of Unit 19N cannot be accurately related to the standard stratification. By some point in time, however, wells had been dug all over a strip measuring 12x60 m. Only a few wells were dug in the higher part of the dune. Most of the wells date from the first half of the occupation period, which is understandable as that was the time when marine influence was strongest and the supply of freshwater will have been under threat more often than in later times, when the saline conditions will have been replaced by freshwater conditions.

A few dozen more wells were dug in phase 2b, but they were created more over the entire dune, in particular around the western end. The criteria for classifying wells as the youngest dug were evidence of a higher groundwater level and expanding peat growth (Units 11 and 10). All the wells except those from phase 1 were assumed to contain a dark secondary fill.

Only a few wells were dug in phase 3, finally, and all near the top of the dune, above the -3.4 m contour line, which then roughly marked the boundary between the dune and the surrounding peat (Units 10/11).

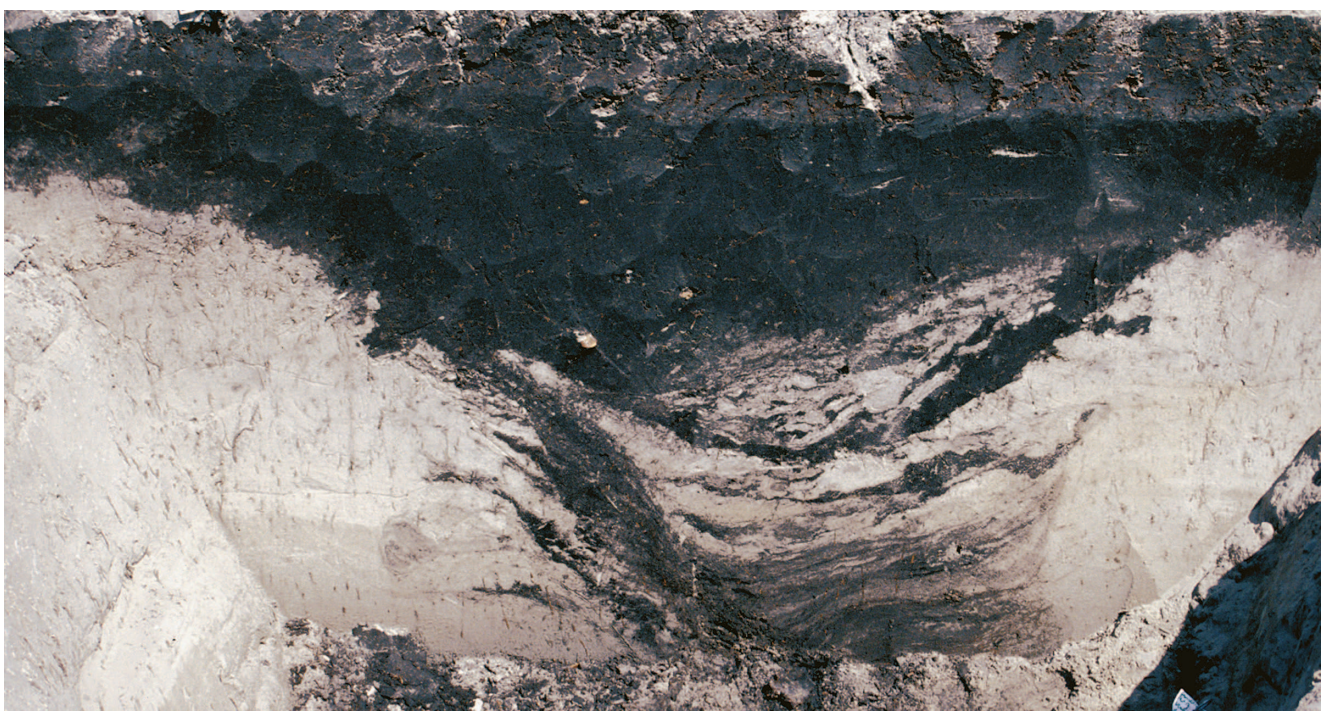

Figure 3.9 Feature 12-314, section showing a microstratigraphy of dark soil and sand. Arthropod and diatom samples taken from the base and half-way up the fill were analysed.

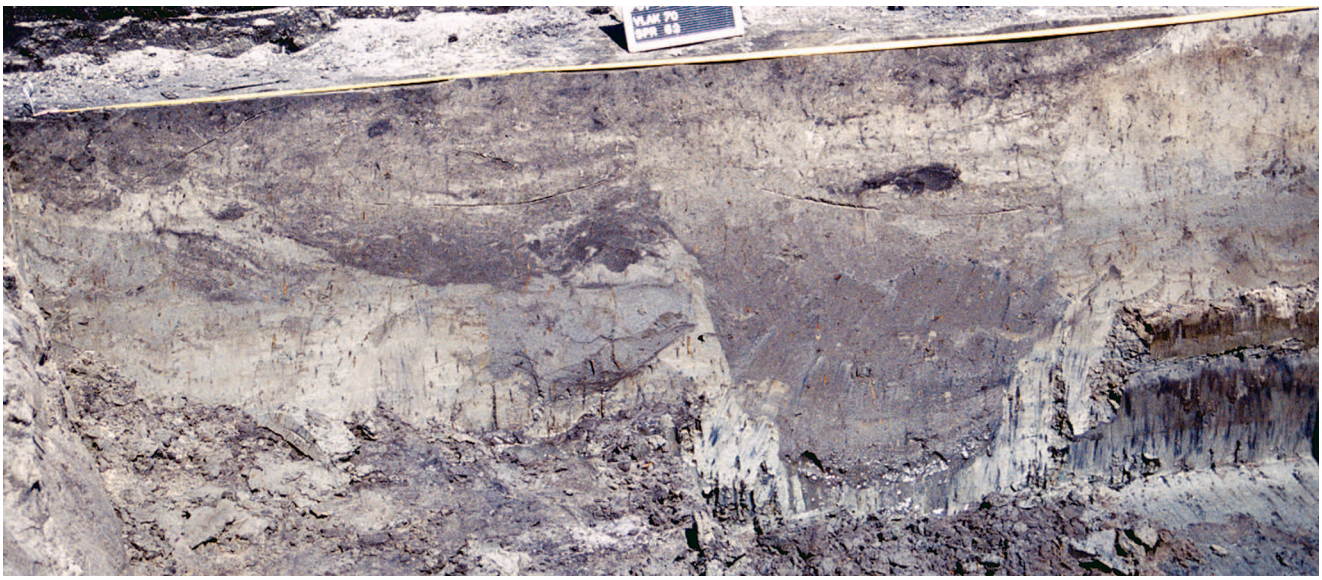

Figure 3.10 Feature 18-63, two intersecting wells.

No wells were encountered in the northeastern part of the dune, to the northeast of trench 21. Did this part of the site have a different function, or was it used only in phase 3, when there seems to have no longer been any need for wells?

Comparison of the number of large wells (diameters of >80 cm, N=138) dug in phases 1 and 2a with the assumed duration of occupation (less than a century?) leads to the conclusion that the wells were dug at an average of around one a year. On the assumption that the site was permanently occupied, this frequency would seem to be based on a highly acceptable risk of one disaster a year. If the site is assumed to have been occupied on a seasonal basis, the wells could represent annually dug fixed sources of drinking water. An argument against the latter option is that such a well would have become brackish in the event of a saltwater flood, and would no longer have served its intended purpose.

3.5 Large features with a special function

The shape, fill and/or contents of three categories of large features indicate that they represent pits that were indisputably dug for a specific purpose or function:
- hearth pits
- burial pits
- a deposition pit

3.5.1 Hearth pits

Description

Hearth pits (N=55) are features with diameters of between 25 and 120 cm (fig. 3.11). They have a bowl-shaped section and a fill with a high charcoal content. Three hearth pits were not identified as such until further soil had been removed beneath level C because the pale top parts of their fills did not stand out very clearly from the surrounding light-coloured dune sand at the higher level. The pits' (partly reconstructed) depths relative to level C were 10-55 cm, which means that they were dug to depths of 40-85 cm relative to the original ground surface.

Two subtypes of hearth pits can be distinguished on the basis of the pits' fills:
- pits with a thick layer of charcoal at the base of the pit covered by pale (bleached) sand (N=45; figs. 3.12-13).
- pits with a homogeneous light to dark grey fill containing regularly distributed large quantities of charcoal (N=10).

Figure 3.12 Hearth pit, feature 2-99.

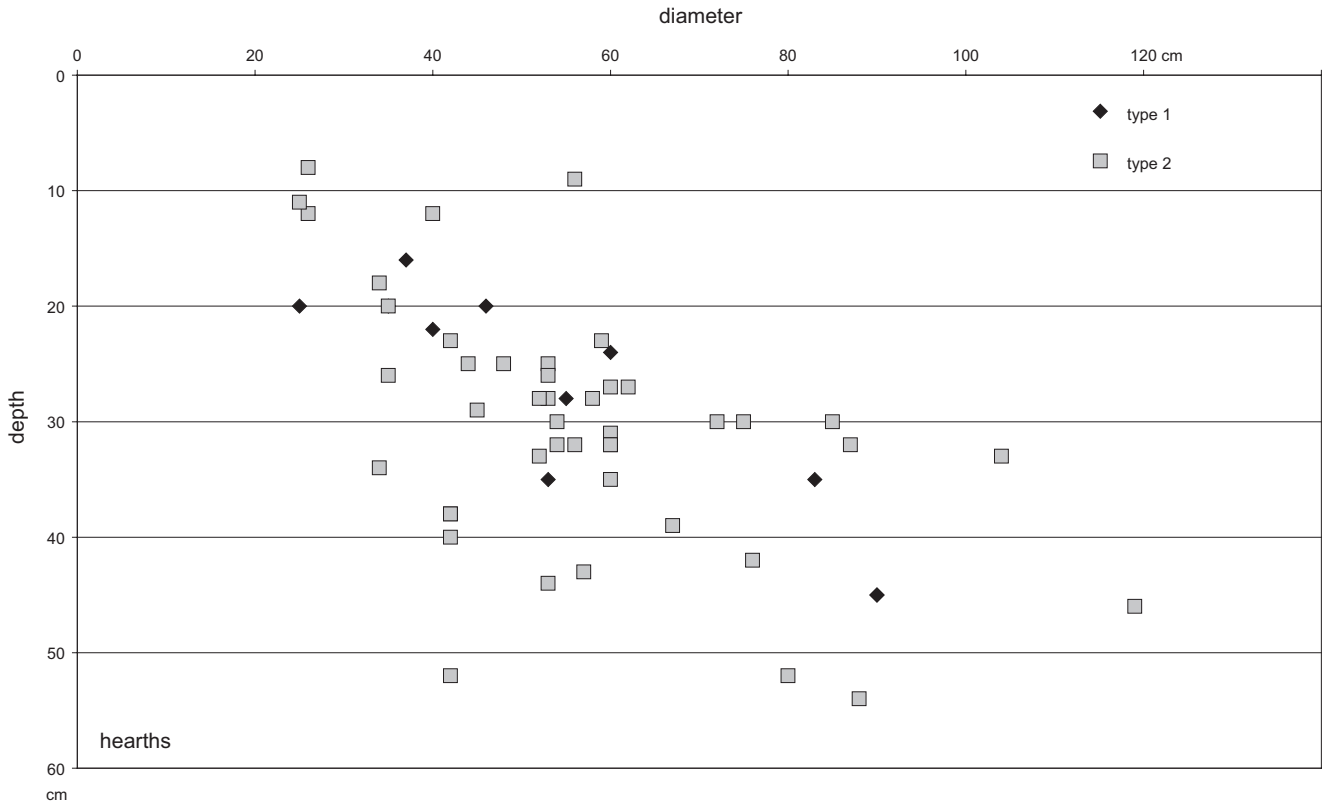

Figure 3.11 Hearth pits, diameter versus depth.

The two types were interpreted as hearth pits on the basis of the abundant quantities of charcoal found in them. The fact that the soil around the hearth pits had not been discoloured by the heat of the fire suggests that the fires were not particularly hot and did not burn for very long.

The hearth pits were found all over the dune, from the southwesternmost to the northeasternmost part, but there was a pronounced concentration, comprising half of the total number, at the middle of the northwestern slope. The hearth pits all lay above the -3.80 m contour line of the former surface, so in the high part of the dune.

Dates

In the areas of the 'occupation layer' (Unit 20) and the colluvium (Units 15/16) these pits came to light beneath these strata, which means that they must date from the first half of the occupation period (phases 1 and 2). One hearth pit in the northwesternmost part of trench 18 certainly dates from phase 1, judging from its low stratigraphic position. Ten pits found at the top of the dune may date from phase 3.

Such hearth pits are well known from all phases of the Mesolithic. They are usually encountered in small numbers in isolated positions, but at two sites several hundred were found close together. One of those sites is NP3 in the southeast of the province of Groningen, which lay on an exceptionally long (1.5 km) but only 40-m-wide coversand

Figure 3.13 Hearth pit, feature 18-107.

ridge. There, 600 small pits with fills with a high charcoal content were found within an excavated area of 6 ha. Many of the pits, which had extremely uniform dimensions, were clustered in small groups. They were round or oval, with diameters of 40-60 cm, in a few exceptional cases 80 cm, and depths of 40-50 cm. A large number of ^{14}C dates obtained for these pits place them in the Middle Mesolithic, 7600-6500 cal BC. The pits were found not within, but adjacent to the associated flint scatters that are assumed to represent domestic areas (Groenendijk 1987, in press). From this same period (7400-7100 cal BC) date twelve hearth pits that came to light on the buried coversand ridge of Verrebroek 'Dok' in Antwerp's docks (Crombé *et al*. 2003). Many dozens of such pits were found on coversand ridges in Amersfoort-Noord (Vathorst). Some of them were hearth pits, with diameters of 80-250 cm, *i.e*. significantly larger than the aforementioned ones. Associated microliths, charcoal identifications (coniferous wood) and two ^{14}C dates (8680 ± 50 and 7180 ± 90 BP) place the pits in the Mesolithic. A third ^{14}C date (5190 ± 120 BP) however shows that such pits continued to be dug until the end of the 5th millennium cal BC (Van der Roest 1998/1999).

The second site where many hundreds of hearth pits came to light is Mariënberg-De Schaapskooi, which lies on a coversand ridge along the river Vecht in the province of Overijssel. These pits were slightly larger, with diameters of 0.5-1 m and depths of 5-40 cm relative to the exposed surface. Their original depths are estimated to have been at most 65 cm. Their dates cover a wider span, from 7500 to 5000 cal BC, *i.e*. late Boreal and Atlantic (Verlinde/Newell in press).

A total of 111 'deep hearth pits' were found at the occupation site of 'Hoge Vaart'. They have all been dated to the local phase 2, 6400-6100 BP, around 5300-5000 cal BC, at the end of the Mesolithic (Peeters/Hogestijn 2001, 36, 131). They were deeper than 15 cm. Three types of pits were distinguished, the first corresponding to the Schipluiden type 1, the other two to Schipluiden type 2:

– pits with a thick layer of large lumps of charcoal at the base,
– pits with small lumps of charcoal mixed throughout the entire fill,
– pits with diffusely distributed fine charcoal particles.

Experiments have shown that hot fires, with temperatures of up to 900ºC, could very well be created in such pits. The small pits in particular will have retained the heat for several hours. This suggests a variety of functions: roasting seeds and nuts, heating cooking stones, smoking meat or fish and drying foodstuffs or utilitarian objects such as animal skins (Groenendijk/Smit 1990).

^{14}C dates show that such 'typically Mesolithic' hearth pits were used in the Neolithic, too (Groenendijk 1987, 97), but their occurrence at Schipluiden is indeed an eye-opener reflecting the continuity of this custom.[3] The pits' clustered distribution adjacent to domestic areas and their dimensions are comparable with those of the Mesolithic examples.

3.5.2 Burial pits

Description (table 3.2)

Six burials, including a double grave, were found in the western part of the dune. They will be discussed in detail in chapter 5. The following discussion will be restricted to contextual aspects of these finds.

The burials were visible in the excavated area as dark grey pit fills with outlines ranging from oval to subrectangular, with the exception of burial 4, which was not observable in the form of a pit. This was a partially disturbed shallow grave in the occupation layer, which did not extend into the underlying light-coloured deposits. These features were identified as burials only when they were found to contain articulated human skeletons.

Four of the burials lay close together, spaced 2-4 m apart, in a small cemetery at the western end of the dune. The other two were found in isolated positions, one at the top of the dune and the other at the foot of the southeastern slope.

More burials were searched for in the excavation, especially in the areas between and around the graves, but no others came to light. This and the fact that the recorded burials were clearly visible suggest that the total number of deceased who received such a formal burial was quite small in relation to the size of the settlement.

Dates

The cemetery can be dated to (the end of) phase 2 on the basis of intersections. Burial 6 was dug into the secondary fills of some pits that have been dated to phases 1/2a. Burial 4 was embedded in the occupation layer (Unit 20). Burials 1 and 2 were both filled with the same dark sand of the occupation layer in that area. The burials, in particular 4 and 6, moreover lay so far down the slope of the dune as to make dates in phase 3 unlikely, for by the time of phase 3 those locations lay in the peripheral zone of the swamp surrounding the site. What is however remarkable is that these burials lay in the westernmost corner of the (reconstructed) enclosed area.

Burial 5 was intersected by a well that has been dated to phase 2, which implies a date in phase 1 or the early part of phase 2. The burial's position on the dune slope moreover makes a date in phase 3 unlikely.

Burial 3 lay at the top of the dune, so it could in principle date from any of the occupation phases. The pit was dug into the fill of a well that has been dated to phase 2. The occurrence of large lumps of peat in this fill implies that the expanding peat (Unit 10/11) had by this time already reached this area.

grave no.	orientation	form	length	width	depth	surface	base	fill	phase
1	S-N	rectangular	186	112	52	-3.6	-4.4	dark sand (20)	2
2	W-E	oval	115	55	32	-3.4	-4.0	dark sand (20)	2
3	W-E	oval	85	56	56	-3.3	-4.1	heterogeneous, peat lumps	3
4	N-S	–	–	–	–	-3.8	-4.0	in Unit 20	2
5	W-E	round-oval	85	67	65	-3.7	-4.6	light sand	1-2a
6	SW-NE	rectangular	63	43	40	-4.0	-4.7	peaty sand (19N)	2a

Table 3.2 Burials, basic data.

This leads to a date in phase 3. This assumption is supported by the fact that a location at the highest point of the dune was chosen for this burial.

The burials yielded no grave goods that could have been of further help in dating the pits.

The ^{14}C dates suffer from a considerable reservoir effect and are of no use for phasing individual graves.

Conclusion

At different times in the history of the site's occupation deceased were buried on the dune. In each case a peripheral location was chosen for the burial: at the western end of the dune, at the edge of the settlement site and at the former foot of the dune, at the edge of the surrounding swamp. In phase 1 a child of around 8 years of age was buried on the southeastern side (burial 5). In phase 2 a small cemetery was created in the westernmost corner of the enclosed area, in which four adult men and a small child (burial 6) were buried. And in phase 3, finally, an adult man (burial 3) was buried at the western end of the dune, which had by then shrunk considerably (*cf* chapter 5).

3.5.3 Deposition pit

One fairly small pit with steep sides (12-48, find no. 6086) at the northwesternmost edge of the settlement site was conspicuous not so much on account of its shape, but because of its contents. The pit had a diameter of 66 cm and extended to a depth of 36 cm beneath the exposed features area. In those respects it was very much the same as the smallest wells. This pit however had a homogeneous fill which belonged to Unit 19N in its entirety. An exceptional aspect of the fill is that it contained a large number of animal bones. There was no anatomical relation between the bones, which were randomly mixed, but they did appear to have been deposited in a single act. The bones are the remains of three head of cattle and the skull of a dog, killed by a blow. The exceptional concentration and composition of the assemblage suggest an intentional deposition on a special occasion (see section 22.3.7). No bones were found at the base of the fill, which must mean that this part of the fill had already been formed by the time the bones were deposited here, which must hence have been some time after the pit had been dug. This part of the fill did contain a large number of uncarbonised sloes *(Prunus spinosa),* some of which had under the exceptionally good preservation conditions survived with identifiable flesh. The fact that these remains are exclusively remains of fruits, and that other sloe remains or other botanical macro-remains were absent, is an argument in favour of deliberate deposition and against natural causes, such as fruit falling from a sloe tree that happened to grow there.

The pit was dug at the edge of the swamp at a time when Unit 19N was in full development. This implies a date in phase 2a.

It is assumed that the pit's contents is not the outcome of random accumulation, but indeed reflects deliberate deposition, in several phases: first a batch of sloes and later the remains of several animals. We do not know what the purpose of the depositions was, but it may have been in some way associated with the cemetery in the pit's immediate vicinity, which has indeed likewise been dated to phase 2. We may assume that this part of the site had a spiritual meaning for the occupants.

3.6 Ditches and trenches

Three short, elongated features with lengths of 1-2.5 m, widths of 15-30 cm and depths of at most 30 cm were found in different areas in the central and western parts of the dune. They were not visibly related to any of the other features and appeared to represent the deepest parts of longer, shallow ditches whose functions are not clear. The irregular course of the longest feature makes it more likely that they were drainage ditches rather than parts of structures (foundation trenches).

3.6.1 Wall-foundation trench, house plan

At the middle of the dune, in the comparatively empty area outside the dense clusters of postholes, was a unique feature: a trench marking a rectangular enclosure with rounded corners measuring 3.5 × 6 m (figs. 3.14-16). The trench was at most 30 cm wide and at most 30 cm deep and had a dark

fill identical to the ‘occupation layer’. The northwestern stretch of the trench was clearly deeper than the southeastern.

Along the eastern side of the enclosure was a distinct asymmetrically positioned opening or entrance with a width of 1.5 m. Here the two ends of the trench came to a clear, abrupt end. The trench was interrupted along the western side, too, but there the situation was less clear. At this point the trench was very shallow and appeared to be intersected by the fill of a pit. There was no indisputable second entrance.

As the trench appeared to be the foundation trench of the walls of a small house, remains of (wall) posts were searched for. To this end, the fill was sectioned both longitudinally and transversely, and parts of the base of the fill were shovelled down horizontally. However, no features of any posts or stakes were found, but it did become clear that the feature represented a deliberately dug structure.

Within the enclosure were a large number of small postholes, four of which - relatively large ones with diameters of 15-19 cm and depths of 25-37 cm – lay along the axis. They may be regarded as parts of the plan of the house and as the features of posts that supported a ridge beam. The posts in question were less sturdy than those that stood elsewhere on the dune. If there were any comparable structures, but then without a wall trench, on the dune, they could be represented by similar rows of roof supports, but no indisputable evidence of such rows is observable among or between the dense posthole clusters.

The dark fill of the trench and its location at the highest point of the dune suggest that the house dates from the final occupation phase. The northern stretch of the foundation trench intersects a pit fill. In view of the exceptional character of this structure it is possible that it is not associated with the period of occupation considered here, but with some incidental later use of the top part of the dune. We don’t know of any comparable plans in the Lower Rhine area for this period.

Figure 3.14 Foundation trench of the hut, feature 16-500. This hut has been dated to a late phase in the occupation and possibly represents a period of more incidental use after the site had been abandoned.

Figure 3.15 The hut, feature 16-500, sectioned. Two hearth pits are visible on the left. Measuring staff with 20-cm divisions.

3.7 THE SMALL FEATURES: STAKE HOLES AND POSTHOLES (fig. 3.17)

'Small features' are understood to be features associated with posts of varying thicknesses that were dug into the ground.

The features of this group were classified on the basis of their dimensions and diameters. The limits between the distinguished categories are not sharp, and hence somewhat arbitrary. We distinguished the following groups:

- stake holes: all features with diameters < 8 cm,
- postholes with post moulds,
- post moulds: the outlines of an actual post with a diameter ≥ 8 cm,
- postholes: fills of holes that are assumed to have held a post.

3.7.1 Stake holes

All features with a diameter of less than 8 cm were assumed to represent stake holes and stake moulds (N=768), irrespective of their depth. Of these stake holes and stake moulds, 293 belong to the fences that were found to have enclosed the dune. The stake holes that did not belong to these fence features varied substantially in dimensions. Their diameters varied from 2 to 7 cm, with an average of 6 cm, and their depths relative to level C were on the whole fairly small (on average 7.5 cm), but in some cases greater than 20 cm, *i.e.* more than 50 cm relative to the former ground surface. Those features may represent fence posts or the wall posts of houses. It is not certain

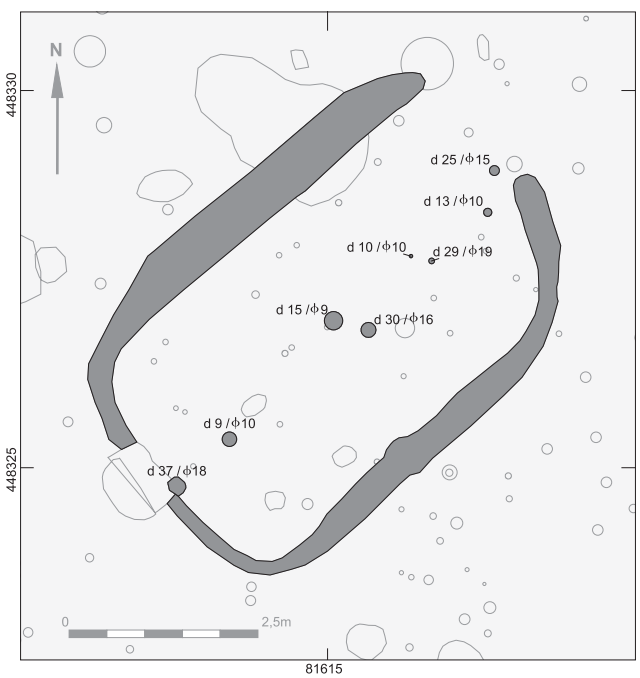

Figure 3.16 Plan of hut, feature 16-500 (scale 1:100).

whether the smallest and shallowest features indeed have any archaeological meaning.

3.7.2 Postholes with post moulds

In a small number of features the outlines of a post were observable (N=86, or part of the wooden post itself had survived (N=4). The holes of this category had diameters of 14-55 cm and the post moulds measured 10-22 cm. These dimensions show that there is a substantial amount of overlap between large post moulds and small postholes. The two categories were hence distinguished primarily on the basis of the feature's outlines.

3.7.3 Post moulds and postholes

The largest category by far is that of post moulds (N=3086). They are small features with regular outlines in vertical section, with diameters of 8-44 cm. Shallow post moulds have a semicircular cross-section, deep features have a rectangular cross-section and a flat, round or (sometimes) slightly pointed base. Their maximum depth relative to level C is 60 cm, which means that their depth relative to the original ground surface was at most approx. 90 cm. They are assumed to mark the places where a post either decayed in the soil or was pulled out of the ground. In the latter case the tugging will usually have resulted in a feature that widens towards the top rather than one with a purely cylindrical section.

The criterion for interpreting a feature as a 'post mould' was its resemblance to features found in other excavations, in particular at sites of a comparable age and with comparable soil and/or preservation conditions, where such features were found to form part of house plans. The sites in question are in the first place Wateringen 4 and Ypenburg, but also Haamstede-De Brabers (Vlaardingen group) and Molenaarsgraaf (Bell Beaker/Barbed Wire Beaker culture) (Raemaekers *et al*. 1997; pers. comm. H.Koot, Rijswijk; Verhart 1992; Louwe Kooijmans 1974).

A relatively small number of features with round or pointed bases in vertical section were interpreted as postholes (N=180). They had somewhat less regular outlines and were on average larger than the post moulds. The fact that the recorded, basal parts of these features already taper outwards towards the top, is regarded as evidence that the features are postholes rather than post moulds.

It is not certain how realistic the functional explanation of the morphological differences between the two categories actually is. The differences could indeed be attributable to greater disturbance due to bioturbation in the case of most of the postholes, especially the small ones. No distinction was made between these two categories in the map analysis.

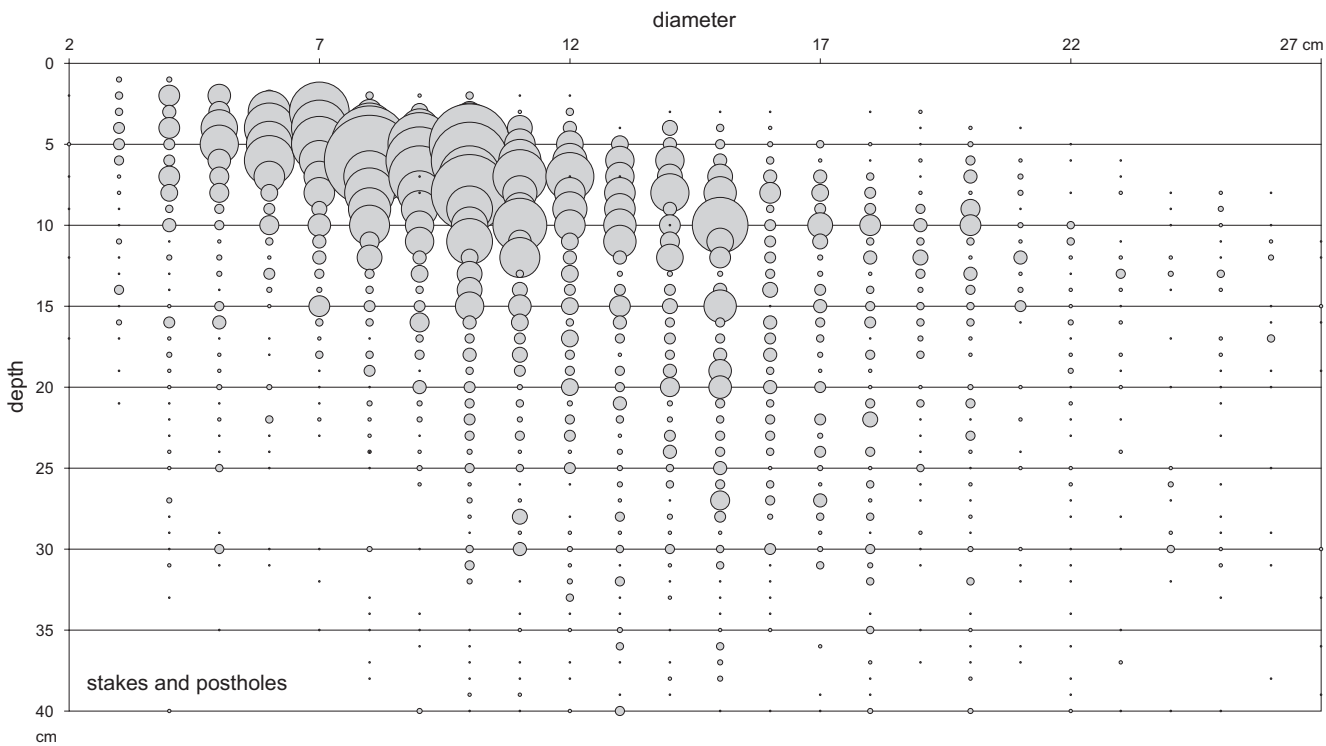

Figure 3.17 Stakes and postholes, diameter versus depth.

In the above discussion of the pits (section 3.4.1) it was already pointed out that there is some amount of overlap between the smallest pits on the one hand and the largest post moulds and postholes on the other, and that all features with diameters <50 cm were in the analysis regarded as probable postholes/post moulds.

3.8 CONFIGURATIONS OF POSTHOLES AND STAKE HOLES

3.8.1 Map analysis

Numerous stake holes and postholes came to light all over the entire dune, from the westernmost point to the northernmost, where the excavated area ended at the sheet piling. In the field, close attention was paid to identifying relations between the postholes, but without success. No house plans were identified in the field, and no outlines of granaries, which are nevertheless known from slightly later times (Haamstede-De Brabers, Verhart 1992). A handicap was of course the fact that the individual excavation trenches afforded insight into only slices of the overall site.

In the excavation maps (figs. 3.2-3) clusters of features with varying diameters can be visually distinguished – nineteen in total, with diameters of 5-12 m – but no distinct configurations of postholes can be made out within these clusters, certainly no linear or rectangular arrangements. The option of a series of round structures had to be dismissed on the basis of the databases due to the heterogeneity of the features and the incompleteness of the configurations. Linear arrangements are visible between the clusters: short rows of large features and longer rows of small features. The analyses of many of those arrangements however likewise yielded negative results. All this is partly due to the way in which the map was created. The features were recorded in the map as they were observed at level C, approximately 30 cm beneath the original ground surface. Level C was exposed as close to the surface as possible to avoid missing small and shallow features. The features observable at this level proved not to be representative of the underlying features: in many cases, small post moulds came to light beneath the large features exposed at level B and vice versa.

So the site map proved to be an unreliable analytical instrument. Attempts were subsequently made to identify structures by filtering the database and studying selections based on the depths and diameters of the features, but the maps obtained in those analyses likewise revealed very few patterns. Finally a new map was made in which each small feature was replaced by a symbol (circle), positioned at its centre coordinate, with a diameter relating to the feature's diameter and a colour relating to the feature's depth, both divided into 10-cm classes (fig. 3.3). This yielded a far more objective and (thanks to the depth data) more differentiated survey of the features. This new representation revealed new spatial relations. Some of the 'distinct clusters' identified in the site map proved to have merged, while short linear relations were observable between the largest features. These relations will be discussed below, leading to the question whether houses once stood at this site and, if so, what shape they may have had.

An interesting aspect are the remarkable features of long fences erected at the foot of the dune. They will be discussed first.

3.8.2 Fences along the foot of the dune

Description

Long rows of paired small features and/or postholes were observed along the periphery of the southwestern part of the dune, both on the northwestern side and on the southeastern side. These features, 308 in total, are assumed to represent stretches of fences (figs. 3.18-19). The majority (N=293) belong to the category of stake moulds. Of those features, 34 were too small, shallow or vague to be accurately measured; in those cases only the locations were measured. Only 15 of the features had larger diameters, up to 16 cm.

On the southern side the features were observed at the top of the grey clay (Unit 19), after the 'find layer' of Unit 18 had been removed by hand. Many of the features were poorly visible due to their small diameters or the abundance of large numbers of natural small features in their vicinity or because the top part of the feature sometimes appeared to have been compacted sideways. It would seem that most of the features were overlooked in the southern part of trench 10, which was the first to be dug, but the absence of fence postholes in trenches 2 and 3 was verified in the field. The first features were clearly identified in trench 4, after which specific attempts were made to find more of such features in the other trenches. But even in areas where parts of the fence must originally have stood, features were often absent. The fence was most clearly visible on the northern side, as remains of the wooden posts themselves had survived in many places there.

The good visibility of the fences is the result of the specific wetland conditions: the posts were hammered into the ground in a wet zone, in which the wooden points had in some cases survived, and were subsequently buried, and hence protected from later disturbance. All the fences, excluding stretch 1, were found to lie precisely in or just outside the zone where Unit 18 was covered by the colluvium of Units 15/16. This will certainly have contributed towards their preservation and archaeological visibility. This makes the absence of indisputable fence features on the dune itself quite understandable. Postholes from this era, let alone features of such thin fence stakes, rarely survive under the 'normal' dry conditions prevailing in the Dutch upland areas.

Figure 3.18 Sectioned postholes of the fence, stretch 1 in trench 4.

The features of the fence stakes had diameters of 2-7 cm, the same as those of the surviving stakes themselves (fig. 3.20). Viewed in detail, the stakes were rather irregularly arranged; many pairs were set askew to the course of the fence. The distance between the stakes of each pair moreover varied, from 5 to 25 cm with an average of approximately 10 cm, and the distance between the individual pairs was not constant either. On the whole, the pairs were set 70 to 80 cm apart, but in some places the distance between two pairs is only 20 or 40 cm, or on the contrary 140 cm. The setting is more suggestive of primary irregularity than of repair work. Where distances of 120 or 140 cm were observed, a pair of postholes may have been missed. In some places not two, but three postholes were found in a row; they may be seen as evidence of repair. The features of the fence stakes were on average deeper (at most 50 cm, on average 11 cm) than the stake features in general.

The fences were erected at the foot of the dune, at the edge of the surrounding swamp. On the northwestern side the fence coincided with the -4.4 to -4.5 m contour line of the former ground surface (level A). In that area there was a single 50-m-long fence enclosing the part of the site that contained the wells. On the southern side was a double, and in parts even a triple fence. A long, continuous fence could be followed for almost 80 m along more or less the same contour line, from excavation trench 4 (stretch 9) in the west via stretch 5 to stretch 6. It may have extended further into trench 21. The middle fence (stretch 4) was recorded over a length of 30 m. It stood higher up the slope, parallel to stretch 5, between contour lines -4.4 and -4.2 m. The innermost fence (stretch 3) was observed only in trench 11, at a depth of around -4.1 m. It probably formed a continuation of stretch 1, which was erected at the same altitude.

No indisputable entrance is observable in the recorded parts of the fence. The entrance may well have been narrow and fairly inconspicuous. There was no need for a broad entrance, since wagons were to our knowledge still unknown at this time.

Complete enclosures?

No evidence of fences was found on the northeastern side of the dune. Are we nevertheless to regard the recorded stretches as parts of an enclosure, or were they independent fences? The strongest argument in favour of a complete enclosure is the identical palaeogeographical positions of the fences at the dune/marsh transition on either side of the dune. The basic function of any fence is moreover to serve as an enclosure, separating a particular area from the outside world, either to keep something in or keep something else out. But the recorded stretches cannot be linked up in a straightforward manner.

In the west, stretches 1 and 2 come to an abrupt end. Four stake holes, two of which are arranged as a pair, seem to suggest that stretch 1 bent 90°, continuing in a northerly direction. This would support the assumption that the entire dune was enclosed. Stretch 1 can however not be connected to stretch 7 on account of the substantial difference in depth between the features of the two stretches. The comparable depths of the features, but also the obtained ^{14}C dates (see below) reveal a much closer correlation between stretches 9-5 and 7.

So did stretch 1 not extend any further? Features of a continuation of this stretch should have come to light at a comparable depth along the northwestern side of the dune, but this is precisely the zone that was badly disturbed by the many wells that were dug there. No *features* of stakes were observed in that area, but six points of wooden posts were found in five pit fills which are in every respect comparable

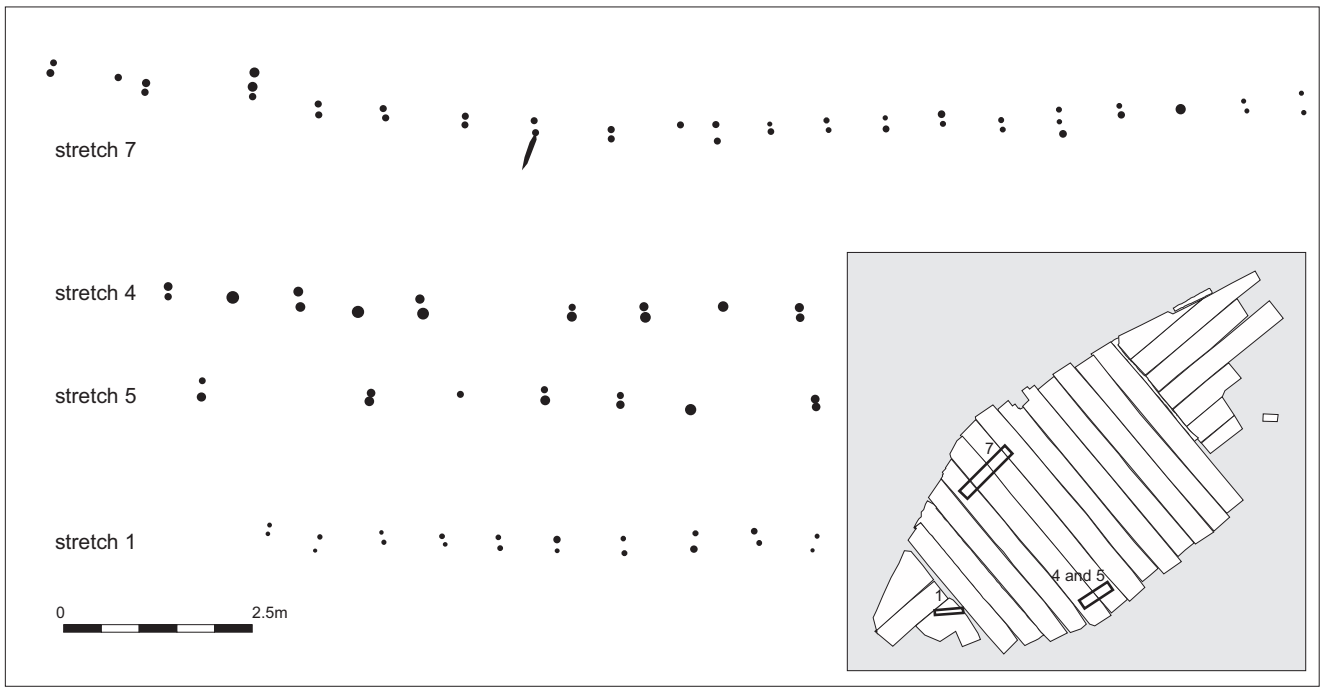

Figure 3.19 Selected sections of the fences (scale 1:100).

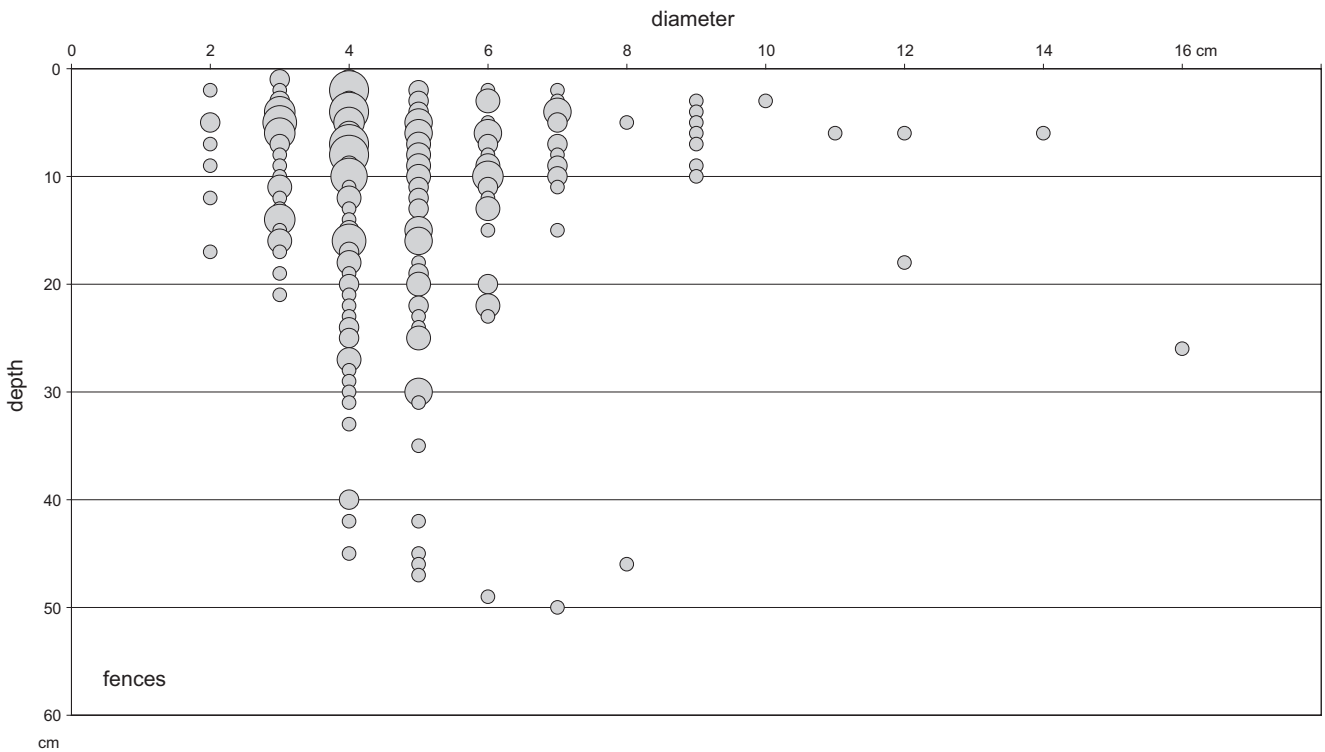

Figure 3.20 Stakes and postholes of the fences, diameter versus depth.

with those of stretch 7 and which may very well be the last remnants of one or more parallel fences. We certainly have no alternative or better explanation for those remains.

On the eastern side, stretch 7 curved 105° towards the northwest (stretch 7*) in trench 18, after which it could be followed no further due to an unfortunate concurrence of circumstances involving a drainage facility. What appeared to be further traces of the fence came to light five metres further northeast, but the features concerned, of four sets of paired stakes ('stretch 2'), were extremely small and shallow, making them insufficiently conclusive as evidence. The situation at the periphery of the excavated area moreover made their interpretation extra difficult. The analysis of the wood (section 11.4.5) however proved helpful: the posts of 7 and 7* were found to differ so much in character that 7* may be safely associated with a separate activity: a change to or extension of 7. This means that it is quite possible that the fence originally ran in a straight line and that stretch 7* was later added to it.

The features of the southern fence (stretch 6) became progressively less clear, in particular less deep, towards the east (table 3.3). The intensive search efforts led to the discovery of only a few features to the east of trench 17 ('stretch 8', fig. 3.3). A broad strip of deeply trampled soil along the foot of the dune was found precisely in the zone through which the fence may be assumed to have continued. Such a trampling zone is to be interpreted as a much used track, possibly where cattle were driven along the fence or gathered behind the fence, as can also be observed in present-day pastures. It is plausible that the fence continued along the (north)eastern side but, if so, its course can no longer be traced.

An observation suggesting that the fences may – in spite of the differences – nevertheless be regarded as parts of a single enclosure was made in the wood analyses (section 11.4.5): one post of stretch 7* and one of stretch 5 seem to have been hewn with the same axe, recognisable by a very similar pattern created by some burrs on the axe's cutting edge. This would imply that the same person worked on both of these far-apart-lying stretches of the fence within a very short

space of time. We can however not say with certainty that the two stretches belong to the same enclosure.

trench	N=	mean depth cm	mean diameter cm
4	20	25.5	4.5
10	2	9	4
11	46	7.2	5.1
12	17	16.2	5
13	23	10.4	4.1
14	13	10.3	6
15	18	7.7	5.4
16	21	7	3.6
17	15	5.4	4.3

Table 3.3 Stakes and stake holes of the fences along the southeastern margin of the dune showing a decreasing depth from west to east.

Phasing

The parallel fences on the southeastern side are probably not contemporary, but were presumably successively installed. The outermost, most deeply founded fence was probably installed first, along a flowing, continuous line. Later, when the water level gradually rose, it was in two steps replaced by a new fence a little further up the dune slope, when it acquired a somewhat less regular course. Stretch 4 can plausibly be regarded as the local replacement of part of the southern fence, and in that case it need not automatically have had a counterpart on the other side of the dune. Stretches 1 and 3 on the contrary seem to reflect a more drastic movement of the fence up to a higher position on the slope. But due to the poorer preservation conditions it is only partly visible.

Stratigraphy

On the southern side the eastern section of trench 12 was set so far back that it came to lie over the features of the outermost fence (stretch 5, fig. 3.21). This section showed that the tops of the postholes lay at the top of the clay (Unit 18) and their fills consisted of a humic clay that differed clearly from both the matrix of Unit 18 and the overlying peaty sand (Units 15/16). Only beneath those strata did they become visible in the grey clay of Unit 19. This means that the fence postdates the trampling horizon (Unit 18), and predates the colluvium. This enables us to stratigraphically date stretch 5 to the transition from phase 2a to phase 2b. If the fence had been older, then the top parts of the features would have been obliterated by the trampling.

An exactly comparable position was established for stretch 7. Many ends of the wooden posts of this stretch came to light already during the manual removal of the peaty clay of 19N, which means that by the time when they were driven into the ground, all or most of this clay had already been laid down. The woodless features however became visible only beneath this clay. This is comparable with the observations made at the southern fences in relation to Unit 18.

Insofar as they were observed, the features of stretch 4 were in a stratigraphical position comparable with that of the features of stretch 5. Those of stretch 3 however lay in the area in which Unit 18 dovetails the dune and which contains the transition from the colluvium of Units 15/16 to the occupation layer 20. The exact height of the tops of these features was not determined, but the thinness of Unit 18 and

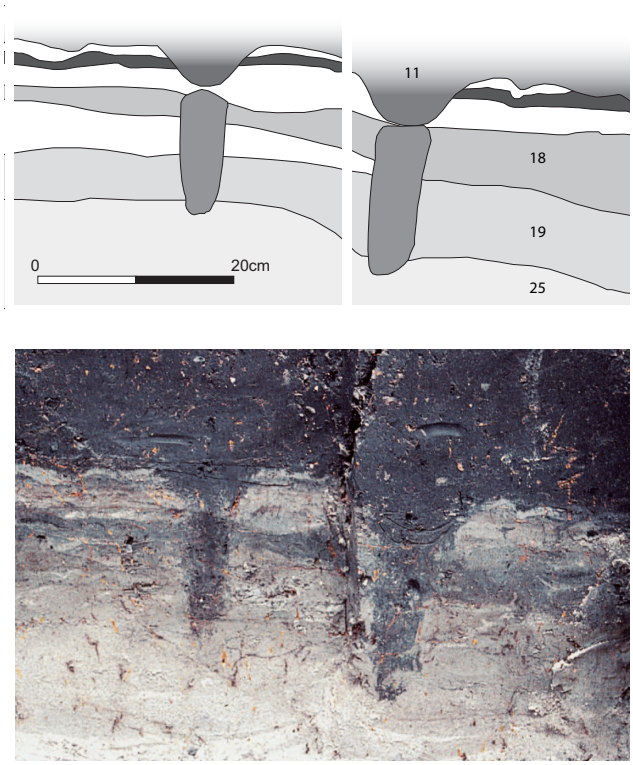

Figure 3.21 Fence, stretch 5. North section of trench 12 showing the relation of post moulds to the stratigraphy. These features lie just outside the limit of the colluvium of Units 15/16. The posts seem to have been driven into the ground from the surface of Unit 18. This unit is overlain by a sequence of thin clastic deposits (white), which were laid down while the posts were standing. Unit 11 bulges down into the post moulds, as a result of compaction of the moulds' loose composition.

the shallowness of the features of stretch 3 under level C suggest that the posts were dug into the ground from a higher level (the top of Unit 16).

All that could be determined of the features of stretch 1 was that they lay directly under Unit 20. The fact that a little determinable and even datable wood had in some cases nevertheless survived supports the relatively young date proposed for this stretch.

^{14}C dates

Four posts found in different parts of the dune and forming part of different stretches (1, 5, 7 and 7*) were subjected to ^{14}C analysis. The four were specifically selected to ensure that the dates obtained would on the basis of the posts' sharp stratigraphical correlation prove relevant for the site's internal chronology. These dates can only be soundly used in relation to the stratigraphy and the sequence of the fences. The one date obtained for the innermost stretch 1 is perfectly in accordance with the dates of phase 3, while the three dates obtained for the outermost fence (stretches 5 and 7) agree with the dates of phase 2, which confirms the sequence suggested above (see section 2.3).

Construction, function

Fences of a very similar type, composed of paired thin posts, are known from the Middle Bronze Age of Dutch prehistory, in particular from settlements in the rivers area, *i.e.* Zijderveld, Dodewaard, Geldermalsen (Eigenblok) and various others (Theunissen 1999, 167; Knippenberg/Jongste 2005; Jongste/Van Wijngaarden 2002). The distances between the paired postholes are the same (10-15 cm), but the pairs are set a good deal further apart: 1-3 m. The posts were originally dug 35 to 40 cm into the ground, implying that they were just over one metre high. Fences consisting of a single row of thin posts (type 1) were slightly more common. Their features tend to be encountered more frequently inside occupied areas, where the fences will have enclosed the farms, whereas fences of the double type were more common in the peripheral zones of settlements, enclosing cultivation areas. Theunissen assumes that the single fences comprised wattlework made of (willow) branches and that billet wood or branches were clamped between the posts of the double fences.

Several other structures are known from traditional European land use.[4] The paired posts may have been connected by one or more transverse beams or by (willow) branches, on top of which thin stems may have been horizontally or obliquely arranged. One, two or three horizontal beams result in a very open fence, but a solid, dense enclosure can be obtained with both horizontal and oblique infilling, certainly if split stems are used. As the Schipluiden site lay in a landscape that was fairly devoid of heavy wood, and its occupants employed a technology based on stone, we may assume that wood will have been used economically, and that people will have opted for the simplest structure for their fences, without any wood joints. The paired posts may in that case have been connected by willow branches at three heights. These connections will then have served to support thin horizontal stems placed between the posts. This fence-building technique was in former days commonly used in Norway (fig. 3.22), but also in Russia, as can be seen in the painting 'Afternoon in the village' by Piotr Suchodolski (1864) (Wagenaar/Jackson 2004, 25; fig. 3.23). The fences concerned were erected around kitchen gardens, to keep cattle out. The dimensions of the Oslo fence closely resemble those of the Schipluiden fence. The Oslo fence enclosed a pasture, and was evidently sturdy enough to keep cattle

either inside or outside its confines. This function is also a likely option for the Schipluiden fences, which will have been far too insubstantial for keeping out wild animals or for defensive purposes.

A third possibility as far as the structure of the fences is concerned is also inspired by a traditional Scandinavian rural custom. According to this method, long (willow) branches were inserted obliquely downwards between the posts of each pair. Together, they constituted an enclosure that was as dense as a wattlework fence. It is not possible to choose between these three options on the basis of the features.

It is not very likely that the fences were intended to keep cattle *in*. After all, they enclosed not only wells, but also burials and the numerous (settlement) structures represented by the thousands of postholes that will be discussed below. So the most plausible option is that they were meant to keep cattle *out*: they will have protected the water supply and the settlement from the animals.

Figure 3.22 Traditional Scandinavian fence consisting of double posts and horizontal beams held together by osiers photographed in 1978 in the *Norsk Folkemuseum*, Oslo.

Dimensions, use of wood

The fence on the northwestern side (stretch 7) was recorded over a length of around 50 m, that along the southeastern side over a length of at least 55 m, possibly even 80 m. The assumed connection between the two parts around the north-western end of the dune would add an extra 30 m, bringing the total established length to 160 m. With an average distance of 70 cm between the paired posts, that would imply around 500 posts. Depending on the course of the fence in the northeastern part of the site, the total number of fence posts will at some time have been between 700 and 900. Assuming a structure with three horizontal beams, we arrive at 2000 to 2500 stretching metres of round timber with a diameter of 3-5 cm. If we assume that the wood was not imported from some distant source, this must mean that the landscape was no longer completely open by the transition from phase 2a to phase 2b, and that young trees grew in the immediate vicinity of the site.

The enclosure measured at least 3000 m², perhaps even double that area if the northern part of the dune was also fenced in. For a small farming community without means of transport the construction of such a fence will have implied quite an effort, which however pales before that involved in the construction of the contemporary large collective cause-wayed enclosures in large parts of northern and western Europe.

Two structures that are to some extent comparable with the Schipluiden fence are known from the Netherlands. The first is a slightly later palisade that was found at the foot of the Hazendonk river dune, which enclosed an area of about 1000 m². The palisade was recorded over a length of 40 m, predominantly in excavation unit C, and consisted of approximately 10-cm-thick posts (mostly alder) that were set about 25 cm apart. It was dated to 33/3100 cal BC, phase 1b of the Vlaardingen group (Louwe Kooijmans 1977). The second structure is the well-known enclosure of Anloo, which was interpreted as a cattle pen. This has been dated to the early Havelte style phase of the TRB culture, *c*. 3100 cal. BC (Waterbolk 1960, Harsema 1982). This structure was likewise a palisade set in a foundation trench. The three-phased structure enclosed an area ranging in size from around 3000 (the smallest enclosure) to 5000 m² (the largest). Both enclosures were substantially sturdier than that of Schipluiden, so it is not certain whether they had a comparable function or were perhaps intended for defensive purposes, too.

Ends of wooden posts

Many of the fence features were found to contain more or less well preserved remains of the wooden posts. See section 11.4.5 for the analysis of these post remains.

3.8.3 Clusters of postholes (figs. 3.2-3)

The majority of the large postholes, with diameters and depths exceeding 20 cm, were found in a long zone in the highest part of the dune. On the southeastern side, the limits of this zone more or less coincide with the -3.4 m contour line of the original dune surface, and on the northwestern side they coincide with the -3.2 m line. The zone has a length of 120 m, from the westernmost end to the limit of the excavated area in the north, and a width varying from 5 to 20 m. The southwestern half is an uninterrupted area, but in the central and northern parts the previously distinguished clusters are still roughly identifiable. This zone is surrounded by a peripheral area containing numerous small features, and a few large ones which are rarely deeper than 20 cm. The irregular shape of this zone reflects a long row of activity areas, where sturdy posts were dug into the soil. This altogether shows that the entire dune area was used over a long period of time.

On the southeastern side of this postholes zone are a number of projecting areas extending at most down to the -4.0 m contour line. Everywhere between -3.2 and -4.0 m on the northwestern side are open clusters of shallow postholes and the odd feature of a sturdier post. This zone extends to the area containing the wells, even overlapping the edge of that area. The low altitude of the postholes shows that they date from an early phase (1 or 2a) of the occupation period, because this part of the slope was gradually covered by expanding peat growth in later phases. The shorter period of use explains the lesser density of features in this area. These low-lying clusters also include large, deep postholes, but in smaller numbers. The four main dense clusters in the highest part of the dune were labelled A-D and the minor clusters E-K. Clusters A-D were also analysed by computer (section 4.3.2, fig. 4.5).

Figure 3.23 Piotr Suchodolski 1864 ‘Afternoon in the village’, one of the paintings shown in the 2003-2004 exhibition focusing on ‘the Russian Landscape’ in the Groninger Museum. The double-post structure of the fence surrounding the kitchen garden is a very plausible option for the Schipluiden fences.

The fact that all the clusters of postholes include features of posts that were dug deep into the ground suggests that these clusters mark the sites of houses or huts of the kinds whose features have been found at other sites in the neighbourhood (see below). That we are unable to identify actual plans must be attributable to frequent rebuilding of new houses on the same spot, which would be understandable at this site on a narrow ridge in swampy surroundings. The absence of good-quality timber (with the exception of *Juniperus*) moreover implies that the occupants will have to have repaired or rebuilt their dwellings more often than people elsewhere. In view of the favourable preservation conditions, arrangements of postholes should nevertheless be identifiable, especially in the low-lying open clusters on the northwestern side of the dune, which was used for a shorter length of time and which should hence contain fewer overlapping plans.

3.8.4 Rows of postholes

At first sight, the largest postholes (diameters >30 cm, depths >30 cm) appear to be quite randomly arranged. On closer inspection many of them however prove to form part of rows with lengths of 5-12 m (commonly 7-11 m) comprising the features of 3-5 relatively heavy posts set 2-4 m apart. They have been numbered per cluster (fig. 3.24). Many of the postholes lie along straight lines, but some are slightly out of line. In a few cases double or even triple features were found. The rows show no preference for a particular orientation, but many do lie parallel or perpendicular to the dune's longitudinal axis. Many moreover intersect one another. Two or more parallel rows were not encountered anywhere.

Before attempting to interpret these rows we first had to determine whether such linear arrangements are observable in any random distribution of postholes. This is certainly the case as far as rows of three postholes set at irregular distances from one another are concerned, but less convincing in the case of rows of four postholes.

Good testing areas were the low-lying open clusters (H-K) on the northwestern side of the dune, which comprised only a limited number of large postholes, some of which were clearly arranged in short rows. In total, six rows with lengths of 7-11 m comprising 3-4 postholes set 2.3 to 4.8 m apart were distinguished in these clusters. Some of the rows are more regular (H1 and D1) than others. We regard this occurrence of rows in the open areas as an argument against random distribution and in favour of a functional meaning.

Distinguishing rows of postholes in the large clusters on top of the dune was far more difficult due to the great multitude of features in that area. Especially in the densest clusters (A, B, C, D) there are in each case several possible alternatives. Most convincing are the rows extending from postholes at the edges of the clusters (*e.g.* A6, A7, C1) and the (scarce) rows of postholes of equivalent dimensions and outlines set at regular distances relative to one another (*e.g.* B1, B6). Ultimately 36 rows were distinguished in these dense clusters, but we do not flatter ourselves into assuming that we have solved the puzzle. It was for example not possible to assign all of the largest postholes to such rows and we have not succeeded in interpreting the numerous shallower, smaller postholes.

3.8.5 Houses?

The rows of postholes cannot be functionally interpreted in isolation. We can however turn to the (admittedly scarce) evidence obtained at other sites for help. The chronologically and geographically closest frame of reference is provided by the contemporary house plans of Wateringen 4 (fig. 3.25) and Ypenburg, and the slightly younger (Vlaardingen group) plans of Haamstede and Vlaardingen.

The Wateringen plan (Raemakers *et al.* 1997) is two-aisled and measures 10.9 × 4.0 m. Four posts along the axial line, two of which were incorporated in the short walls, will have supported the ridge beam. They were set at distances of 4.2 to 3 m relative to one another. The wall posts were arranged on average 1 m apart along a slightly curved line. The postholes had varying diameters (up to 50 cm) and depths (up to 50 cm beneath the excavated level). The employed timber comprised stems of alders (central supports) and junipers (wall posts) with diameters of 6-16 cm, *i.e.* much smaller than the diameters of the features in which the surviving ends of the posts were found (Hänninen/Vermeeren 1995).

The three house plans of Ypenburg are two-aisled, 8-9 m long and 3.5-4.5 m wide (Koot in prep.). The postholes along the axial line set at varying distances relative to one another will have held the original roof supports and extra supports installed at a later date. The wall posts were spaced closely apart. The diameters of the postholes are 20-50 cm.

The largest and clearest plan of Haamstede-De Brabers (Verhart 1992) bears a close resemblance to that of Wateringen 4. The plan, which is also two-aisled, measures 9.1 × 3.8 m. One of the postholes that will have held the roof supports was situated in a short wall, the other three are in the interior. The distances between them vary from 1.5 to 4 m. The distances between the wall postholes are small, generally 50 cm. There where the distances appear to be much larger, postholes may have been overlooked. The holes that held the roof supports have diameters of 35 cm. They contained post moulds with diameters of 15-20 cm and depths of 50-60 cm relative to the excavated level. The wall posts were less sturdy, with diameters of approx. 15 cm and depths of 13-40 cm. There seems to have been a wall made of stakes between the wall posts. A second house plan found at this site was a good deal smaller (7 × 4 m).

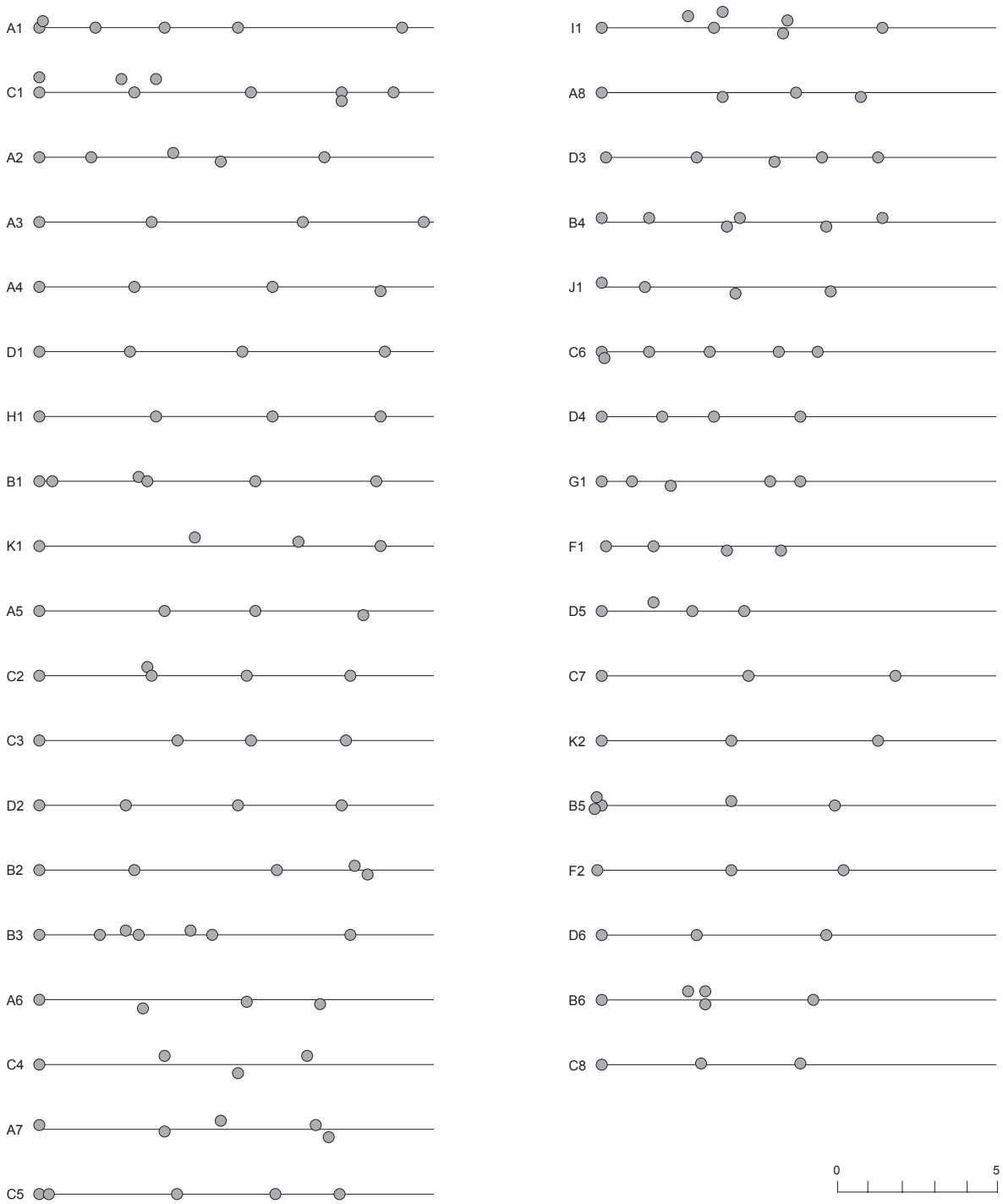

Figure 3.24 Selected rows of main postholes of the posthole clusters interpreted as the central rows of roof supports of small two-aisled houses. Row codes: cluster code plus serial number (scale 1:200).

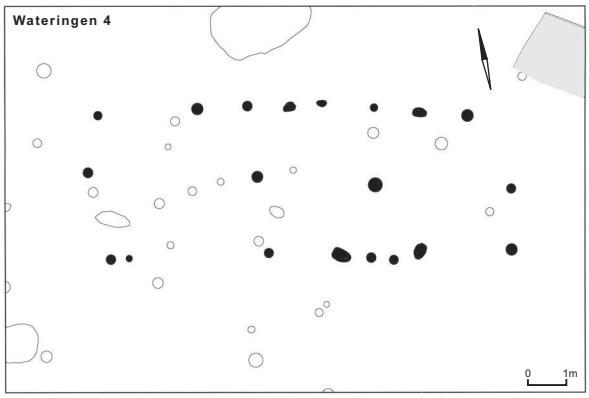

Figure 3.25 Wateringen 4, house plan of the Hazendonk group (scale 1:200).

The two-aisled plan that was found on the western levee at Vlaardingen measures 10 × 5.3 to 5.8 m, which means it is a lot wider than the other plans. The ridge beam was supported by six 10-16-cm-thick posts that were set 1.8-2.1 m apart and were evidently – judging from surviving ends – dug into the ground to a depth of 1.10 m. The associated postholes had diameters of 40 cm or more. The wall posts, which were arranged in slightly curving rows, were less sturdy. A second house, whose plan came to light on the other side of the creek, was much smaller (7.2(?) × 3.5 m, Glasbergen *et al*. 1966).

These plans of the four sites have a lot in common: they are all two-aisled, 9-11 m long and 3.5- 5.5 m wide. The irregular spacing of the central posts seems to be a characteristic feature of pre-Middle Bronze Age house plans in the Low Countries (pers. inf. S. Arnoldussen). The posts, in particular the central roof supports, of the Vlaardingen houses were somewhat more regularly arranged than those of the Hazendonk group. A conspicuous aspect of both the Wateringen and the Vlaardingen house are the slightly curved walls. The dimensions of the features correspond to those of Schipluiden. So why is it that we are unable to identify comparable plans at Schipluiden and can at best distinguish only single rows of relatively large postholes set at irregular distances relative to one another? There are two possible answers: the first is that there were no houses at Schipluiden, but other structures; the second is that the postholes of the identified rows held the roof supports, and that the postholes of the wall posts are not visible because they were lighter than those of the houses at Wateringen and Ypenburg. In view of the many arguments in favour of a normal settlement function for the Schipluiden settlement, the second option (rows of roof supports) is preferred.

Between one (F, G, H) and three (I) rows were identified in the northwestern, low-lying open clusters, with in the case of G evidence for replacement in the form of multiple features. From this we conclude that in the earliest phase of the occupation of the northwestern side of the dune there were for a few house generations at most four small houses, possibly no more than two if we regard F and G and H and I, respectively, as each other's successors. It is quite understandable that people will have built their houses in such somewhat sheltered locations next to the dune in the otherwise open landscape of this period.

On top of the dune we distinguished 5-11 rows per cluster: 8 in A, 6 in B, 11 in C, 5 in D/E and around 8 in K. As many features have not yet been interpreted in this manner, these figures should be seen as minimum figures. If these rows indeed represent the lines of the ridge beams of houses (excluding one another within a cluster), then this must mean that each identified cluster represents the frequent rebuilding of a house on the same spot. The fact that refuse was in all phases deposited over the entire southeastern waterfront strongly suggests that the houses represented by these clusters were in use at the same time, certainly in phases 2b and 3. We conclude that the rising water level forced the occupants to move their houses to a location on top of the dune at an early stage, possibly in phase 2a. People then continued to live there for at least eleven house generations in probably at most five contemporary houses. We may assume that some of the house sites (K, A) were in use for a longer period of time than others (D/E).

A house built from poor-quality timber (alder) will not have lasted very long. If we assume a house life of 15 years, we arrive at a minimum duration for the entire occupation period of a good two centuries. The ^{14}C chronology for phases 2b and 3 together spans roughly three centuries. Considering all the uncertainties, this is a good match. It should be borne in mind that these are the results of model calculations, based on the assumption that the rows of postholes represent the lines of ridge beams, and dependent on the numbers of rows identified per cluster, the synchronicity of the low- and high-lying clusters and the assumed life span of a house.

3.8.6 Rows of stake holes

In some places straight rows of relatively deep holes of stakes or thin posts were observed in the open areas between the posthole clusters. Most of these holes were deeper than 30 cm below level C, and the rows were at most 11 m long. Most of the holes were set 1-2.5 m apart. We may assume that the features do not represent parts (walls) of houses, because they appear to be totally unrelated to the assumed rows of roof supports. They are most probably the features of fences of structures other than the large enclosure. No comparable rows could be distinguished within the clusters due to the great multitude of features.

3.8.7 Posthole cluster in Units 1 and 2 (figs. 3.26-27)
When trench 22 was being mechanically dug, 29 ends of wooden posts were found next to the dune, at the base of the peat of Unit 1 and in the clay of Unit 2, above the foot of the dune. They were lying and standing dispersed in a cluster with a diameter of approx. 6 m. The posts had diameters of 3-8 cm and were generally at most 30 cm long, with one exception of 75 cm. Most of the ends of the posts had been sharpened into a point and had from an indeterminate level been driven through the clay of Unit 2 into the peat of Unit 1, in some cases into the underlying dune sand. Some of the pointed ends showed a burr, which will have been formed when the posts were driven into the ground (in particular into the sand). The weight of the layers that were later deposited on top of this part, in particular that of Unit 0, caused dense compaction of the peat, and in the process also compressed the posts like an accordion. ^{14}C analysis of these posts yielded a date of *c.* 2300-2050 cal BC, *i.e.* the Bell Beaker culture. By this time the groundwater had reached a level of around -2.5 m NAP (Van de Plassche 1982, 86) and the entire dune had been buried by the expanding peat, but its position may still have been recognisable by a different (higher) vegetation. The employed types of wood reflect the contemporary swampy environment: 18 determinations yielded 5× alder and 13× willow (section 11.6).

The absence of associated finds and the random arrangement of the remains make it impossible to say for what purpose these posts were driven into the ground.

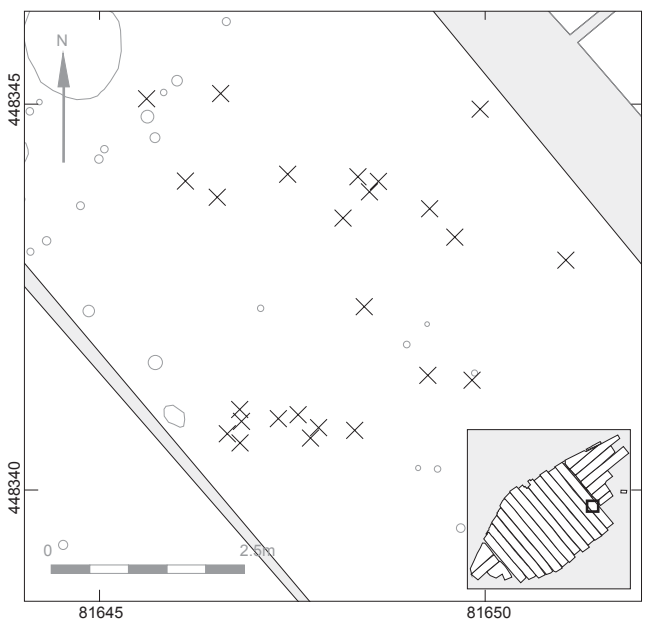

Figure 3.26 Cluster of posts (X) in peat Unit 1, trench 20, dated to 2300-2050 cal BC (scale 1:100).

Figure 3.27 Two posts of the post cluster in Unit 1 showing deformation resulting from later compaction.

3.9 PHASING

In the foregoing survey, attempts have been made to assign the different types of features to the stratigraphically distinguished occupation phases on the basis of various criteria. Those criteria are stratigraphy, the nature of the fills and the depth zone. Due to the rise in sea level and the associated rise in local groundwater level the dune gradually became 'submerged', *i.e*. covered with aquatic deposits, mainly peat. This means that the deepest features do not date from phases 2b or 3, but from the beginning of the occupation period, phases 1 and 2a.

The conclusions of the previous sections can be summarised per phase as follows.

Phase 1

Around 3600 cal BC the waterfront lay on the southeastern side of the dune. Refuse was deposited there over the entire length of the dune. It is not clear whether the low-lying postholes of clusters A, B and C and the concentration at the western end date from this early phase. What we do know for sure is that a child was buried in this phase (burial 5). On the other side of the dune the first wells were dug in this phase. This is taken to imply regular problems with fresh-water supplies. It is possible that one or two small houses were in this phase built in the areas of clusters F and I in this part of the dune. If there were any structures on top of the dune in this phase, their features cannot be distinguished from later features.

Phase 2a

After the site had been temporarily abandoned due to floods, it was soon taken in to use again, in the same general pattern, characterised by deposition along the waterfront and the digging of wells on the northwestern side. In spite of the short interruption in occupation, there is nevertheless evidence of continuity in spatial layout. The structures represented by the low-lying posthole clusters may still have been in use in (the earliest part of) this phase. Due to the unclear correlation between Units 19N and 18 on the southern side, the features can unfortunately not be as precisely classified as the remains that were found embedded along the waterfront.

A small area at the western end of the site was intended for rituals: cult depositions in a small pit and the burial of deceased in a small cemetery.

Phase 2b

Around 3500 cal BC, at the end of phase 2a, the dune was for the first time enclosed with a large fence. The fence was founded not in the sand, but just beyond it, in the peripheral zone of the swamp, and on the northwestern side enclosing all the old wells. In the course of phase 2b the fence – or at least the stretch along the southeastern side – was replaced twice by fences placed higher up the slope.

From this phase onwards people lived at the crown of the dune, at four or five contemporary house sites (A, B, C/E D). Wells were dug a little higher up the slope and at more disperse locations, especially around the western end of the dune.

The more intensive use of the top of the dune throughout the entire phase 2 led to the formation of an anthropogenic soil ('occupation layer') and colluviation along the edges (Unit 16).

Phase 3

Between 3500 and 3400 cal BC – in phase 3 – the level of the groundwater rose from -4.0 to -3.7 m. The top part of the dune projected no more than 1-0.5 m above the surface of the surrounding swamp and had by this time shrunk to a width of 30 m. The entire southeastern edge was still used for dumping refuse, showing that the entire crown was still occupied. The youngest fence (stretches 1 and 4) probably dates from this phase. Only a few wells were dug in this phase, probably because sufficient freshwater was naturally available in the surrounding swamp and the sea no longer penetrated to the site.

The small hut whose features came to light between clusters C, G and F may date from the final occupation phase.

After the occupation

A flood around 3200 cal BC, during which the clay of 02 was deposited, marked the end of the site's occupation. Nevertheless, people returned to the site from time to time, as can be inferred from two pieces of partly carbonised wood found in the west and a cluster of postholes in the east. The latter have been ^{14}C dated to the late Bell Beaker period, 2300-2050 cal BC. This find shows that people were by this time living elsewhere, and that the site had only a supporting function, probably as a fishing station.

notes

1 The word 'level' is here used to indicate a cleaned, slightly domed exposed surface following the stratigraphy.

2 We decided to use the word 'well' throughout this publication for the sake of brevity and conformity with earlier publications, although the features in question are merely pits and may have served as water supplies for people and cattle alike.

3 A single hearth pit of type 1 was recorded at Wateringen 4, too (Raemaekers *et al*. 1997). This now proves not to have been an incidental discovery. The difference in numbers again demonstrates the great difference in scale between the two sites.

4 We would like to thank Prof. dr W. Haio Zimmermann, *Niedersächsisches Institut für historischen Küstenforschung,* Wilhelmshaven, for the information and documents he provided on historical and traditional fences in Norway, Bohemia, Germany and Austria.

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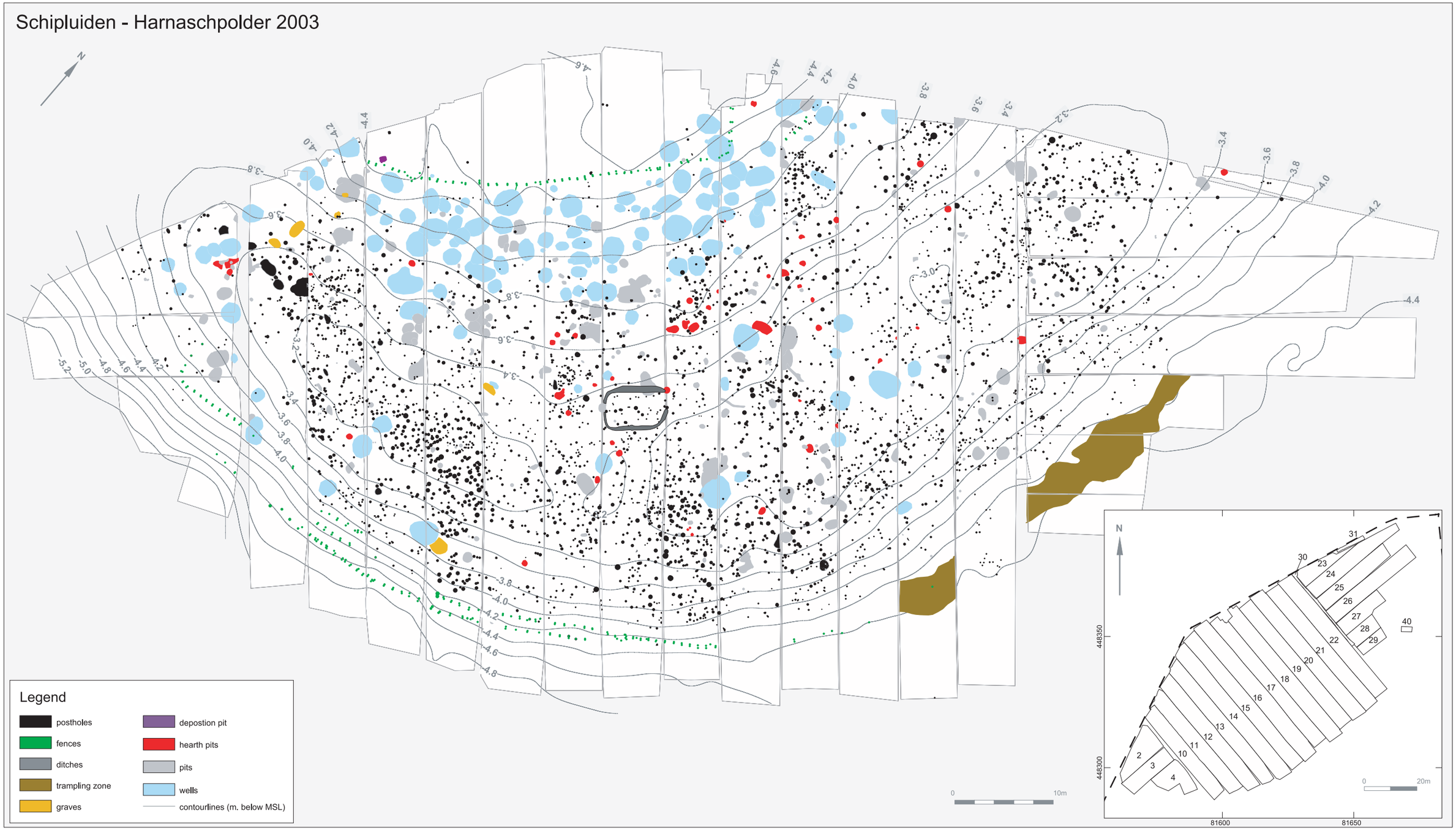

Figure 3.2 Over-all excavation plan of Schipluiden-Harnaschpolder showing all the interpreted anthropogenic features according to the field drawings (scale 1:400).

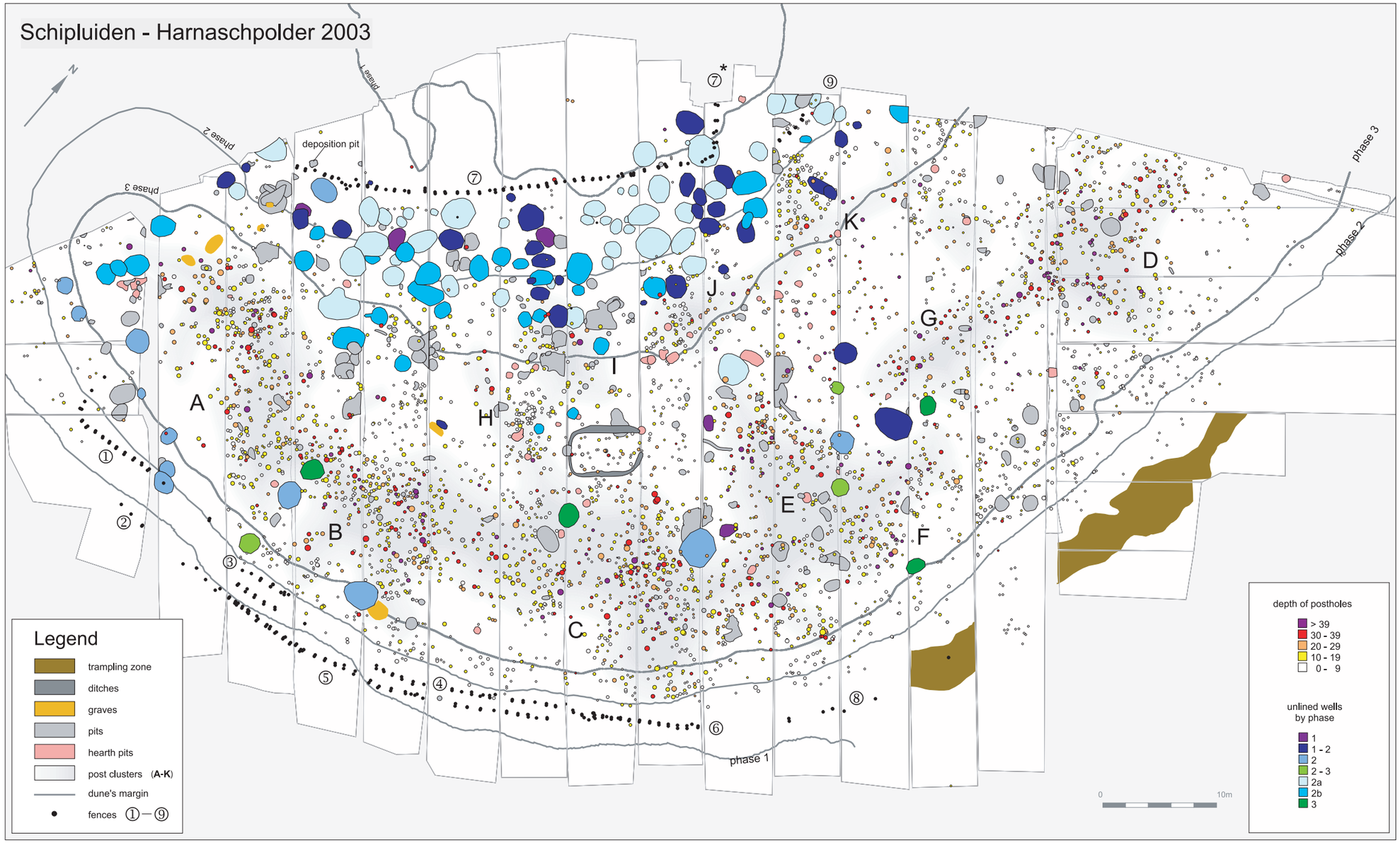

Figure 3.3 Cartogram of the Schipluiden excavation plan showing postholes coded on the basis of diameter and depth according to the field registration files (scale 1:400).