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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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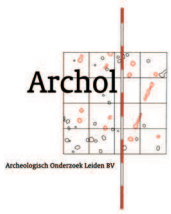

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PART I

INTRODUCTION

1 Discovery and working method

Peter Jongste
Leendert Louwe Kooijmans

The Middle Neolithic Schipluiden site was discovered during a systematic coring prospection of a building ground where a new wastewater treatment plant was scheduled. The site was assessed on the basis of additional borings and a small trial excavation. As the site could not be saved, an excavation strategy was developed by a project team. The excavation was executed by a research team coordinated by Archol B.V. The unforeseen wealth and wide extension of features and finds necessitated some adjustments to the excavation programme. The research goals of full coverage of the site and recording of all finds were met within the available time and the budget generously provided by the Water Board of Delfland.

1.1 Background of the investigation

1.1.1 Cause

The immediate cause of the discovery and excavation of the Neolithic settlement at Schipluiden was the construction of a new wastewater treatment plant by the *Hoogheemraadschap* (Water Board) of the Delfland region in the Harnaschpolder, in the northernmost part of the municipality of Midden-Delfland. The plant was to measure around 25 ha and comprise effluent pipelines with a total length of 30 km (figs. 1.1-2).

An 'AHR Project Group' (AHR stands for *Afvalwaterzuivering Haagse Regio* = Wastewater Treatment in the Region of The Hague) responsible for the archaeological supervision of the work was formed via a covenant between the *Hoogheemraadschap*, the municipal archaeological services involved, the provincial authorities of Zuid-Holland and the University of Amsterdam (Koot 2000). The Project Group's tasks were to inventory and survey the sites concerned, take protective measures and optionally execute or organise the execution of excavations. When the project was commissioned, the area was, on the basis of the known archaeology of the region, assumed to contain sites from the Roman period and the Middle Ages, but the possibility of research into Neolithic occupation remains was not considered (Koot 2000, 6 and 9). The report of the archaeological inventorying of early 2001 states that it was still not clear whether the research area was expected to contain dunes with Neolithic sites, and explicitly recommends deep exploration of the soil by means of deep borings (Bult *et al*. 2002, 52). The reason for this was that four settlements of the Hazendonk group had been found elsewhere in this region: Rijswijk (Koot 1994), Wateringen 4 (Raemaekers *et al*. 1997), Wateringse Veld (Oude Rengerink 1996a, b) and Ypenburg (Koot/Ten Have 2001).

1.1.2 Discovery

During boring trials (to a depth of -6.50 m NAP) carried out in the context of an Additional Archaeological Inventory, *RAAP Archeologisch Adviesbureau B.V.* discovered a buried sandy ridge with a width of around 50 m in the northernmost part of the building site. This was later found to be a low dune whose top lay at around -3.40 m NAP (Deunhouwer 2001).[1] The dune was explored further via 24 standard borings (Ø 4 cm) and two wide-diameter borings (Ø 12 cm). Most of the samples from the top of the body of sand were found to contain charcoal, and nine also contained fragments of pottery, flint and/or bone and – a sample obtained in one of the wide-diameter borings – even two carbonised emmer grains. With hindsight, these modest finds represented a

Figure 1.1 The wastewater treatment plant and the Neolithic site. Orange: greenhouse farming.

Figure 1.2 Aerial photographs taken on July 16 2003, half way through the excavation, showing the site surrounded by built-up areas and greenhouses and cut off by the A4 motorway. Detail showing excavation trenches.

refuse area at the foot of the dune. As only part of the site was accessible – the rest was still occupied by greenhouses – the site's dimensions could not be determined. It was however possible to establish a detailed stratigraphy for the period in which the dune was under the influence of the rising groundwater covered with peat and layers of clay. The top of the dune was found to have suffered erosion in later times (Iron Age).

At the time of its discovery the site was referred to as 'Schipluiden-Harnaschpolder' in view of its location in a remote corner of the municipality of Schipluiden, although the site actually lies much closer to the village of Den Hoorn and the large town of Delft. We decided not to change this designation to avoid confusion, even though Schipluiden was later incorporated in the larger municipality of Midden-Delfland.

1.1.3 Additional Archaeological Research

An Additional Archaeological Research assignment yielded more insight into the nature and quality of the site (Deunhouwer 2002). This additional research comprised 26 manual and 46 mechanical wide-diameter (Ø 10 cm) borings intended to obtain samples of an adequate volume. A test pit measuring 4×4 m was dug on top of the dune. The great depth of the site precluded the digging of a long trial trench. The results of this additional research in many respects confirmed those of the first exploration. Although the site was still not accessible in its entirety, the settlement appeared to have covered the whole dune, whose area was estimated to have been 0.75 ha. Find densities were still not known, but the archaeological remains appeared to be concentrated primarily on the dune slopes and in the aquatic deposits overlying the sand. Features were observable in the test pit, and a few remains were found. Among the botanical remains were carbonised sloe stones, while the zoological evidence included fish remains. The depth of the remains and characteristics of the pottery suggested that they predated (by a short time) the Vlaardingen group. This was confirmed by the outcome of thirteen AMS ^{14}C dates obtained for charcoal from the residues of the boring samples and samples from the test pit, including a carbonised sloe stone. They span a time range of 3900-3350 cal BC (2σ). This period coincides with that of the Hazendonk group, with minor overlaps with the preceding Swifterbant culture and the subsequent Vlaardingen group.[2] Unfortunately five stratigraphically consecutive samples from one boring at the southern edge of the dune revealed no development from old to young.

1.1.4 Assessment and advice

On the basis of the quality of the biological remains and the site's preservation in a calm depositional environment, the site was assessed as being of high value. As the fact that the plans for the wastewater treatment plant had already been approved meant that the site was destined to disappear, it was decided to excavate it.

1.2 Research questions

Following the report of the exploratory research, the AHR Archaeological Project Group formed a team that would be responsible for planning the excavation. The team was composed so as to comprise expertise relating to the period concerned, the categories of finds that were expected to come to light and the specific (wetland) research conditions. It was clear from the start that the members of this team would also be charged with the excavation's supervision on account of the limited availability of the required expertise in the Netherlands. The team formulated the research questions and made the excavation plan (Louwe Kooijmans *et al*. 2002).

The core questions of the research were: how did people live in the coastal area in the early Neolithic, to what extent may they be classed as 'fully Neolithic', and what place did the Schipluiden community occupy in the neolithisation process of the Lower Rhine area? Additional questions concerned the reconstruction of the former landscape, dating and phasing, cultural characteristics, subsistence and the settlement's function. Aspects of particular interest with respect to the latter issue were the size and composition of the group who lived here, its degree of mobility and seasonality. All questions were to be tackled with due attention for the unmistakable environmental changes that took place in the period of occupation, and the extent to which they may have affected the site's use.

The ways in which the analyses of the individual categories of remains and samples were hoped to help yield answers to these questions are indicated in a cross-table (fig. 1.3).

1.3 Excavation design

1.3.1 References

The excavation design was of course primarily based on the evidence obtained in the surveying of the site itself. In addition, the site Wateringen 4, which was much smaller but highly comparable in environmental and chronological terms, had shown what kind of macroscopic information the fine find fractions obtained in the borings could reveal. The possibility that two sites that were assumed to be so very comparable would actually prove to differ substantially in terms of the duration of occupation was however never considered. In a more general, methodical respect, the two excavations at Hardinxveld (Louwe Kooijmans 2001a, b), though differing from Schipluiden in environmental and chronological terms, also proved to be important references. But although these references were conscientiously used, the

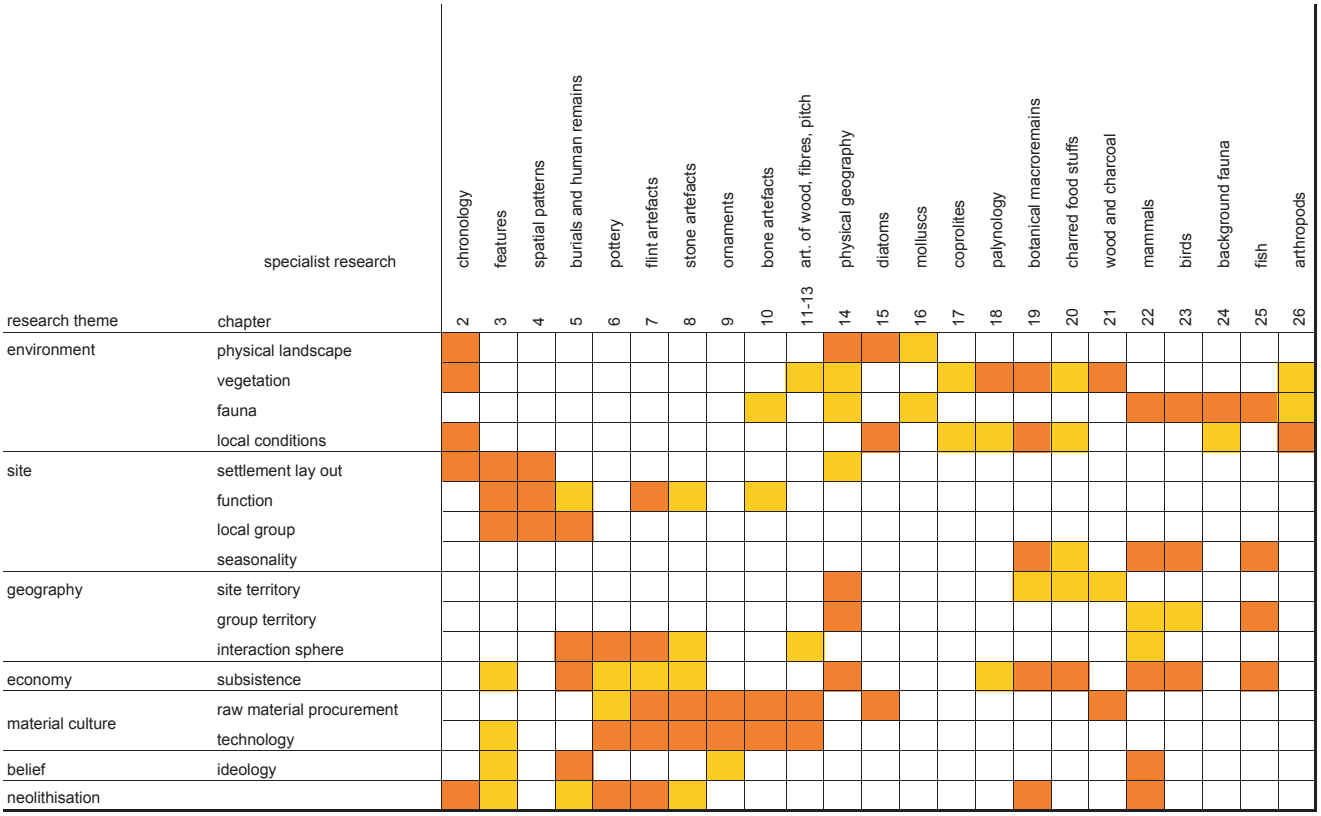

Figure 1.3 Specialist research versus research themes.

site was found to differ considerably from what had been expected. This was largely attributable to underestimation of the indications provided by the aquatic deposits at the edge of the settlement site in the preliminary investigation.[3]

1.3.2 The design

The design was based on complete excavation of the whole site, as this site afforded the possibility of mapping an entire settlement, with the exception of only a small part in the north, which had previously been disturbed by the construction of a motorway. Partial excavation was undesirable on account of the possibility of spatial differentiation of the site and the unpredictability of the occurrence of unusual features such as burials and house plans. The area to be excavated was calculated to measure 5500 m².

The design was formulated according to the same quality criteria as employed in comparable excavations, notably those of Wateringen 4, as a synchronous frame of reference in the same region, and Hardinxveld-De Bruin and Hardinxveld-Polderweg for the overall excavation procedure. These criteria conform to the standards of the Faculty of Archaeology of Leiden University and the KNA.[4]

Two important, but contradictory requirements were good stratigraphical control over the finds and an adequate spatial overview of the cleared surfaces to enable configurations of features to be identified in the field already. The solution chosen primarily entailed the digging of 6-m-wide parallel trenches perpendicular to the average longitudinal axis of the dune (fig. 1.4). This meant that, for every find, a vertical section would be available within 3 m. Secondly, in collecting the finds, the established stratigraphy was to be followed where possible, and each layer was to be excavated via spits with a thickness of at most 10 cm. The 6 m chosen for the width of the trenches was assumed to be sufficient for identifying house plans of the kind known from the period concerned (see section 3.8.5). It was moreover a good practical dimension for manual excavation.

A metre grid was assumed to be adequate for the resolution of the envisaged spatial patterns in the distribution of the finds (fig. 1.5). So, with 10-cm-thick spits, this meant that finds would be collected in units of 1 × 1 × 0.1 m. By way of comparison: the metre grid initially prescribed in the design for the late Mesolithic site of Hardinxveld was later reduced to segments of 50 × 50 cm. At the Bronze Age

settlements that came to light along the course of the scheduled Betuwe railway line units of 2 × 2 × 0.1 m were used (Jongste/Van Wijngaarden 2002).

Total find recovery of all archaeological find categories of >2 cm was taken as the standard, with a view to both the information they would yield and the distribution patterns that were to be drawn. On account of the envisaged fragility of the pottery and bones and the possibility of use-wear traces and residues on stone, flint and bone implements, it was decided that the find-containing deposits would be excavated by hand, instead of being sieved. In view of the size of the site and the limiting value of 2 cm, this could be done by shovel. Trowels would be used only for concentrations of fragile finds.

In order to check the manual collection and obtain a sample of class 4-20 mm of all the find categories, it was decided to rinse the soil from one-metre strips from each trench through a 4-mm sieve. The primary aim of this sieving was to recover small fragments of flint, beads of various materials, small faunal remains (of fish) and large botanical macro-remains (fruit stones and pips and nuts).

An archaeo-ecological sampling programme was set up for zoological and botanical remains smaller than 4 mm. Samples of 10 litres were to be taken from the sections of the trenches all over the site in 6 × 6 m grids. They were to be assessed during the excavation and on the basis of the results of those assessments 60 samples would be selected for botanical and zoological assessment and analysis. Features were also to be sampled. A 5-litres portion of each 10-litres sample was to be sieved through mesh widths of 2 and 1 mm for the zoological research and the other 5-litres portion through mesh widths of 2, 1 and 0.5 mm for botanical research. A 0.5 litre portion was each time to be sieved to obtain a fine fraction of 0.25 mm.

For the other specialisms (diatoms, molluscs, arthropods, ^{14}C dating) the specialists themselves were to take samples at what they considered the most suitable points, or where necessary samples would be taken in consultation with the relevant specialists.

In order to place the settlement in its former landscape, its immediate surroundings within a radius of one kilometre were to be covered in a geological survey as there would be a major discrepancy between the detailed information obtained at the excavated site and the palaeogeographical information available on the region. The specially surveyed microregion would of course have to be incorporated in the broader palaeogeographical context.

The fieldwork was assumed to take at least 15 weeks, from April until Augustus of 2003. However, the civil-engineering preparatory work began to overrun its schedule and that put pressure on the excavation's schedule, which was partly dependent on the availability of students in the summer months. In the end the fieldwork was started in June and completed in September, within the allotted time.

1.3.3 Deviations from the design

Any excavation, however meticulously prepared and planned, will be affected by unforeseen discoveries, and things were no different in the case of the investigation of Schipluiden-Harnaschpolder. The greatest surprise at this site was its size. Although it had indeed been envisaged that the entire dune had been occupied, neither the information obtained in the surveying nor that of Wateringen 4 had given cause to assume that the refuse deposits would extend far into the surrounding sediments. In addition, the number of finds and the density of features exceeded the initial expectations by a factor of eight to ten. This alone already shows that the research led to a fundamentally new understanding of the

municipality	Schipluiden
region	Harnaschpolder
site code	AHR 39
ROB registration number	4257
coordinates	see figure 1.3
execution	ARCHOL BV in cooperation with the Faculty of Archaeology (Leiden University), Groningen Institute of Archaeology, BIAX Consult, Archeobone
preparatory work	weeks 20-22
excavation work	weeks 23-37 (2.6.2003 until 12.9.2003)
post-excavation work	weeks 38-39
duration of the excavation	15 weeks
number of student days	2615, from 126 (=25 studs) to 238 (=47 studs) per week, on average 35 students from Leiden and Ghent
duration of analyses and writing of the report	17 months

Table 1.1 Administrative details of the excavation.

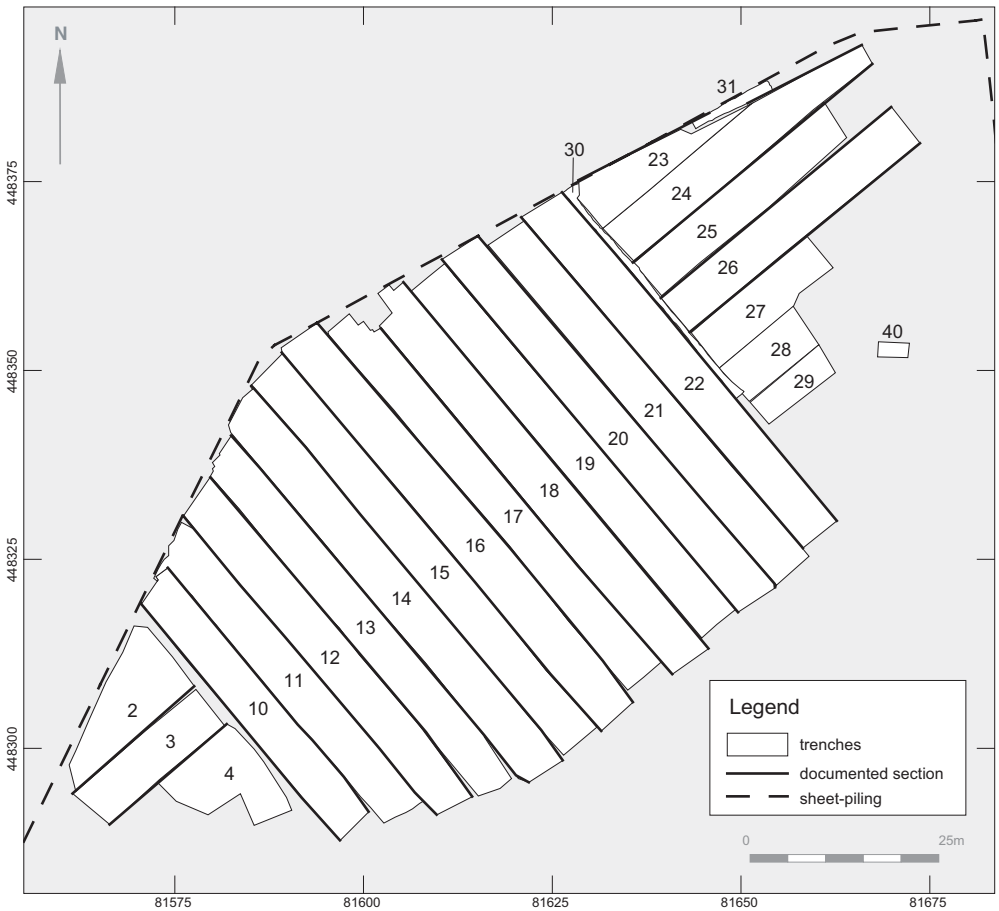

Figure 1.4 Layout of the excavation trenches and sections.

period concerned, in which there were evidently not only small settlements, but also much larger ones that were used over longer periods of time.

Another unexpected aspect was the wealth of organic remains, in particular wooden artefacts, which had survived because activities were carried out far from the site in the surrounding swamps.

What were the causes of this underestimation? In the first place a too rigid focus on Wateringen 4 as a reference, based on the assumption that sites of a comparable age in an identical environmental setting in the same region would be bound to correspond in other respects, too. A second cause was the limited possibility of interpreting the features observed in the test pit and the find indications obtained in the borings. In retrospect, one or more small trial trenches, or even better a single long trial trench, covering the two long slopes of the dune, would have proved very elucidating. Another factor, finally, were the limited possibilities of exploring the northern part of the site.

Fortunately, the organisation made it possible to respond to the new situation on time during the excavation. The capacity for sectioning features and the drawing work was expanded, as was that for the processing of the finds. By way of compensation the 4-mm sieving programme was restricted 50%, because various samples, especially those from the aquatic deposits, were difficult to sieve. During the fieldwork it had been found that manual digging already yielded a sufficient degree of accuracy. Sieving the soil from the units 1/12 instead of 1/6 nevertheless yielded an adequate sample of the fine fraction (4-20 mm).

After some manual trials it was decided to use a digging machine to collect finds from the clay Unit 19S (phase 1), for reasons of efficiency.

Due to the delay in the civil-engineering preparatory work the fieldwork had to start at a time when only the south-western part of the site had been cleared. Unfortunately, very little came of the original plan to start with two more representative trenches (12 and 18). Instead, trenches 10 and 14 were dug first. The greater part of the southwestern end of the dune (trenches 2 and 4) moreover had to be excavated with priority, more quickly and without find recovery in view of the risk of the nearby motorway subsiding due to the

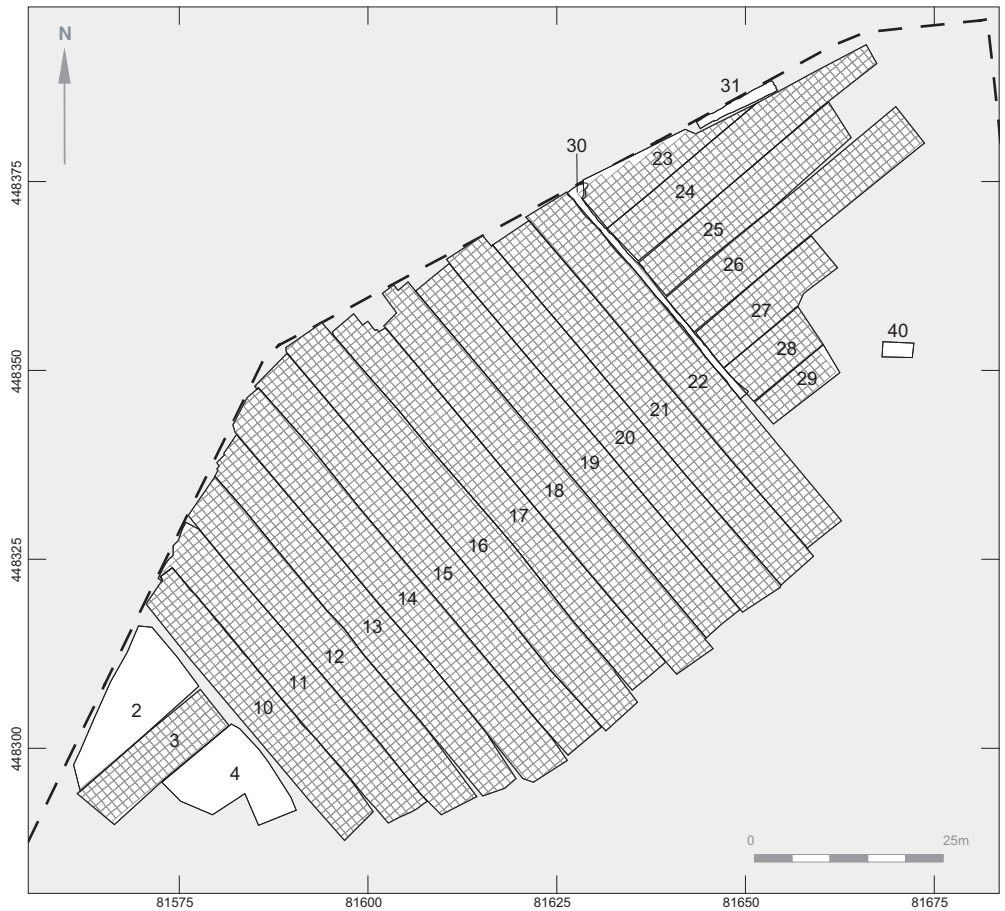

Figure 1.5 Layout of excavated segments.

well points dug for drainage. The features were however completely recorded.

Finally, the layout of the trenches at the northeastern end was adapted to the local relief of the dune to ensure better stratigraphical control.

1.4 Execution

1.4.1 Organisation

Responsibility for the execution of the excavation was granted to ARCHOL B.V. in Leiden on the basis of its capability, proven in previous projects (Hardinxveld), of conducting such large-scale, detailed wetland excavations on a contract basis. The contracts for the ceramic, botanical and zoological research were granted to the Groningen Institute of Archaeology, BIAX Consult in Zaandam and Achaeobone in Leeuwarden, respectively. Among the partners with which ARCHOL cooperated were the In Terris agency in Amsterdam (automation), Smits Antropological Bureau in Amsterdam (human remains), the Zoological Museum of the University of Amsterdam (arthropods) and the TNO Institute for Applied Geosciences (NITG) in Utrecht (diatoms). ARCHOL's systematic cooperation with the Faculty of Archaeology of the University of Leiden guaranteed the availability of the required expertise and internal quality control. By using students of archaeology – on average 35 a week – the large required working capacity could be met under relatively favourable conditions. The standard excavation team comprised eighteen persons (see Appendix 1.1). In addition, ten specialists were regularly involved in sampling procedures in the field. For the internal communication, a Schipluiden Bulletin presenting the results of the previous week's work was distributed every week.

1.4.2. Automation (database, cartography and photographs)

The great wealth of finds and features involved extensive recording work. In view of the wet, dirty working conditions in the field it was decided to use primarily analogue forms and field drawings for the field records. Height measurements (obtained with the aid of an infrared theodolite or Total Station) and the field photos (taken with a digital camera) were directly digitally processed. The find cards

were all barcoded to avoid the risk of errors in reading the unique identifications in the find processing.

All the field forms and field drawings were checked during the fieldwork and digitised or otherwise computerised. A database program was developed in an Access environment for the digital processing of the excavation data. The employed digital forms were based on the obligatory specifications formulated for this research by the principal. Besides options for entering and changing data, the program also comprised extensive control queries, which made it possible to quickly detect omissions and errors. The field drawings were digitised in AutoCAD and further processed into Mapinfo and Surfer files for further spatial analyses.

The finds were also processed simultaneously with the fieldwork. A specially developed VisualBasic split module made it possible to automatically record the number of finds in each category and their total weight. Also digitised were the production of new find cards, including the recorded find context, and the box administration.

The material specialists used their own digital records, developed in consultation with the AHR Project Group, in processing the various categories of finds. The system of unique find numbers that was used by everyone meant that the described finds and samples could always be coupled to the field records.

The relational integrity of the various tables, each covering a specific part of the workflow and administration, was regularly checked in strict, comprehensive inspections throughout the duration of the research. This ultimately resulted in an integral digital set of records.

Figure 1.6 Sieving installation in sea container and the artificial decantation basin of the closed-water circulation system.

1.4.3 Facilities

The Delfland *Hoogheemraadschap* made a house lying a short distance from the site available as an excavation base and for the automatic processing of the data. A shed was available for the processing of the finds (washing, drying, sorting and storage) and the sieving of the ecological samples. The sieving installation that had been developed for the Hardinxveld excavations (Louwe Kooijmans 2001a, b) was used for the 4-mm sieving procedure. The installation was placed in a sea container next to the site (fig. 1.6). A closed circuit with a basin for collecting and reusing the rinsing water was created for the sieve's water supply.

1.4.4. Layout of the site

The ground level of the site of the scheduled wastewater treatment plant – and hence the excavation site – was -1 m NAP. The site was along its northwestern side limited by the A4 motorway. The fact that work would have to be done at depths ranging from -3 to -5 m meant that the site would have to be drained by well points. To this end, steel sheet piling was driven into the ground along the motorway. A slope was assumed to suffice on the other side of the site. Phase 2 of the site preparations comprised the archaeologically supervised mechanical removal of the archaeologically sterile clastic covering layers (Unit 0) to approximately 30 cm above the highest find level. Next, the trenches were marked out. They were alternately excavated, so that a good general survey of the site's dimensions and the distributions of finds and features would be obtained halfway through the excavation already (fig. 1.7).

1.4.5 Standard procedure

Field procedure

During the fieldwork, due consideration was paid to the contours of the old landscape. The find layers were followed as they sloped downwards and were "peeled away" down to the levels at which features became visible. The features were then plotted. The standard procedure followed in each excavation trench was as follows. First the remnants of the covering layers were mechanically removed, after which the metre grid for the segments in the find layer (level A) was installed. Next, the find layers were excavated by manual shovelling in collection units of 1 × 1 × 0.1 m down to the first level at which features became visible, which was still characterised by anthropogenic soil (level B) (fig. 1.8). The height of each segment in the find layer was determined.

The height of level B was determined along three rows in each trench (along the edges and across the centre). Then excavation was continued mechanically to approximately 10 cm beneath level B, to a level at which features could still be clearly identified (level C, fig. 1.9). This level was mapped (scale 1:50, fig. 1.10). The heights of the levels were deter-mined (see level B), and each individual feature was three-dimensionally measured. All features were sectioned, the small ones (postholes) first, and the larger ones (pits) last.

As the excavation of Wateringen 4 had shown that not all features were visible at this depth, the excavation was in each trench continued to approximately 30 cm beneath level C, to level D.[5] This led to the discovery of a modest number of new features, among which were some hearth pits.

Finally the two long sections of the first series of trenches were drawn. Palaeoecological grid samples were taken from the sections, to ensure optimum stratigraphical control.

Ecological sieving programme

10-litres samples were taken from the fills of pits, wells and sections. They were all (N=300) assessed by the specialists concerned during the fieldwork. Of the 300 samples, 128 were subjected to zoological analysis. A selection of sixty samples with good research potential, obtained from different parts of the site and representing the different phases and the distinguished contexts (layers, pit fills), were botanically analysed. See chapters 18-25 for further details.

A few pit fills with extremely favourable preservation conditions were sampled for arthropod research (see chapter 26). Diatom samples were taken from the aquatic stratification and from the odd pit fill (see chapter 15).

1.4.6 Post-excavation work

The specialists responsible for analysing the various find categories were confronted with quantities that were five to ten times the amounts envisaged. This meant that the specifications that had been set up for the selections of the various categories that were to be analysed were actually superseded. For reasons of scientific desirability, available research capacity, time and costs, new lower limits were therefore defined for the different find categories. The new limit chosen for pottery was 10 grams, that for flint and stone was 2 cm. In the case of bone it was felt to be undesirable to employ such an absolute dimensional criterion, in view of the risk of it affecting the scores of smaller species. The criterion chosen for this category was therefore quick and unambiguous determinability. This led to the exclusion of fragments that could not be identified with any greater precision than 'large, medium-sized or small mammal (LM, MM, SM)'. As a good spatial and quantitative picture of the total quantity of finds could be obtained via other routes (chapter 4), the new strategy did not imply a loss of information. The same objectives could be realised with a little extra effort, and the much better quality of the finds implied the prospect of a far more satisfying final result.

In managerial terms it could be said that the merit of the employed 'design and construct' concept was proved, because a more rigid organisational set-up would have either

Figure 1.7 General view of the site from the south, half way through the excavation.

Figure 1.8 The excavation of the 1 m^2 segments in 10-cm spits and following the natural stratigraphy.

Figure 1.9 Removal of approx. 10 cm of soil between segments and level C (*cf.* fig. 3.1) by a machine equipped with a shovel specially designed for archaeological excavation.

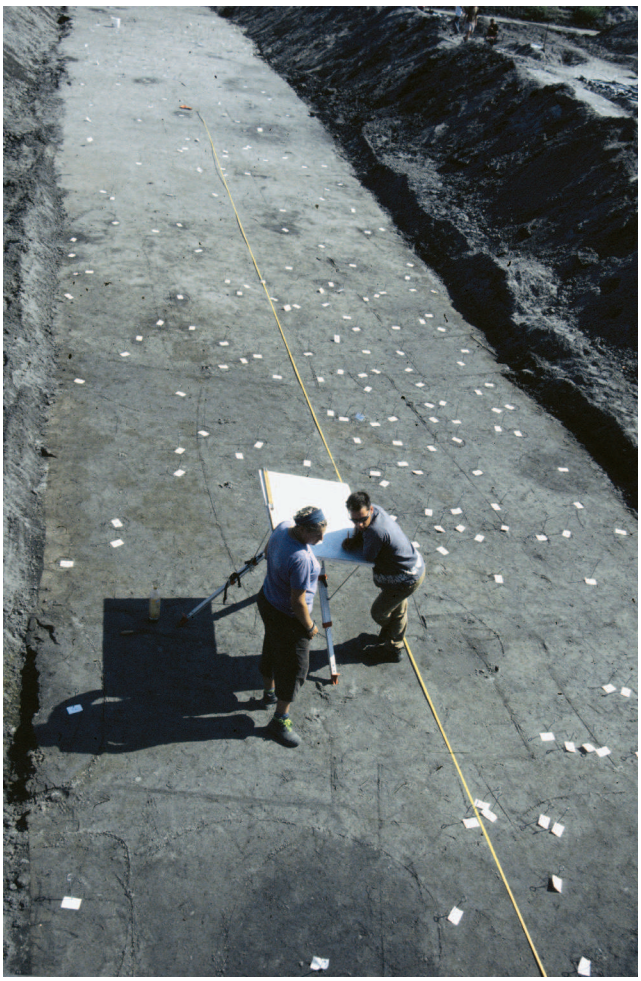

Figure 1.10 Recording of features, indicated by white labels, at level C.

involved alarmingly higher costs or necessitated restrictions in the excavation, which would have led to a qualitatively poorer final result.

One of the results of the cooperation between ARCHOL and the Leiden Faculty of Archaeology was that limits were on many occasions for scientific reasons exceeded in favour of the project. This was for example the case in the intrasite spatial analysis (chapter 4), the analyses of flint (chapter 7) and stone artefacts (chapter 8) and the coprolites analysis (chapter 17), but also in the preparation of the overall publication.

Some of the finds recovered in this excavation will be incorporated in the reference collections of the individual experts – *i.e.* finds that will be of use for future scientific research on account of their informational value.

Some of the wooden objects have been preserved by means of freeze-drying by the preservation and restoration laboratory of Archeoplan (Delft).

The entire set of records (analogue and digital), the categorised finds, the preserved and restored objects and all the reports written in the course of the research were on conclusion of the project filed in the depot of the provincial authorities of Zuid-Holland, where they can be consulted for further research.

1.4.7 The report

It was decided to divide the report into three main sections.

Two chapters were first to outline the site's chronological and spatial context, respectively, both independently of environmental and cultural-material factors. The spatial analysis was moreover to contain a fundamental assessment of the representativeness of the collected archaeological finds in relation to the employed recovery method. These chapters were to be followed by the reports of the specialist analyses, each based on its own research questions.

The second section, 'Man and materials', was to present the results of all the analyses of the artefacts and the burials, including those of the skeletal research. And the third section, 'Subsistence and environment', was to focus on the results of the geoscientific and biological research.

A final chapter was to synthesise the two sections, and to place the know-how and insights obtained in the research in the broader context of the early occupation of the Dutch and the development of early farming communities in the Lower Rhine area.

notes

1 In the excavation, the highest point was found to lie at -3.0 m, outside the explored area.

2 A remarkable number (four) of these dates (4040-3640 cal BC, 2 sigma) entirely predate the ^{14}C dates obtained for the samples taken in the excavation, while two others only just overlap in the two-sigma range (3900-3540). Three of these samples were charcoal from the test pit, the three others were charcoal from different depths in the stratifications on the western and southeastern sides.

3 The archaeological indicators (small pieces of charcoal, bone, flint and pottery) from borings are not representative of the rich archaeological remains of larger dimensions.

4 KNA = Dutch Archaeology Quality Standard (http://www.archinsp.nl/publicaties/KNAUK.pdf).

5 The field codes of these levels were 1-11 (A), 50 (B), 70 (C), 90 (D).

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Appendix

1.1 The project staff.

Design team		
C.W. Koot	leader of the AHR Archaeology Project Group	
Dr A.L. van Gijn	Faculty of Archaeology, Leiden University	
Dr L.I. Kooistra	BIAX Consult	
Prof. dr L.P. Louwe Kooijmans	Faculty of Archaeology, Leiden University	
Dr J.A. Mol	Faculty of Archaeology, Leiden University	
Prof. dr D.C.M. Raemaekers	Groningen Institute of Archaeology	
Dr J.T. Zeiler	Archeobone	
Excavation team		
Prof. dr L.P. Louwe Kooijmans	Faculty of Archaeology, Leiden University	scientific supervision
Dr P.F.B. Jongste	Archol BV	project leader
T.D. Hamburg	Archol BV	excavation leader
M.M. van den Bel	Archol BV	assistant excavation leader
S. Knippenberg	Archol BV	assistant excavation leader
Dr J.A. Mol	Faculty of Archaeology, Leiden University	physical geography
E. de Graaff	Archol BV	physical geography field assistant
M. Wansleeben	Faculty of Archaeology, Leiden University	automation design and supervision
M. Kappers	In Terris	automation
E. Smits	Smits Antropologisch Bureau	physical anthropology
R. van Beek	Archol BV	field technician
M. Hemminga	Archol BV	draughtsman
Y. Taverne	Archol BV	draughtsman, field technician
R. de Leeuwe	Archol BV	land surveyor
L. Bruning	Archol BV	find processing
D. Eijsermans	Archol BV	assistant find processor
Student assistants		
P. van den Bos	student assistant	
A. van Hilst	student assistant	
M. Pruijssen	student assistant	
R. Timmermans	student assistant	
ARCHOL B.V.		
C. Leeflang	director	
S.M. van Roode	member of office staff	
Other specialists involved in the project		
Prof. dr D.C.M. Raemaekers	Groningen Institute of Archaeology	pottery
M. Rooke	Groningen Institute of Archaeology	pottery
Dr L.I. Kooistra	BIAX Consult	wood
Dr L. Kubiak-Martens	BIAX Consult	botanical macroremains
Dr A.L. van Gijn	Faculty of Archaeology, Leiden University	artefacts of stone, flint and bone
Prof. dr J. Boon	FOM Institute AMOLF	chemical analysis
Prof. dr C.C. Bakels	Faculty of Archaeology, Leiden University	pollen analysis
Dr J.T. Zeiler	Archaeobone	archaeozoological remains
Dr H. de Wolf	Netherlands Institute for Applied Geosciences	diatoms
T. Hakbijl	Zoological Museum, University of Amsterdam	insects
W. Kuijper	Faculty of Archaeology, Leiden University	molluscs
Dr D.C. Brinkhuizen	Stichting Monument & Materiaal	fish remains
C. Vermeeren	BIAX Consult	coprolites
M. van Waijjen	BIAX Consult	coprolites

Figure 1.11 The excavation team. Front row from left to right: Caroline Leeflang, Liesbeth Smits, Eveline de Graaff, Leendert Louwe Kooijmans, Raf Timmermans, Roos de Leeuwe, Anne van Hilst, Sigrid van Roode, Maurits Pruijssen, Peter van den Bos. Rear row: Danny Eijsermans, Tom Hamburg, Sebastiaan Knippenberg, Michiel Kappers, Peter Jongste, Lauren Bruning, Yvonne Taverne, Minja Hemminga, Martijn van den Bel, Roy van Beek, Milco Wansleeben, Joanne Mol.

Figure 1.12 The final weeks' student field team celebrating the excavation of 'the last square'.